Minnesota WeatherTalk Newsletter for Friday, January 3, 2014

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, January 3, 2014

HEADLINES
-December 2013 was climate near historic for northern communities
-Cold start to 2014
-Weekly Weather potpourri
-MPR listener questions
-Almanac for January 3rd
-Past weather
-Outlook

Topic: December 2013 near historic for far north

In assessing the climate for December 2013 it should be said that from the standpoint of cold temperatures the month was quite historic for many northern Minnesota communities, especially due to the Arctic cold that prevailed over the last few days of the month. Minnesota reported the coldest temperature in the 48 contiguous states thirteen times during the month, the highest frequency among all 48 states. Many northern observers saw overnight temperatures drop below -30 degrees F on several occasions. The mean monthly temperature for December from several communities ranked among the coldest Decembers ever. A sample listing includes:
-4.1 F at International Falls, 2nd coldest all-time
4.6 F at Duluth, 8th coldest all-time
0.1 F at Crookston, 3rd coldest all-time
-3.1 F at Roseau, 3rd coldest all-time
0.3 F at Park Rapids, 3rd coldest all-time
-4.4 F at Embarrass, 2nd coldest all-time
-4.1 F at Baudette, coldest all-time
-3.7 F at Warroad, coldest all-time
-2.9 F at Babbitt, coldest all-time
-2.8 F at Gunflint Lake, coldest all-time

In addition, some communities reported an exceptionally snowy month of December. For Two Harbors it was the snowiest December ever with 55.2 inches, while Duluth reported its 3rd snowiest with 39.9 inches, and International Falls its 4th snowiest

with 26.4 inches. Wolf Ridge along the north shore of Lake Superior in Lake County reported its 2nd snowiest December with 46.3 inches.

Topic: Cold start to 2014

Continuing the trend from late December, New Years Day brought record cold to many Minnesota communities for the start of 2014. In fact Minnesota reported the coldest temperature in the 48 contiguous states on the first two days of 2014. International Falls began New Years morning with a new record low of -39 degrees F, while Babbitt reported a record low of -41 degrees F and Embarrass a record low of -43 degrees F. Then on Thursday, January 2, 2014 yet more new low temperature records were reported including -42 degrees F at International Falls, -47 degrees F at Embarrass and Babbitt, -44 degrees F at Crane Lake, -43 degrees F at Brimson, and -40 degrees F at Isabella, Kabetogama, and Bigfork. Though not record-setting many other observers throughout northern and central Minnesota reported -30 degrees F or colder on January 2nd.

The reading of -47 degrees F at Embarrass and Babbitt is the coldest temperature anywhere in Minnesota since January 15, 2009 when Babbitt reported -48 degrees F. Minnesota has not seen temperatures of -50 degrees F or colder since January 17, 2005 when a few climate stations reported -50 degrees F or colder (-54 F at Embarrass back then). The National Weather Service is calling for near historic cold temperatures to prevail across Minnesota over Sunday through Tuesday (Jan 5-7) before temperatures moderate near normal late next week.

On New Years Eve NOAA's Climate Prediction Center revised the outlook for the month of January 2014 calling for the entire Great Lakes Region, including Minnesota, to see cooler than normal temperatures for the month. Thus, a continuation of the weather pattern that has prevailed in December is expected for most sections of the state.

Topic: Weekly Weather Potpourri

Tropical Cyclone Bejisa was spinning in the Southern Indian Ocean this week off the eastern coast of Madagascar. Its winds were up to 120 mph producing sea waves of 30-35 feet. It was bringing damaging winds, heavy rains, and high seas to France's La Reunion Island, where there were widespread power outages, uprooted trees, and damaged homes. Bejisa was expected to dissipate at sea by early next week and not be a threat to Madagascar.

The NOAA National Weather Service in California recently released a report on the drought year of 2013. It was the driest year of record for many California locations

including Sacramento, Fresno, Los Angeles, and Yosemite. Furthermore it appears that the dry pattern that dominated in 2013 will carry on through at least early 2014. You can find more information on the dryness of the California climate at NWS-Hanford web site...

http://www.wrh.noaa.gov/hnx/

A paper published in the journal Nature this week estimates that global temperatures will change by 2100 by 3 to 5 degrees C based on better resolution of rising temperature effects on the Earth's cloud systems. Better model resolution and prediction of cloud systems has previously been an obstacle to improving global climate models. You can read more about this paper at...

http://www.sciencedaily.com/releases/2013/12/131231094442.htm

MPR listener question: Since last month brought the coldest December since 2000, as well as one of my highest home heating bills, I wondered how often is December the coldest month of the winter season in the Twin Cities area? I will bet it is not very often.

Answer: Examining the climate record of the Twin Cities over the past 142 years it appears that in only 24 winters (17 percent of the time) was December the coldest month. So you are right. The majority of the time January is the coldest month.

Twin Cities Almanac for January 3rd:

The average MSP high temperature for this date is 21 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 4 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for January 3rd:

MSP weather records for this date include: highest daily maximum temperature of 46 degrees F in 1880; lowest daily maximum temperature of -12 degrees F in 1919; lowest daily minimum temperature is -26 degrees F in 1887; highest daily minimum temperature of 33 F in 1992; record precipitation of 0.76 inches in 1906; and a record 9.0 inches of snow fell on this date in 1906. Maximum snow depth on this date was 19 inches in both 1969 and 1970.

Average dew point for January 3rd is 6 degrees F, with a maximum of 34 degrees F in 2006 and a minimum of -42 degrees F in 1919.

All-time state records for January 3rd:

The state record high temperature for this date is 53 degrees F at Canby (Yellow Medicine County) in 1998. The state record low temperature for this date is -54 degrees F at Pokegama Dam (Itasca County) in 1904. State record precipitation for this date is 1.90 inches at St Cloud (Stearns County) in 1897; and state record snowfall for this date is 15.5 inches at Willmar (Kandiyohi County) in 1943.

Past Weather Features:

January 3, 1912 was the coldest ever statewide, with temperatures as cold as -27 degrees F at St Charles. At least ten northern Minnesota communities reported a temperature of -40 degrees F or colder, and the daytime high at Long Prairie was only -19 degrees F, marking one of their coldest days in history. The Cold Wave dominated Minnesota over the first two weeks of January 1912 keeping temperatures consistently below 0 degrees F in many places.

The first three days of the New Year in 1943 brought heavy, persistent snowfall to many parts of the state. Western and central Minnesota observers reported 10 to 18 inches of snowfall to begin the year.

January 3, 1998 was perhaps the warmest in state history as most central and southern Minnesota communities enjoyed daytime temperatures in the 40s F. In western Minnesota residents of Pipestone and Canby watched the thermometer climb into the 50s F. Temperatures plummeted into the single digits and teens again by the 4th of the month.

Word of the Week: Z-R relationships

This is a term used in radar meteorology and refers to the empirical relationship between the power of the reflected signal from a radar (Z), in units of dBZ (decibels relative to Z, droplet volume and droplet size), and rainfall rate at the ground (R); many relationships exist, depending on the degree of convection, presence of ice and assumed rain drop distribution. Basically this is how meteorologists can in the absence of rain gage reports, estimate rainfall amounts from accumulated radar returns.

Outlook:

Blizzard and windchill warnings may still be in effect for parts of the state on Saturday as an Arctic air mass moves down from the north bringing falling temperatures. Very cold temperatures and dangerous windchills will prevail on

Sunday and Monday as well. Some moderation in temperature toward normal seasonal values may occur by next Thursday and Friday. The week ahead looks mostly dry.

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 10, 2014

MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, January 10, 2014

HEADLINES
-Measures of cold
-Sound from the soil
-Weekly Weather potpourri
-MPR listener questions
-Almanac for January 10th
-Past weather
-Outlook

Topic: Measures of cold

Certainly 2014 has started out cold, not only for us here in Minnesota but for the entire eastern half of the nation as well. New record low temperatures (some in the single digits F) were reported this week in Georgia, Tennessee, Kentucky, North Carolina, Alabama, Virginia, New York, and several other states. Among the consequences water pipes froze, airports were plagued by delays and cancellations, and gardens and crops were damaged.

Minnesota reported the coldest temperature in the nation 7 of the first 10 days of January, with lows ranging from -35 degrees F to -47 degrees F. These lowest temperatures in the nation to start the year included:
Jan 1 -43 F at Embarrass
Jan 2 -47 F at Babbitt
Jan 3 -36 F at Embarrass
Jan 5 -40 F at Babbitt and Embarrass
Jan 6 -37 F at Babbitt
Jan 7 -35 F at Brimson
Jan 9 -35 F at Brimson

Further, since December 10, 2013, Minnesota has reported the coldest temperature in the nation 20 times according to NOAA. So far in January 15 Minnesota observers have reported low temperatures of -40 degrees F or colder. Babbitt (-41 degrees F), Embarrass (-43 degrees F), and International Falls (-39 degrees F) all began the New Year with record low temperatures on January 1st. Subsequently more record lows

were observed on January 2nd and 3rd as well (-47 degrees F at Babbitt). Then near record windchill conditions prevailed across the state on Sunday (January 5) and Monday (January 6) with values ranging from -50 F to -60 F in many places. Grand Marais reported a windchill reading of -63 degrees F briefly early on January 6th. Governor Dayton cancelled K-12 public schools in the state that day because of the dangerous windchill conditions. Along with dangerous windchill conditions on Sunday, January 5th Roseau reported a high temperature of just -20 degrees F which was a new record cold maximum temperature for the date, and on Monday, January 6th St Cloud reported a high of only -15 degrees F which tied the historical record for the coldest daytime high on that date (from 1912) as well.

Despite the large geographic scale of this Arctic Outbreak of cold and the fact that Minnesota more often than any other state was the coldest place in the USA during the first week of the year, no new state record cold temperatures were observed, as the statewide record low temperature values over the first 9 days of January range from -46 degrees F to -55 degrees F.

On our web site you can read a synopsis of the cold start to January 2014 compiled by Pete Boulay of the Minnesota State Climatology Office by going to.....

http://www.climate.umn.edu/doc/journal/arctic_blast140105_07.htm

Topic: Sound from the soil

This week there were reports out of Wisconsin of ice quakes, sometimes known as frost quakes or cryoseims. They may be quite sudden and loud, a bit like a sonic boom. This effect is produced by saturated soils or pools of water in underlying rocks that freeze due to extremely cold temperatures and the freezing action causes a sudden expansion of the soil and rock, almost like a concussion wave moving through the ground.

Certainly we had a roller coaster ride in temperatures across the region to start January, with a widespread thaw on Saturday (temperatures ranging from mid to upper 30s F in southern MN), followed by an Arctic freeze-up Sunday and Monday (temperatures dropping into the -20 to -40 degrees F range). Soil temperatures, even with snow cover to protect them, fell into the teens F in many areas.

Topic: Weekly Weather Potpourri

Highlights from the weekly drought update given by Brad Rippey of the USDA:
-During the four-week period ending on January, 7, 2014, U.S. drought coverage increased nearly three percentage points to 33.22%. Drought coverage had fallen to

annual low of 30.28% on December 10, 2013; that figure represented the smallest drought coverage since December 27, 2011. Most of the recent increase in U.S. drought coverage has been due to a lack of cold-season precipitation in the West. Western drought concerns are most acute in those areasincluding Californiamoving deeper into a third consecutive year of drought.

Tropical Cyclone Ian formed in the Western Southern Pacific Ocean this week east of Fiji and south of Pago Pago. It strengthened by mid-week producing winds up to 110 mph and sea wave heights of 20-25 feet. It is expected to move south and stay away from any land areas before dissipating early next week. Tropical Cyclone Colin was also being monitored in the Southern Indian Ocean, but it was expected to remain out to sea and not a threat to land.

While much of the USA shivered this week in the cold, many parts of Brazil were sizzling in the heat. Coastal regions of Brazil saw temperatures climb into the 90s F with very high dewpoints. These conditions caused the Heat Index to rise as high as 120 degrees F placing a great deal of stress on people and animals. You can read more about this at...

http://www.ydr.com/nation-world/ci_24869794/zoo-animals-get-iced-treats-brazil-swelters

MPR listener question: Babbitt, MN was reported to be the coldest place in the USA on Monday, January 6th with a reading of -37 degrees F. It was also reported that this temperature was colder than the temperature on planet Mars in recent days. Can this be true?

Answer: The answer is yes, based on our limited amount of temperature data from Mars. According to the Rover Environmental Monitoring Station aboard NASA's Rover craft Curiosity on the surface of Mars, recent temperatures there have ranged from -20 degrees F of -121 degrees F. Bear in mind that seasonally it is the month of June on Mars with nearly a 12 hour day length where Curiosity is roaming the surface, and that the equator to pole temperature differences can be very large, as well as the day to night range in temperature. If you want to follow Martian weather you can use this web site....

http://marsweather.com/

Twin Cities Almanac for January 10th:

The average MSP high temperature for this date is 22 degrees F (plus or minus 13 degrees F standard deviation), while the average low is 5 degrees F (plus or minus 14 degrees F standard deviation).

MSP Local Records for January 10th:

MSP weather records for this date include: highest daily maximum temperature of 49 degrees F in 1990; lowest daily maximum temperature of -14 degrees F in 1912; lowest daily minimum temperature is -30 degrees F in 1886; highest daily minimum temperature of 33 F in 1928; record precipitation of 1.13 inches in 1975; and a record 4.0 inches of snow fell on this date in 1975 and 1976. Maximum snow depth on this date was 18 inches in both 1969.

Average dew point for January 10th is 3 degrees F, with a maximum of 39 degrees F in 1980 and a minimum of -39 degrees F in 1982.

All-time state records for January 10th:

The state record high temperature for this date is 58 degrees F at Madison (Lac Qui Parle County) in 1990. The state record low temperature for this date is -52 degrees F at Pokegama Dam (Itasca County) in 1905. State record precipitation for this date is 2.12 inches at Grand Portage (Cook County) in 1975; and state record snowfall for this date is 15.0 inches at Brainerd (Crow Wing County) in 1983.

Past Weather Features:

The all-time coldest January 10 in state history occurred in 1912. Thirteen Minnesota communities reporting low temperatures of -40 degrees F or colder. Most daytime highs only made it into the negative teens, while Angus (Red River Valley) reported an all time cold maximum temperature of -26 degrees F. It was all part of the great Arctic Outbreak of January 1912 which brought day after day of below zero F temperatures.

One of the worst blizzards of the 20th Century struck Minnesota over January 10-12, 1975. Called at the time "The Storm of the Century" this system brought unusual low pressure (28.55 inches at Duluth) and associated high winds (gusts from 50-80 mph). Across central and northern counties 20 or more inches of snowfall produced drifts up to 20 feet closing many highways. Near Willmar a passenger train was stalled by snow for hours with 168 people on board. There were 35 deaths associated with the storm, but the National Weather Service was praised for its timely forecasts and warnings.

The warmest January 10 in state history occurred in 1990 when most communities saw afternoon temperatures climb into the 40s F and several western and southern communities reached the 50s F. In fact some citizens took their lunch breaks outside that day to enjoy the warm sunshine.

Outlook:

Moderating temperatures over the weekend (20s and 30s F) with a chance for mixed precipitation in places nearly every day. Continued moderation next week as well, with temperatures near seasonal normals and chances for mixed precipitation.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, January 17, 2014

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, January 17, 2014

HEADLINES
-Significant January snows
-Visited by windchill and blizzard conditions
-New climate outlook
-Weekly Weather potpourri
-MPR listener questions
-Almanac for January 17th
-Past weather
-Outlook

Topic: Significant January snows

Sunday brought a surge of warm, moist air into the state. Many communities saw the thermometer reach the 40s F on Sunday afternoon, topped by 43 degrees F at Ottertail, 44 degrees F at Winona, and 45 degrees F at Cass Lake. Later on Sunday night freezing drizzle and significant snowfall began to occur.

In fact, Monday through Thursday (Jan 13-16) brought the first significant snowfalls of the month for many Minnesota weather observers. A number of climate stations reported 4 or more inches of new snowfall this week. Among the higher snowfall reports were: 5.0 inches at Lake City, 5.5 inches at Grand Marais, Red Wind, and Elk River, 6.0 inches at Wabasha, 6.1 inches at Forest Lake, 7.0 inches at Afton, 7.2 inches at Minnesota City, 9.0 inches at Isabella, and 10 inches at Lutsen. Amounts of new snowfall in western Wisconsin were generally higher, ranging from 7-12 inches. Yet more snowfall is expected off and on through the weekend and into the Martin Luther King holiday.

Topic: Visited by windchill and blizzard conditions

Strong winds ranging from 30-50 mph on Tuesday (Jan 14) combined with falling temperatures caused the National Weather Service to issue windchill advisories, especially in western counties. Continued strong winds combined with moderate snowfall brought the need for blizzard warnings in central and western counties on both Wednesday and Thursday. A number of counties reported whiteout conditions

with zero visibility for driving. A number of Minnesota highways were closed for a time due to zero or very low visibility and development of large snow drifts.

Topic: New climate outlook

The NOAA Climate Prediction Center released new seasonal outlooks on Thursday (Jan 16). For the Western Great Lakes Region, including Minnesota the outlook for February through April calls for cooler than normal temperatures. This continues the trend established during the previous months of November, December, and January. There are equal chances for above or below normal precipitation during the February through April period across our region. You can find more on this at....

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

This outlook concurs with that from Environment Canada, except that the Canadian outlook favors above normal snowfall for northern Minnesota counties over the next three months. You can find more information at...

http://weather.gc.ca/saisons/det_e.html

Topic: Weekly Weather Potpourri

Brad Rippey, USDA meteorologist, reported some further facts about California's extreme drought in 2013....." California's driest year on record (2013) featured an average of 7.37 inchees of precipitation, 33 percent of normal. By comparison 1976 was a "garden year" with 11.87 inches (3rd driest on record). Number two was 1898 .....with an average of 9.90 inches. On the flip side, an average (precipitation) of 42.33 inches fell in 1983 (an El Nino year)."

Melbourne, Australia suffered through a 3-day Heat Wave this week with daytime temperatures peaking at 111 degrees F. The persistent heat caused a suspension of play at the Australian Open Tennis Tournament. Fortunately following some thunderstorm activity, cooler temperatures are expected to prevail there, putting temperatures in the 60s and 70s F for the next several days.

According to a NOAA press release there were 7 weather/climate disasters which produced at least $1 billion in losses during 2013. This was down from 11 such disasters which occurred in 2012. For a listing of these events, you can go to their web site....

http://www.ncdc.noaa.gov/billions/events

The NOAA web site also offers an explanation of the Polar Vortex and its role in atmospheric circulation. Because the cold wave suffered earlier this month was related to an unusual displacement of the Polar Vortex this article might be of interest to several readers. You can find it at...

http://www.climate.gov/news-features/event-tracker/wobbly-polar-vortex-triggers-extreme-cold-air-outbreak

A recent paper published in the New Phytologist by research biologists at Boston University shows that trees and shrubs of Walden Pond leaf out about 18 days earlier than they did when Henry David Thoreau made his observations there in the 1850s. This is a measure of climate change for the Concord, MA area. You can read more about this study and what it means for invasive species at...

http://www.sciencedaily.com/releases/2014/01/140113114756.htm

MPR listener question: Can you settle a bet with my neighbor? He says we have never seen a 70 degrees F temperature reading in Minnesota during January, but I swear I remember such a day back in the early 1980s? What does the data show?

Answer: No official thermometer reading in Minnesota's rich climate history has ever reached 70 degrees F in January. The closest we have measured officially is 69 degrees F at Montevideo (Chippewa County) on January 24, 1981. I suppose that some "unofficial thermometers" may have registered 70 degrees F that day. By the way that reading at Montevideo was 45 degrees F above normal for the date!

Twin Cities Almanac for January 17th:

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 4 degrees F (plus or minus 15 degrees F standard deviation).

MSP Local Records for January 17th:

MSP weather records for this date include: highest daily maximum temperature of 44 degrees F in 1894; lowest daily maximum temperature of -12 degrees F in 1962; lowest daily minimum temperature is -26 degrees F in 1967; highest daily minimum temperature of 35 F in 1876; record precipitation of 0.90 inches in 1996; and a record 5.1 inches of snow fell on this date in 1932. Maximum snow depth on this date was 20 inches in both 1970.

Average dew point for January 17th is 5 degrees F, with a maximum of 39 degrees F in 1973 and a minimum of -37 degrees F in 1962.

All-time state records for January 17th:

The state record high temperature for this date is 58 degrees F at Winona (Winona County) in 1889). The state record low temperature for this date is -52 degrees F at Tower (St Louis County) in 1982. State record precipitation for this date is 2.20 inches at Byron (Olmsted County) in 1996; and state record snowfall for this date is 15.0 inches at Fort Ripley (Crow Wing County) in 1870.

Past Weather Features:

January 16-17, 1870 brought a widespread blizzard to Minnesota. Visibility was near zero even in downtown St Paul. Snowfall amounts ranged from 8 to 15 inches, but the winds blew snow into drifts of 8 to 10 feet.

January 15-19, 1919 brought one of the mildest mid-January spells of weather in Minnesota history. Daytime temperatures climbed into the 40s F as far north as Warroad. In the southern part of the state observers at Luverne, Worthington, and Fairmont reported temperatures in the 50s under sunny skies and light south winds. Most of the Minnesota landscape had little or no snow cover

January 17, 1982 was the coldest in state history. At least 20 Minnesota communities reported a low temperature of -40 degrees F or colder. Cook reported -50 degrees F, while Tower reported -52 degrees F. The windchill conditions that day were quite dangerous, ranging from -35 to -55 degrees F.

January 17, 1996 brought an ice storm to central Minnesota, including the Twin Cities. Ice accumulations ranged from 1/2 inch to 1 inch thick on power lines and trees. Power outages were widespread affecting over 200,000 residents. In western and northern counties blizzard warnings were issued and a number of schools and businesses were closed.

Outlook:

Partly cloudy, breezy, and a chance for occasional snow on Saturday, especially in southern Minnesota counties. Generally dry on Sunday under partly cloudy skies. Colder Monday through Wednesday next week, then some moderating temperatures toward the end of the week, but still cooler than normal.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, January 31, 2014

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, January 31, 2014

HEADLINES
-Snow Trouble on the 30th
-Preliminary Climate Summary for January 2014
-Weekly Weather Potpourri
-MPR listener questions
-Almanac for January 31st
-Labrador Keratopathy
-Past weather
-Outlook

Topic: Snow Trouble on January 30th

A winter storm brought 1 to 6 inches of snowfall to many portions of east-central MN and west-central WI on Thursday, January 30th, causing a great deal of traffic accidents and very slow commuting. At one time snowfall rates were measured at 2 inches per hour. Some observers reported record amounts of snowfall for the date including 6.4 inches at MSP, 6.2 inches at Red Wing, 5.5 inches at Northfield, and 4.5 inches at Hastings. Fortunately by 2:00 pm the snow had stopped and skies began to clear, but snow emergencies were declared in the Twin Cities.

Topic: Preliminary Climate Summary for January, 2014

January 2014 will be remembered as cold and snowy in most places. Climate observers reported mean monthly temperatures that ranged from 7 to 10 degrees F colder than normal, ranking among the 4-5 coldest Januarys of the past 35 years. Extreme values of temperature for the month ranged from -47 degrees F at Babbitt on the 3rd to 44 degrees F at several locations on the 13th. At least a dozen observers reported a monthly minimum temperature value of -40 degrees F or colder, while Minnesota reported the coldest temperature in the nation on 19 days during the month, more than any other state. The month was made colder by the wind, as there were numerous days when the National Weather Service had to issue Windchill Advisories or Warnings. Winds gusted to 30 mph or higher on 11 days. Some of the windchill readings compiled by Pete Boulay of the State Climatology Office included:

-63 degrees F at Grand Marais Airport on the 6th (-48 F in the Twin Cities)
-50 degrees F at Duluth on the 7th
-51 degrees F at Park Rapids on the 23rd (-37 F in the Twin Cities)
-53 degrees F at Grand Marais Airport on the 27th (-39 F in the Twin Cities)
-52 degrees F at Fosston on the 28th

According to the State Climatology Office the median number of days each winter when the windchill warning criteria (-35 F or colder) is reached is three times. The National Weather Service had to issue four windchill warnings for the Twin Cities so far this winter.

Snowfall for the month of January was normal to above normal in most areas of the state. Those observing stations reporting 20 or more inches included Tofte, Isabella, MSP, and Red Wing. A characteristic of January 2014 was the frequency of measurable snowfalls. MSP reported 13 days with measurable snowfall, while International Falls reported 17 days with measurable snowfall.

Topic: Weekly Weather Potpourri

The United Kingdom Meteorological Office reports this week a record wet January for portions of southeastern and central England. Rainfall totals have been over twice normal in many areas and up to over 7 inches in places. Portions of Wales have seen their wettest January since 1995 with up to 9 inches of rainfall. More information can be found at...

http://www.metoffice.gov.uk/news/releases/archive/2014/Early-January-Stats

Tropical Cyclone Dylan passed over Queensland, Australia this week bringing strong winds and heavy rainfall. Dylan delivered up to 18 inches of rainfall over the community of Mackay causing much localized flooding and a good deal of coastal erosion in some places.

The University of Waterloo in Canada released a new study last week analyzing changing climate and its impact on the ability to host the Winter Olympics. The study found that a number of cities previously used and suited for hosting the Winter Games will no longer be eligible to host these events because of their changing climate character later this century. You can read more about this paper at...

http://www.sciencedaily.com/releases/2014/01/140123075709.htm

MPR listener question: My son says we'll have 20 nights this month with below 0 F temperatures in the Twin Cities and that this is well above average. I disagree. It used

to be this way all of the time. What is the historic average number of nights with below 0 F temperatures in the Twin Cities?

Answer: Give your son credit, he is correct. The historical average for nights below 0 F during January in the Twin Cities is 12 (based on 145 years of climate data). If you are of an older generation you are probably remembering Januarys like 1950, 1963, 1966, 1977, and 1982 when we saw well over 20 nights fall below 0 F.

Twin Cities Almanac for January 31st:

The average MSP high temperature for January 31 is 22 degrees F (plus or minus 13 degrees standard deviation), while the average low is 4 degrees F (plus or minus 14 degrees standard deviation).

MSP weather records for January 31st include: highest daily maximum temperature of 46 degrees F in 2009; lowest daily maximum temperature
of -9 degree F in 1887; lowest daily minimum temperature of -27 degree F in 1887; highest daily minimum temperature of 34 degrees F in 1993; record rainfall of 1.16 inches in 1881; and record snowfall of 6.2 inches in 1908. Maximum snow depth has been 23 inches in 1969.

Average dew point for this date is 4 degrees F, with a maximum of 35 degrees F in 1989 and a minimum of -33 degrees F in 1985.

All-time state records for January 31st:

Scanning the state climatic data base: the all-time high for this date is 57 degrees F at Springfield (Brown County) and Lamberton (Redwood County) in 1989; the all-time low is -55 degrees F at Embarrass and Tower (St Louis County) in 1996; record precipitation is 1.70 inches at Glenwood (Pope County) in 1986; and record snowfall is 14.8 inches at Burlington Township (Becker County) in 1858.

Word of the Week: Labrador Keratopathy

Sometimes referred to as a type of snow blindness, Labrador keratopathy is a degeneration in the cornea of the eye caused by exposure to excessive UVB radiation. A number of years ago Canadian doctors found a relatively high incidence of this problem in Labrador, specifically in people who live around 55 to 56 degrees north latitude. This portion of NE Canada has a longer lasting and a more extensive season of snow cover than other countries at a similar latitude (the United Kingdom for example). Residents in this part of Canada are exposed to relatively higher amounts of UVB radiation as a result of reflectance off the snow cover. At lower latitudes, snow

cover is not as long-lasting, while at higher latitudes the reduced day length and excessively cold temperatures keep residents indoors more of the time and limit their exposure to UVB radiation.

Past Weather Features

A blizzard brought several inches of snowfall and strong winds to northwestern Minnesota over January 30-31, 1893. The temperature at Park Rapids dropped from 15 degrees F to -41 degrees F overnight, and over four consecutive nights minimum temperatures were -30 degrees F or colder.

The warmest end of January occurred in 1989 when over the 30th and 31st most climate stations reported daytime highs in the 40s under sunny skies. Over 25 communities in western and southern Minnesota saw afternoon temperatures climb into the 50s F.

By far the coldest end of January in state history occurred in 1996 as Arctic high pressure visited the state. Following a moderate to heavy snowfall over the 28th and 29th temperatures began to plummet statewide, with numerous locations falling to -30 degrees F or colder. On the 31st several observers reported morning lows of -40 degrees F or colder, and Fosston reported a high temperature that afternoon of only -23 degrees F. Two days later the statewide low temperature record of -60 degrees F was set at Tower, MN.

Outlook:

Continued colder than normal temperatures into the weekend with a chance for snow on Saturday in eastern sections. Another chance for snow next Tuesday as well. The first two weeks of February a pattern of colder than normal temperatures and less chances for snowfall should prevail.

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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the News main page) or the main Extension search (upper right of this page) to locate more recent information.

Minnesota WeatherTalk Newsletter for Friday, February 7, 2014

To: MPR's Morning Edition
From: Mark Seeley, Univ. of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, February 7, 2014

HEADLINES
-Perspectives on the cold winter
-Weekly Weather potpourri
-MPR listener questions
-Almanac for February 7th
-Past weather
-Outlook

Topic: Perspectives on the cold winter

On last Sunday, February 2nd, Groundhog's Day, it was reported that Groundhog Phil saw his shadow, indicating six more weeks of winter. And where was the coldest place in the USA on Groundhog's Day? Embarrass, MN with -38 degrees F. Most citizens responded "enough already!" It has been a cold, snowy winter for many in the eastern half of the northern USA, including Minnesota. Read more at....

http://www.washingtonpost.com/blogs/capital-weather-gang/wp/2014/02/02/groundhog-day-2014-punxsutawney-phil-sees-shadow-6-more-weeks-of-winter/?tid=pm_pop

One of the most significant measures of this winter is the "persistence" of cold temperatures, with only brief respites of above normal temperatures. Since December 1st, 2013 nearly 70 percent of all days have brought colder than normal temperatures to Minnesota. There are several other "indicators" of how cold this winter has been:

A preliminary climate summary shows that Minnesota recorded the 4th coldest December-January combination in history (back to 1895) with a statewide average temperature of 3.8 degrees F, about 8 degrees F colder than normal. The only colder combinations of December-January were in 1917-1918 (1.4 F), 1976-1977 (1.7 F), and 1978-1979 (2.7 F). Neighbor Wisconsin also recorded its 4th coldest December-January combination with a statewide average temperature of 8.5 degrees F, also about 8 degrees F colder than normal. The only colder combinations of December-January temperatures in Wisconsin were 1976-1977 (5.2 F), 1917-1918 (6.6 F), and 1919-1920 (7.4 F).

Despite consistent snow cover, frost depth in the soil has progressed downward, even more so where snow cover is thin. Some reported frost depths from around the state:
St Paul Campus 18 inches
Waseca 25 inches
Morris 28 inches
Crookston 36 inches
Lamberton 44 inches

Since December 1, 2013 Minnesota has reported the coldest temperature in the nation 35 times, including twice already in February. This is a higher frequency than any other state, including Alaska which reported its mildest December-January combination since the winter of 2000-2001.

As of Friday, February 7th the Twin Cities reports 40 days with a low temperature of 0 degrees F or colder. This is the largest number of such temperatures since the winter of 1981-1982. So, a whole generation of Twin Cities residents have never experienced persistent cold of this kind. The last time the number of days with minimum temperature of 0 degrees F or colder exceeded 50 during winter in the Twin Cities was 1977-1978 when 53 such readings were reported. You can read more about this from Pete Boulay in the State Climatology Office at...

http://www.dnr.state.mn.us/climate/journal/at_or_below_zero_13_14.html

The Duluth Office of the National Weather Service reports that as of February 7th, Duluth has recorded 19 consecutive days with minimum temperature readings below 0 degrees F. If this pattern persists until Monday, February 10th, the historical record for consecutive days with low temperatures below 0 degrees F will be tied, 22 days, which occurred in 1936 and 1963. The forecast for Duluth suggests that overnight lows will remain below 0 degrees F into early next week. You can read more at...

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=dlh&storyid=100188&source=0

MPR's chief meteorologist Paul Huttner will help from Dr. Jay Austin of the Large Lakes Observatory in Duluth wrote about the extent of ice cover on Lake Superior in a recent Updraft blog. It appears the lake is nearly completely ice covered and has the most ice in 18 years. With continued cold temperatures Lake Superior may become as ice-covered as it was in 1979. There is a great deal of fast ice anchored to the shoreline that extends out through shallow waters. You can read more at...

http://blogs.mprnews.org/updraft/2014/02/polar-vortex-winter-lake-superior-freezes-over-a-month-early/

Further the cold winter has made the ice caves along the Apostle Islands in Wisconsin more accessible, and many people are going out to see them, as reported by MPR.....see

http://minnesota.publicradio.org/display/web/2014/02/05/regional/lake-superior-ice-cave-photos

Our energy bills are also impacted by the cold weather. Many communities in the state are reporting the highest number of Heating Degree Days (aggregate sum of mean daily temperatures below 65 F) for the period November 1 to January 31 since the winters of 1995-1996 and 1996-1997. This statistic is likely reflected in your large heating bill.

Greg Spoden, Minnesota's State Climatologist notes that even by the standards of Embarrass, MN it has been a cold winter. Observer Roland Fowler of Embarrass reports 23 nights with temperatures of -30 degrees F or colder this winter, compared with an average of just 9.

Topic: Weekly Weather Potpourri

The National Weather Service Office in Grand Forks, ND has issued a summary of the winter blizzard season so far. Their office has issued 5 blizzard warnings so far this winter for eastern ND and northwestern MN, all five being associated with ground blizzards due to very strong winds. The climatology of blizzards there shows an average of just two blizzards each winter. You can read more about this at...

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=fgf&storyid=100243&source=0

Two Tropical Cyclones were being monitored this week in the Southern Indian Ocean. Tropical Cyclone Edilson was near La Reunion east of Madigascar. It was producing wind gusts over 75 mph and sea wave heights of 15-20 feet, but it was expected to remain out to sea and dissipate by the middle of next week. Another tropical cyclone was south of Diego Garcia and expected to strengthen with winds up to 80 mph and sea wave heights of 15-20 feet.

This week's national drought assessment from Brad Rippey of the USDA included the following headlines:
-During the four-week period ending on February 4, 2014, U.S. drought coverage increased more than four percentage points to 37.38%. Drought coverage had fallen to 30.28% on December 10, 2013; that figure represented the smallest drought coverage since December 27, 2011.

-In addition, U.S. coverage of the two most serious drought categoriesextreme to exceptional (D3 to D4) droughtnearly doubled in the last four weeks from 4.13 to 7.37%. That change was driven by deteriorating conditions in California. During the four-week period ending February 4, California's coverage of extreme to exceptional drought surged from 27.59 to 67.13%. California also experienced its first-ever coverage of exceptional drought (D4) in the nearly 15-year history of the U.S. Drought Monitor, beginning on January 28. By February 4, nearly one-tenth (9.81%) of California was considered to be in D4.

Wednesday, February 5th was National Weatherperson's Day, commemorating the first official weather observations in America in 1744. This day honors the men and women who collectively provide the country with weather data, forecasts, and warnings to inform and protect us. You can read more about this history of this day at....

http://www.crh.noaa.gov/lsx/?n=wxmanday

Weather conditions have been fine for the start of the Sochi Winter Olympic Games in Russia, with seasonal temperatures and bright, sunny skies. The mountain terrain for the skiing events boasts over 6 feet of snow. Weather disturbances early next week may disrupt some of the outdoor events as snowfall with moderate winds moves across the area. You can learn more at....

http://www.bbc.com/weather/features/26087202

MPR listener question: There have been reports this winter about the deep and abiding cold perhaps increasing the mortality of forest insects like the Emerald Ash Borer (-30 degrees F or colder) and the pine bark beetle (-40 degrees F or colder), but what about agricultural pests? Do you think some of them will be set back by this cold winter?

Answer: Most agricultural insects that overwinter in Minnesota are well adapted to climate conditions here according to University of Minnesota entomologists. Secondly, many of these species overwinter in the soil or in the vegetation of hedgerows and field boundaries. These environments are protected by snow cover as insulation, so the risk of exposure to lethal temperature conditions is reduced. However, there may be some higher mortality inflicted on certain agricultural pests this winter. For example soybean aphid eggs, often laid on common buckthorn or other vegetation may be exposed to the lethal temperatures we have had so far this winter. Temperatures colder than -29 degrees F are lethal to soybean aphid eggs, and certainly many places in Minnesota have seen temperatures that cold this winter.

Twin Cities Almanac for February 7th:

The average MSP high temperature for this date is 23 degrees F (plus or minus 13 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 7th:

MSP weather records for this date include: highest daily maximum temperature of 53 degrees F in 1987; lowest daily maximum temperature of -14 degrees F in 1933; lowest daily minimum temperature is -29 degrees F in 1875; highest daily minimum temperature of 36 F in 1925; record precipitation of 0.94 inches in 1928; and a record 4.1 inches of snow fell on this date in 2001. Maximum snow depth on this date was 22 inches in 1967.

Average dew point for February 7th is 5 degrees F, with a maximum of 38 degrees F in 1965 and a minimum of -32 degrees F in 1972.

All-time state records for February 7th:

The state record high temperature for this date is 62 degrees F at Browns Valley (Traverse County) and Madison (Lac Qui Parle County) in 1987. The state record low temperature for this date is -53 degrees F at Leech Lake Dam (Cass County) in 1899. State record precipitation for this date is 1.75 inches at Lynd (Lyon County) in 1928; and state record snowfall for this date is 14.0 inches at Campbell (Wilkin County) in 1946.

Past Weather Features:

A snow storm dropped 9 inches of snow at Ft Snelling on February 7, 1857 and 14 inches at Princeton, MN. The winter of 1856-1857 was one of the coldest and snowiest of the 19th Century in Minnesota.

On a statewide basis the coldest February 7th in history occurred in 1933. Twenty Minnesota communities saw the thermometer drop to -40 degrees F or colder, and a few places fell to -50 degrees F. The high temperature at St Peter that day was -14 degrees F, same as the Twin Cities. The below 0 F weather lasted until February 10 when the temperatures finally climbed into the teens and twenties F.

The warmest February 7th in state history occurred in 1987 when over 70 Minnesota communities saw the mercury climb to 50 degrees F or greater. Dozens of observers

reported reach 60 degrees F as well. It was 50 degrees F as far north as Walker and Itasca State Park, with little snow on the ground.

Outlook:

Partly cloudy skies and cold over the weekend, with a chance for snow in the south on Saturday. Continued cold until Wednesday when temperatures will start to moderate closer to normal and there will be an increased chance for snow.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, February 14, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota Extension, Department of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, February 14, 2014

HAPPY VALENTINE'S DAY

HEADLINES
-Below 0 F nights ending?
-Measurable February snowfall
-Frost depths
-Weekly Weather potpourri
-MPR listener questions
-Almanac for February 14th
-Past weather
-Outlook

Topic: Below 0 F nights ending?

For the Twin Cities the count of nights with 0 degrees F or lower temperatures stands at 44 for the current winter season (since December 1st), the most since the winter of 1981-1982. A string of 17 consecutive days with minimum temperatures of 0 degrees F or lower was observed from January 26 to February 11, the 8th longest such streak in the Twin Cities climate records. But this may be the end of temperatures of 0 degrees F or below with the possible exception of early this weekend (Fed 15). All of the forecast and outlook models suggest more moderate temperatures for the rest of the month. Some other counts of days with 0 degrees F or colder this winter for other cities include:

St Cloud 52 days (most since 1981-1982)
Duluth 58 days (most since 1964-1965)
Rochester 42 days (most since 1978-1979)
International Falls 65 days (most since 2008-2009)

The National Weather Service in Duluth reported a record string of consecutive days with below 0 degrees F minimum temperatures, spanning January 20 to February 11, a period of 23 days. In addition, Roland Fowler, observer at Embarrass, MN reports that the minimum temperature there has reached -30 degrees F or colder on 28 days so

far this winter season. This frequency of low temperatures of -30 degrees F or colder during any given winter is exceptional in Minnesota history. There have only been 8 historical winters that have produced at least 25 days with daily minimum temperature readings of -30 F or colder: 1898-1899 (25 days at Pokegama Dam); 1911-1912 (25 days at Detroit Lakes); 1916-1917 (28 days at Roseau); 1921-1922 (25 days at Fort Ripley); 1935-1936 (26 days at Big Falls); 1964-1965 (25 days at Cotton); 1993-1994 (28 days at Tower); and 1995-1996 (33 days at Embarrass).

More reviews of winter data in Minnesota can be found at...

http://www.dnr.state.mn.us/climate/journal/at_or_below_zero_13_14.html
http://www.dnr.state.mn.us/climate/journal/coldest_winters.html

Topic: First significant snowfall of February

For many Minnesota climate observers the first measurable snowfalls of the month occurred this week over February 11-13. Generally total amounts were less than 1 inch, but a few places received more, and some reported new daily record amounts on the 13th including Duluth with 5.6 inches, Kabetogama with 5.8 inches, Cook with 5.0 inches, and Moose Lake with 4.8 inches. Snowfall on February 13 along the north shore of Lake Superior caused numerous traffic accidents. Some of the larger accumulations of snowfall this week were 4.6 inches at International Falls, 5.2 inches at Orr, 5.5 inches at Lutsen, 6.0 inches at Eveleth, 6.5 inches at Two Harbors, and 7.5 inches at Embarrass. It looks like snowfall may be more significant for the second half of February across the state.

Topic: Frost depths

Over the past week there were many reports of frozen water lines in residential areas. The persistent cold has produced deeper than normal frost penetration into the ground. Where snow cover has been thin the ground frost has gone deeper than 40 inches. Minnesota Department of Transportation notes that under roads and pavement some of their measurements show frost at 6 feet or deeper. Near Ottertail, MN frost was measured at 95 inches (nearly 8 feet), and in the Rochester area there were reports of a number of frozen water lines this week. For many parts of Minnesota frost depth has not been this deep since the 1970s.

Topic: Weekly Weather Potpourri

The Climate Research Unit at the University of East Anglia announced earlier this month the availability of global temperature records using Google Earth. This allows

access to the temperature records of 6000 weather stations, some of which go back to 1850. You can find more information on this data set and how to access it at...

http://www.cru.uea.ac.uk/cru/data/crutem/ge/

States in the Deep South, along the MId-Atlantic seaboard, and the northeast were impacted by a major winter storm this week. The storm brought mixtures of rain, sleet, snow, and freezing rain which took down power lines and brought power outages to hundreds of thousands of citizens. Traffic accidents occurred in very high numbers, and there were thousands of flight cancellations at major airports. Some of the states affected included LA, FL, SC, NC, AL, GA, VA, NY, MA, CT, and PA. The National Weather Service was given credit for accurately forecasting the storm ahead of time to allow communities to prepare.

Following a very wet January, more flooding rains and high winds plagued parts of the United Kingdom this week, closing schools and railroad lines, and causing traffic snarls. In some areas hurricane force winds accompanied the heavy rains on Wednesday (Feb 12), and yet more heavy rains are expected on Valentine's Day before the weekend.

MPR listener question: When is the last time the Twin Cities has set a new daily record low temperature reading? Has the "urban heat island" made it more difficult to set record lows?

Answer: The threaded Twin Cities daily climate record goes back to 1871, so our record daily values cover a period of over 140 years. The last time the Twin Cities registered a new record daily minimum temperatures was 36 degrees on September 15, 2011. Since the year 2000 \, the Twin Cities have only reported 5 new record daily low temperatures. Conversely, over the same time period, the Twin Cities have recorded 60 new record daily maximum temperatures, and 89 new record daily high minimum temperatures. So emphatically the "urban heat island" effect is in play when it comes to the Twin Cities climate record, along with climate change as well.

Side note: With one of the coldest winters in some decades taking place this year, other Minnesota communities, less impacted by an "urban heat island" effect have reported several new daily record minimum temperatures. There were 92 such reports in the month of December, 34 reports in January, and just 2 reports so far in February. Minnesota has reported the coldest temperature in the nation on 40 dates so far this winter.

Twin Cities Almanac for February 14th:

The average MSP high temperature for this date is 25 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 8 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for February 14th:

MSP weather records for this date include: highest daily maximum temperature of 50 degrees F in 1882; lowest daily maximum temperature of -5 degrees F in 1920; lowest daily minimum temperature is -25 degrees F in 1875; highest daily minimum temperature of 33 F in 2002; record precipitation of 0.43 inches in 1950; and a record 6.4 inches of snow also fell on this date in 1950. Maximum snow depth on this date was 21 inches in 1979.

Average dew point for February 14th is 11 degrees F, with a maximum of 42 degrees F in 1954 and a minimum of -33 degrees F in 1946.

All-time state records for February 14th:

The state record high temperature for this date is 66 degrees F at Windom (Cottonwood County) in 1954. The state record low temperature for this date is -47 degrees F at Bagley (Clearwater County) in 1906. State record precipitation for this date is 2.15 inches at Lynd (Lyon County) in 1919; and state record snowfall for this date is 22.0 inches at Grand Marais (Cook County) in 1936.

Past Weather Features:

February 14, 1906 brought Arctic cold to northern Minnesota. Twenty communities reported a minimum temperature of -30 degrees F or colder, while Bagley (-47 F), Detroit Lakes (-45 F), and Bemidji (-38 F) set cold temperature records that still stand for the date. The next day, February 15, 1906 the temperature warmed at Bagley by 70 degrees F, rising to an afternoon high of 23 degrees F.

On February 14, 1923 the famous "Black Dust Blizzard" came to an end in western Minnesota. It had lasted for three days, closing schools and isolating families on their farms. Winds of 50 mph had picked up soil in the Dakotas and deposited this with the snow that fell across western MN counties, some in huge drifts. At least 20 people lost their lives in this storm.

A major winter storm crossed the state over February 13-14, 1936 bringing 5 to 10 inches of new snow to many central and northern communities. Greatest snowfall amounts were along the north shore of Lake Superior where Two Harbors reported 10

inches, Pigeon River reported 20 inches, and Grand Marais reported 22 inches of new snow. February of 1936 was the coldest in state history.

By far the warmest Valentine's Day in state history was in 1954. Numerous daily high temperature records were set that February 14th as most observers reported afternoon temperatures in the 40s and 50s F. One of the few occasions when florists could deliver unwrapped flower arrangements for Valentines in Minnesota, that day brought even 60 degrees F to some southern communities under bright sunny skies, and with no snow cover.

Outlook:

Colder than normal with a chance of snow on Saturday, slightly warmer and mostly dry on Sunday. Another chance for snow, sleet, and rain with warmer temperatures on Monday. Warming trend continues much of next week, with another chance for mixed precipitation on Thursday.

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Minnesota WeatherTalk Newsletter for Friday, February 21, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, February 21, 2014

HEADLINES
-Record snows on President's Day
-More record snows and precipitation on Feb 20-21
-Update on cold at Embarrass, MN
-New Seasonal Outlooks
-Weekly Weather potpourri
-MPR listener questions
-Almanac for February 21st
-Past weather
-Outlook

Topic: Coping with a long winter

As we face the final stages of this long hard winter in Minnesota, I was inspired to see these words from the writer Victor Hugo:

"laughter is the sun that drives winter from the human face."

This is a winter that we can be thankful for laughter. I know that I saw many more smiles when the temperature finally touched 40 degrees F two days in a row this week in the Twin Cities. At least that gave us a bit of a respite.

Topic: Record snows on President's Day

President's Day, Monday, February 17th brought widespread snowfall to the state, and in some cases daily amounts were record-setting for the date. Those observers who reported new daily record amounts of snowfall on that date included:
8.0 inches at Cook
6.6 inches at Grand Rapids
6.0 inches at Duluth, Embarrass, and Ely
5.2 inches at Willmar
5.0 inches at Faribault and Brimson
4.9 inches at MSP airport
4.5 inches at Redwood Falls and Granite Falls

4.3 inches at St Cloud
3.6 inches at Rochester
3.5 inches at St James

In addition to the snowfall records a few observers reported daily precipitation records (melted snow) ranging from 0.30 to 0.50 inches. On a statewide basis, most observers reported measurable precipitation on February 17th, and this was arguably the most significant winter storm of February so far.

Topic: More record snow and precipitation on Feb 20-21

A second, more formidable winter storm crossed the state over February 20-21 bringing rain, heavy snowfall to some areas, and blizzard conditions to southern counties which closed a number of roads and highways. It was the largest and most widespread heavy snowfall for these dates since 1953 for many areas. There were power outages and school closures as a result of this storm as well. Though the storm started later in the day on Thursday, February 20th some new daily record amounts of precipitation and snowfall were reported by several observers. Some examples are:
0.99 inches of precipitation and 8.8 inches of snowfall at Rochester
1.06 inches of precipitation and 10.9 inches of snowfall at Duluth
0.67 inches of precipitation and 9.0 inches of snowfall at Princeton

With the overnight continuation of the storm, some record setting values of precipitation and snowfall were also reported on the morning of February 21st. Some examples are:
0.88 inches of precipitation and 8.0 inches of snowfall at Faribault
1.05 inches of precipitation and 7.7 inches of snowfall at Zumbrota
0.65 inches of precipitation and 9.0 inches of snowfall at Albert Lea
1.12 inches of precipitation and 13.8 inches of snowfall at Wright
0.71 inches of precipitation and 14.0 inches of snowfall at Babbitt
0.91 inches of precipitation and 11.7 inches of snowfall at Floodwood

With two significant storms this week, some of the climate observers in Minnesota are showing very large monthly totals for snowfall in February. In the northeast counties Cook has reported 32.9 inches and Isabella has reported 34 inches of snow so far this month.

Topic: Update on record cold season at Embarrass

Earlier this week Embarrass reported lows of -31 degrees F on back to back days, February 16-17. These were also the coldest readings in the nation. Daily minimum temperatures of -30 degrees F or colder have been measured there on 30 days since

December 1, 2013, marking the coldest winter since at Embarrass since records began in 1994. They have also reported 7 days with low temperature readings of -40 degrees F or colder. After reporting a low of -31 degrees F on Monday this week (Feb 17), the temperature rose to 39 degrees F on the 18th, a rise of 70 degrees F, and their warmest temperature since November 20, 2013! That same day Grand Rapids, MN rose to 46 degrees F, also their warmest reading since November 20, 2013.

Topic: New Seasonal Climate Outlook

On Thursday, February 20, the NOAA Climate Prediction Center (CPC) issued a new seasonal climate outlook. The new outlook favors cooler than normal temperatures to dominate the Great Lakes Region over the period of March through May. This obviously includes Minnesota. If this outlook validates then Minnesota will record 7 consecutive months with cooler than normal temperatures (since November, 2013), the first time we have seen this level of cooler than normal temperature persistence since 1995-1996, when 9 consecutive months were cooler than normal (Sep 1995 to May 1996).

The outlook for spring precipitation is a bit confounding. The CPC calls for equal chances of above or below normal precipitation over the three months from March to May, yet they also see some drought alleviation for the drier areas of the state which did not benefit as much from autumn rainfall recharge. You can look at their outlook products at...

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

Topic: Weekly Weather Potpourri

The National Weather Service in Grand Forks, ND released an earlier spring flood outlook this week. Bottom line is there is a moderate spring flood potential along the main stem of the Red River between ND and MN. These conditions may be modified by the precipitation pattern that emerges for March and April. You can read more details on their web site at....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=fgf&storyid=100595&source=0

The Minnesota DNR updated the Winter Severity Index (WSI) for white tailed deer. This is a stress index based on the number of days with a low temperature of 0 degrees F or lower and a snow depth of 15 inches or greater. Northeastern Minnesota counties show the highest WSI so far this winter, with values over 140. You can look at the update on our web site at...

http://files.dnr.state.mn.us/recreation/hunting/deer/wsi_cty_map14.pdf

Tropical Cyclone Guito was spinning in the Mozambique Channel of the Southern Indian Ocean west of Madagascar this week. It was gaining strength with wind speeds over 100 mph and sea wave heights of 20-25 feet. It was expected to move south away from land over the weekend and then dissipate.

By providing hour by hour forecasts the United Kingdom Meteorological Office recently assisted in the evacuation of 75 workers from oil and gas platforms in the North Sea. It hss been an especially stormy winter for oil and gas platform operations in the North Sea. Winds at times have exceeded 65 mph and wave heights have exceeded 35 feet at times.

A recent study from the University of Wisconsin published in Geophysical Research Letters documents a lowering of average sea level atmospheric pressure in the Arctic region, and an associated increased frequency of extreme Arctic cyclones (low pressure systems), which accelerates the erosion of Arctic coastlines. You can read more about this article at...

http://www.sciencedaily.com/releases/2014/02/140218100707.htm

MPR listener question: I know that February is not known as a snowy month in Minnesota. But what has been the snowiest February historically?

Answer: The snowiest February in the Twin Cities record is 1962 with 26.5 inches. On a statewide basis two communities have reported 40 or more inches of snowfall in February: Worthington received 40 inches in 1962, while Lutsen received 47.4 inches in 2001.

Twin Cities Almanac for February 21st:

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 11 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for February 21st:

MSP weather records for this date include: highest daily maximum temperature of 59 degrees F in 1930; lowest daily maximum temperature of -1 degrees F in 1963; lowest daily minimum temperature is -21 degrees F in 1873; highest daily minimum temperature of 44 F in 1930; record precipitation of 0.82 inches in 1882; and a record

5.5 inches of snow fell on this date in 1962. Maximum snow depth on this date was 27 inches in 1967.

Average dew point for February 21st is 13 degrees F, with a maximum of 52 degrees F in 1930 and a minimum of -33 degrees F in 1963.

All-time state records for February 21st:

The state record high temperature for this date is 64 degrees F at Whitewater (Winona County) in 1943. The state record low temperature for this date is -51 degrees F at Meadowlands (St Louis County) in 1939 and at Baudette (Lake of the Woods County) in 1966. State record precipitation for this date is 1.50 inches at Albert Lea (Freeborn County) in 1969; and state record snowfall for this date is 15.0 inches at Northfield (Rice County) in 1882.

Past Weather Features:

One of the worst February blizzards in state history occurred over February 21-23, 1922 bringing rain, sleet, freezing rain, and snow across the state. A severe ice storm caused power outages and tree damage in southeastern Minnesota counties. Winds up to 40 mph blew snow into 3-4 foot drifts in western Minnesota. Little Falls, Milaca, Detroit Lakes, and Meadowlands all reported over 20 inches of snowfall.

Following a large winter snow storm over February 19-20, the coldest ever February 21st in state history occurred in 1939, when the high temperature at Detroit Lakes rose no higher than -10 degrees F. In northern Minnesota 14 communities saw the thermometer drop to -40 degrees F or colder. The cold temperatures moderated by February 25th, but February of 1939 was the 7th coldest in state history.

A big winter storm over February 20-21, 1953 dumped from 6 inches to 17 inches of snowfall across southern Minnesota. It was one of several major snow storms to affect the state in February of 1953.

The warmest February 21st in state history occurred in 1981. Statewide most observers reported sunny skies and afternoon temperatures from the mid 40s F to mid 50s F. Over a dozen communities reached the 60s F, and in some places farmers were planting small grains just to see how such early planting dates would fare.

Outlook:

Mostly cloudy and cold over the weekend. Generally dry and cold next week with temperatures averaging several degrees F colder than normal, and a number of below 0 F nights, finishing off an exceptionally cold month of February.

Further Information:

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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 28, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, February 28, 2014

HEADLINES
-Preliminary climate summary for February
-Measures of this cold winter
-Weekly Weather potpourri
-MPR listener questions
-Almanac for February 28th
-Past weather
-Outlook

Topic: Preliminary climate summary for February

Most observers in Minnesota reported average February temperature that ranged from 10 to 12 degrees F colder than normal, ranking among the 8 coldest months of February on a statewide basis since 1895, and the coldest since 1979. For the month, only four days delivered above normal temperatures. The extreme values for the month were 49 degrees F at Forest Lake on the 18th and -38 degrees F at Embarrass on the 2nd. Over February 6, 9, 11, 27, and 28 many new daily record low minimum and maximum temperature values were set across the state including a new reocrd low of -36 degrees F at International Falls on the 27th and -37 degrees F at Orr on the 28th. Minnesota reported the coldest temperature in the nation (excluding Alaska) on 13 days during the month. As a result of the persist cold frost depths in the ground ranged from 3 to 7 feet deep, depending on the level of snow cover.

Except for portions of northwestern Minnesota, most observers in Minnesota reported above normal precipitation during February, with the most significant winter storm event over February 20-21. A majority of observers reported between 1 and 2 inches of precipitation. Most of this precipitation fell as snow, ranging up to 20 or more inches in eastern counties. New record monthly snowfall was reported from Cook (36.1"), Isabella (34"), Babbitt (33.3"), Embarrass (29.5"), Tower (29.3"), and Orr (26.8"). Unusual snow depths were reported by the end of the month in Cook County, with 37 inches at Grand Marais, and 36 to 48 inches along the Gunflint Trail.

In addition, high winds (greater than 30 mph) created blowing and drifting snow and poor visibility on several days during February. A number of blizzard warnings were

issued. Many sections of Minnesota roads and highways benefited from the use of living and constructed snow fences, which trapped snow and kept it off the roads.

Topic: Measures of this cold winter

For the meteorological winter (Dec-Feb), persistent cold and snow cover have been the themes across Minnesota. On a statewide basis it is the coldest winter since that of 1978-1979 and will likely end up among the top 5 coldest historically. Some measures of the cold winter season include:

65 days with below 0 F minimum temperature at Duluth, including a record string of 23 consecutive days from January 20 to February 11
70 days with below 0 F minimum temperatures at International Falls
50 days with 0 F or colder minimum temperatures in the Twin Cities, over twice the historical average and the most since the winter of 1977-1978
32 days with minimum temperatures of -30 degrees F or colder at Embarrass, a state record
Minnesota has reported the coldest daily minimum temperature in the nation (excluding Alaska) 45 days, or half of the meteorological winter (Dec-Feb), and the most of any state
Speaking of Alaska, here is a comparison of the meteorological winter mean temperature values, and readings of -30 degrees F or colder for International Falls and Embarrass in Minnesota versus Fairbanks, Alaska for the winter of 2013-2014:

International Falls mean temperature for Dec-Feb -2.7 degrees F, with 15 days of minimum temperature of -30 F or colder
Embarrass mean temperature for Dec-Feb -5.5 degrees F, with 32 days of minimum temperature of -30 F or colder
Fairbanks, Alaska mean temperature for Dec-Feb -1.0 degrees F, with 12 days of -30 F or colder

This is perhaps the first time that portions of Minnesota have reported a colder meteorological winter than Fairbanks, Alaska.
More summaries of the meteorological winter in Minnesota can be found at....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=dlh&storyid=100693&source=0
http://www.dnr.state.mn.us/climate/journal/coldest_winters.html

Pete Boulay of the MN State Climatology Office notes that the Winter Misery Index for the Twin Cities has surpassed 180 points, the most since the winter of 1985-1986.

The Winter Misery Index is based on the accumulation of cold temperatures and snow cover. You can read more about it at...

http://www.dnr.state.mn.us/climate/journal/winter_misery_index_13_14.html

Topic: Weekly Weather Potpourri

Iowa State University this week released an analysis of the number of 24-hour days with temperatures below 0 degrees F across the region this winter. They present an interesting spatial depiction (map form) of the analysis and summarize that the frequency of below 0 F hours this winter has been from 1.5 to 3.0 times higher than average. For the Twin Cities the data show over 500 hours of below 0 degrees F so far this winter. Though not record-setting, it is an exceptionally high number. You can look at their analysis at...

http://mesonet.agron.iastate.edu/

The United Kingdom Meteorological Office issued an update on winter weather this week. It showed that the meteorological winter (Dec-Feb) is the wettest of record back to 1910. In fact for the England and Wales climate series that goes back to 1766 it is also the wettest winter ever, averaging over 17 inches of precipitation. Portions of Wales saw over 28 inches of precipitation this winter. You can read more at....

http://www.metoffice.gov.uk/news/releases/archive/2014/early-winter-stats

A new study from Dartmouth University published this month in the journal Geology documents that the loss of glacial ice in Peru is associated with temperature change and not lack of snowfall. Thus a warming climate is implicated as a driver in the shrinkage of tropical glaciers. You can read more about this paper at...

http://www.sciencenewsline.com/summary/2014022523240010.html

Comments from Brad Rippey of the USDA on the weekly drought assessment: "....a strong storm crossed the upper Midwest on February 20-21, delivered wind-driven snow. The latest storm, on top of several earlier systems, further boosted the upper Midwestern snowpack. Nearly every flake of snow that has fallen across the far upper Midwest this winter remains on the ground," Rippey says. "Although there are some uncertainties regarding how much of the moisture will run off and how much will soak in, the latest storm resulted in further reductions in the coverage of dryness and lingering drought (including MN).

The USA National Academy of Science and the Royal Society issued a new report recently entitled "Climate Change: Evidence and Causes." They also held a webinar to present their findings. The report suggests that climate change evidence is stronger than ever and coherent with the consequences being observed in many landscapes. You can find the report online at....

http://nas-sites.org/americasclimatechoices/events/a-discussion-on-climate-change-evidence-and-causes/

MPR listener question: From a listener near Marshall, MN, "in addition to being colder than normal, has this winter been windier than average as well?"

Answer: Certainly the past two months have. Examining the wind records from Redwood Falls for the meteorological winter (Dec-Feb) shows that the mean wind speed in December was 9.6 mph (ave is 11.1 mph), but there were 10 days with peak wind gusts of 30 mph or greater. For January the mean wind speed was higher than normal at 12.9 mph (ave is 11.9 mph), with 20 days of peak wind gusts of 30 mph or greater (60 mph on Jan 26th). In February the mean wind speed was higher than normal at 12.6 mph (ave is 11.4 mph), and there were 12 days with peak wind gusts of 30 mph or greater (49 mph on Feb 20th). At Marshall, MN specifically there have been peak wind gusts of 48 mph on Dec 28th, 58 mph on Jan 26, and 45 mph on Feb 20th.

Twin Cities Almanac for February 28th:

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 12 degrees F standard deviation).

MSP Local Records for February 28th:

MSP weather records for this date include: highest daily maximum temperature of 57 degrees F in 1932; lowest daily maximum temperature of -9 degrees F in 1962; lowest daily minimum temperature is -26 degrees F in 1962; highest daily minimum temperature of 38 F in 1882 and 1895; record precipitation of 0.70 inches in 2012; and a record 8.0 inches of snow fell on this date in 1907. Maximum snow depth on this date was 24 inches in 1962.

Average dew point for February 28th is 15 degrees F, with a maximum of 40 degrees F in 1983 and a minimum of -40 degrees F in 1962.

All-time state records for February 28th:

The state record high temperature for this date is 66 degrees F at Pipestone (Pipestone County) in 1924. The state record low temperature for this date is -50 degrees F at Pokegama Dam (Itasca County) in 1897. State record precipitation for this date is 2.21 inches at Isabella (Lake County) in 1998; and state record snowfall for this date is 16.5 inches at Gull Lake (Cass County) in 1948.

Past Weather Features:

An warm spell of winter brought record-setting high temperatures to many southern and western Minnesota communities over February 26-28, 1924. At least 20 communities saw daytime highs reach the 50s F under sunny skies. Some farmers were seen doing field work at the end of the month.

A strong winter storm crossed the state over February 27-28, 1948. The storm brought rain, freezing rain, sleet, and snow. Ice accumulations caused a great deal of tree damage and power outages. Heavy snowfall brought widespread road closures as well, and schools let out early on Friday the 27th. Many observers reported 8 to 10 inches of heavy, wet snow and some reported record amounts. Over a foot of snow fell at Walker, Duluth, Little Falls, Milan, Mora, Wadena, and Cambridge.

Following a late February snow storm, Arctic air invaded the state in 1962 for four days over February 27 to March 2nd. The coldest February 28th and March 1st in state history were recorded that year. Temperatures as cold as -36 degrees F at Luverne and -35 degrees F at Austin were reported. At least 15 Minnesota communities reported low temperatures of -40 degrees F or colder.

The most recent warm February 28th occurred in 2000 when dozens of observers reported daytime temperatures in the 50s F. It was 55 degrees F as far north as Detroit Lakes, while Madison, Milan, Luverne, Marshall, Windom, and Redwood Falls made it into the 60s F. It was a precursor to a very warm March of 2000, the 4th warmest in state history.

Outlook:

Continued very cold for this time of year into the weekend to start the month of March, with chances for snow in the south on Saturday. Some moderation in temperature with an increasing chance for snow by next Wednesday and Thursday as temperatures climb into the teens and twenties F (still cooler than normal).

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, March 7, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, March 7, 2014

HEADLINES
-Set your clocks ahead
-Cold start to March
-And record snowfall for some
-Weekly Weather potpourri
-MPR listener questions
-Almanac for March 7th
-Past weather
-Outlook

Topic: Set your clocks ahead

Don't forget to set your clock ahead one hour this Saturday night to get on Daylight Savings Time.....otherwise you'll be late for all your engagements on Sunday!

Topic: Cold start to March

After this winter why would March start any other way? Over the first 5 days of the month Minnesota reported the coldest temperature in the nation three times: -44 degrees F at Embarrass on the 2nd; -40 degrees F at Embarrass on the 3rd; and -31 degrees F at Babbitt on the 5th. Temperatures at most locations averaged 20 to 30 degrees F colder than normal over the first five days of the month. In addition several observers reported new daily record cold maximum temperatures and cold minimum temperatures over those 5 days. Some of the record values included:

March 1st:
Detroit Lakes record cold maximum temperature of -10 degrees F
St Cloud record cold maximum temperature of 0 degrees F
Roseau record cold maximum temperature of -14 degrees F, and record cold minimum of -28 degrees F
Baudette and International Falls record cold maximum temperatures of -9 degrees F
Park Rapids record cold maximum temperature of -8 degrees F
Babbitt record cold minimum temperature of -30 degrees F

Embarrass record cold minimum temperature of -32 degrees F
March 2nd:
Warroad record cold maximum temperature of -14 degrees F
Leech Lake record cold maximum temperature of -10 degrees F
St Cloud record cold maximum temperature of 3 degrees F
Park Rapids record cold minimum temperature of -30 degrees F
Cook record cold maximum temperature of -10 degrees F
Babbitt record cold maximum temperature of -8 degrees F, and record cold minimum temperature of -38 degrees F
Brainerd and Rochester record cold maximum temperature of -3 degrees F
Embarrass record cold maximum temperature of -7 degrees F, and record cold minimum temperature of -44 degrees F
Kabetogama record cold maximum temperature of -11 degrees F, and record cold minimum temperature of -27 degrees F
Isabella record cold maximum temperature of -7 degrees F, and record cold minimum temperature of -33 degrees F
March 3rd:
International Falls record cold minimum temperature of -33 degrees F
Babbitt record cold minimum temperature of -38 degrees F
Embarrass record cold maximum temperature of -12 degrees F, and record cold minimum temperature of -40 degrees F
Tower record cold minimum temperature of -38 degrees F
St Cloud record cold minimum temperature of -19 degrees F
Wright record cold maximum temperature of -4 degrees F, and record cold minimum temperature of -31 degrees F
Preston record cold maximum temperature of 0 degrees F, and record cold minimum temperature of -24 degrees F
Theilman record cold maximum temperature of 0 degrees F, and record cold minimum temperature of -26 degrees F
March 4th:
Babbitt record cold maximum temperature of -10 degrees F, and record cold minimum temperature of -38 degrees F
Cook record cold maximum temperature of -10 degrees F, and a record cold minimum temperature of -31 degrees F
Embarrass record cold minimum temperature of -40 degrees F
Floodwood record cold minimum temperature of -29 degrees F
Kabetogama record cold minimum temperature of -33 degrees F
Tower record cold minimum temperature of -37 degrees F
Brainerd record cold minimum temperature of -23 degrees F
Winona Dam record cold minimum temperature of -22 degrees F
March 5th:

Babbitt record cold minimum temperature of -31 degrees F
Crane Lake record cold minimum temperature of -27 degrees F

In addition to these records dozens of other cold daily maximum and minimum temperature records were set, before the temperatures began to moderate later in the day on March 5th. For many central and southern portions of Minnesota the below 0 degrees F readings are coming to an end this week, as no return of Arctic air is seen for the balance of this month.

Topic: And record March snowfall for some

Overnight on Tuesday-Wednesday (March 4-5) a fast moving snow storm cross portions of western and southern Minnesota bringing significant amounts of snow. A swath of moderate to heavy snow from Yellow Medicine County southeast to Houston County caused delays in school starts and business openings on Wednesday March 5th. Some observers in those areas of the state reported new record snowfall amounts for March 5th, including: 10.5 inches at Austin, 10 inches at Winnebago, 9.5 inches at St James, 9.3 inches at Marshall, 8 inches at Wells, 7.4 inches at Lamberton, 7 inches at Amboy, 6 inches at Lanesboro and Mankato, and 4.1 inches at Redwood Falls. In northwestern Minnesota strong winds (35-45 mph) brought blizzard warnings to some areas of the Red River Valley later in the day on March 5th, though snowfall amounts were generally light. The snow on the ground was blown around a good deal by strong winds causing visibility and drift problems.

Topic: Weekly Weather Potpourri

Excerpts from the weekly national drought update issued by Brad Rippey of the USDA-World Agricultural Outlook Board:
- During the four-week period ending on March 4, 2014, contiguous U.S. drought coverage decreased 1.53 percentage points to 35.85%. However, there was improvement in several regions, and deterioration in others. In general, reductions in drought coverage were noted during February and early March in the Midwest and Northwest, as well as the Gulf Coast region. Improvement in the Northwest extended as far south as northern California. However, California experienced an odd four-week period that featured record-setting warmth, bookended by brief stormy periods in early February and again as the calendar turned from February to March. Meanwhile, drought deterioration was noted across portions of the southern Plains and the Southwest. Continental U.S. coverage of the two most serious drought categories-extreme to exceptional (D3 to D4) droughtreached a cold-season peak of 7.65% on February 25 before falling back to 7.40% on March 4. The last time there was greater U.S. coverage of D3/D4 was September 10, 2013. The change was largely driven by worsening drought in California, with nearly three-quarters (73.83%) of the state

experiencing extreme to exceptional drought by February 25. With the late-February and early-March storminess, California's D3/D4 area fell back to 65.89% of the state by March 4.

NOAA is soliciting public comments relative to proposed changes in the icons used on National Weather Service Point Forecast Pages over their Internet sites. If you are a user of NOAA forecast products I encourage you to review these changes and comment by going to:

http://www.weather.gov/forecast-icons

Northern parts of South Africa were plagued by floods this week caused by unusual very heavy rains. Some observers there report over 10 inches of rain so far in March. Roads have washed out and businesses were closed due to flooding. The Kruger National Park, a popular tourist destination was also closed for a time. Yet more thunderstorms and rainfall are expected over the weekend.

A recent paper published in Environmental Research Letters documents that a more significant rate of warming temperatures may be seen later this century in Northern and Eastern Europe than elsewhere on the continent. This conclusion was derived from a modeling study which also revealed that much of Europe will be wetter in the future as well. You can read more about this study at...

http://www.sciencedaily.com/releases/2014/03/140306191524.htm

MPR listener question: How do current snow depths in northeastern Minnesota rank relative to historical extremes? There are many areas with over 30 inches of snow on the ground, including Duluth where we peaked out at 36 inches of snow depth last month.

Answer: Indeed you are correct to point out the deep snow in northeastern Minnesota. Though not record-setting it is rare to have snow depths over 40 inches, yet several observers have reported these amounts for this winter including 47 inches near Two Harbors, 43 inches at Isabella, 42 inches at Wolf Ridge and Babbitt, 41 inches at Cook, and 40 inches at Cloquet and Grand Marais. The measurement of 47 inches neat Two Harbors is the deepest snow there since they measured 51 inches in March of 1965. Similarly at Babbitt the reading of 42 inches is the most there since a snow depth of 52 inches in February of 1969. The state record by the way is a snow depth of 75 inches at Pigeon River Bridge in March of 1950.

Twin Cities Almanac for March 7th:

The average MSP high temperature for this date is 32 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 16 degrees F (plus or minus 12 degrees F standard deviation).

MSP Local Records for March 7th:

MSP weather records for this date include: highest daily maximum temperature of 73 degrees F in 1987 and 2000; lowest daily maximum temperature of 4 degrees F in 1932; lowest daily minimum temperature is -16 degrees F in 1960; highest daily minimum temperature of 45 F in 2000; record precipitation of 1.02 inches in 1874; and a record 11.5 inches of snow fell on this date in 1917. Maximum snow depth on this date was 23 inches in 1962.

Average dew point for March 7th is 13 degrees F, with a maximum of 58 degrees F in 2000 and a minimum of -25 degrees F in 1960.

All-time state records for March 7th:

The state record high temperature for this date is 80 degrees F at Winona (Winona County) in 2000. The state record low temperature for this date is -38 degrees F at Little Fork (Koochiching County) in 1913. State record precipitation for this date is 3.57 inches at Caledonia (Houston County) in 1959; and state record snowfall for this date is 22.7 inches also at Caledonia (Houston County) in 1959.

Past Weather Features:

A strong winter storm brought rain, freezing rain, sleet, and snow to Minnesota over March 7-8, 1950. Heavy ice in northwestern and west central communities brought down power and telephone lines as winds gusted to over 60 mph during the storm. A Northwest Airlines plane crashed in Minneapolis during the storm killing all 13 passengers as well as two people on the ground.

Probably the coldest March 7th in history occurred in 1955. Over a dozen communities reported a morning low temperature of -30 degrees F or colder. In the north Cass Lake saw their temperature warm up to only -3 degrees F during the afternoon, while the high temperature at Red Lake was just -5 degrees. Temperatures warmed into the 40s and 50s F for much of the remainder of the month.

In the absence of snow cover very warm temperatures visited the state over March 5-9, 2000. Over 100 Minnesota communities reported afternoon high temperatures of 70 degrees F or greater. Temperatures remained well above normal most of the month and March of 2000 was the 4th warmest in state history.

Outlook:

Sunny, but cooler than normal on Saturday with morning lows from single digits to the teens F. Increasing clouds on Sunday with warmer temperatures, reaching the 30s and 40s F in many places. Above normal temperatures may prevail in places on Monday and Tuesday, followed by increased chances for snow on later in the day on Tuesday, then cooler temperatures for Wednesday and Thursday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, March 14, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, March 14, 2014

HEADLINES
-Passing of Dr. Don Baker
-North shore snowfall
-ENSO developing
-Weekly Weather potpourri
-MPR listener question
-Almanac for March 14th
-Past weather
-Outlook

Topic: Passing of Dr. Don Baker: mentor and friend

Earlier this week Dr. Donald Baker passed away at age 90 having lived a rich and full life in the St Anthony Park neighborhood of St Paul, and as one of the most respected members ever of the University of Minnesota St Paul Campus community. He was a dear friend and mentor to many, including me. There would be no climate science nor would there be a Land and Atmospheric Science Graduate Program at the University of Minnesota but for the life long commitment and good work of Dr. Baker. In addition we would not have the significant state climate data base and knowledge of climate behavior in our state were it not for him.

Dr. Baker joined the university faculty in 1958 after earning all three of his degrees (B.S, M.S. Ph.D.) from the University of Minnesota. He established the St Paul Campus Climate Observatory in 1960 and later that decade helped establish the State Climatology Program. In the 1970s Don recruited me to join the faculty of the Department of Soil, Water, and Climate as Extension Climatologist at least partly because he grew weary of being a one-man climate program on the St Paul Campus. He became a trusted mentor to me, offering both praise and criticism (as needed) until I became a full professor in 1989.

Dr. Baker did the first comprehensive study and review of wind energy potential for the state and for this he was given a Governor's Award for Recognition in Science in 1984 by then Governor Rudy Perpich. I think about this every time I drive by a huge

wind turbine in the rural landscape. He also taught Governor Arne Carlson how to make a weather observation on Earth Day of 1992, an era in Don's career when he began to see signs of climate change in his data. Dr. Baker retired from the University of Minnesota in 1994 but he remained active and continued to publish studies up through the year 2002.

As I think about his life I should acknowledge that Dr. Baker was one of my primary role models. We all need role models to help us navigate through the many challenges of our lives. For my professional life, Don was my primary role model. He sought scientific truth rigorously and without compromise, but with a humble attitude. He was always honest and treated everyone fairly. His currency was respect: he expected it from you, but he offered it to everyone he met and with a gentleman's fashionable style (probably a reflection of his dear French wife Jacqueline). Dr. Baker will be remembered for his teaching and for his scientific contributions, but I will forever remember him as my role model.

Topic: North shore snowfall on March 12

A very localized snow storm on Wednesday, March 12 brought significant new snow to portions of Carlton and St Louis Counties in northeastern Minnesota. A number of observers reported amounts ranging from 1 to 5 inches. Much of this snow fell on ice from meltwater due to the thawing temperatures of earlier in the week, so roads and highways were slippery during the commuting hours of Wednesday morning. No daily snowfall records were set, but the seasonal accumulations of snowfall for the winter of 2013-2014 in this area of the state are getting to be large numbers. Some of the total snowfalls for the season include 89.5 inches at Duluth, 96 inches at Isabella, 104 inches at Tofte, 106 inches at Two Harbors, 88.5 inches at Babbitt, 87.6 inches at Cook, 84.7 inches at Grand Marais, 80 inches at Grand Portage, 79 inches at Kabetogama, 78.9 inches at Orr, 75.1 inches at Carlton, 71.7 inches at Cloquet, 70 inches at Grand Rapids, and 69 inches at Wright.

Topic: ENSO may form in 2014

The NOAA Climate Prediction Center weekly discussion of the El Nino Southern Oscillation this week highlighted an increasing probability for an El Nino episode to form during the summer months. There is slightly greater than a 50 percent probability that this will happen according to the suite of models used by the CPC. This would likely have little influence on summer weather patterns in the Western Great Lakes, but it may have influence over the fall and winter seasons later this year. You can find more discussion on this topic at....

http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/index.shtml

Topic: Weekly Weather Potpourri

Tropical Cyclone Lusi was slowly dissipating in the Southern Pacific Ocean south of Fiji this week. Peaks winds of 75-90 mph were producing sea waves between 20 and 25 feet, but the heaviest bands of rain showers were remaining over the oceans and not a threat to any land as this storm continues to die out.

Unusually heavy March snowfalls in the Kashmir Valley of northern India has produced significant avalanches in that region which have disrupted train service, damaged numerous villages and caused a number of deaths. Even where an avalanche did not occur, the heavy, wet snowfall was too much weight for some structures which collapsed. Moderate snowfall was expected there through the weekend.

With a dominance of cold weather this winter throughout much of the eastern half of the country, the NOAA Storm Prediction Center has reported little tornado activity so far in 2014 when compared to historical averages. For the first two and a half months of the year there have been only 49 reports of tornadoes, mostly through Illinois, Kentucky, Tennessee, Alabama, and Georgia. February 20, 2014 severe weather produced 34 of the 49 tornado reports for the year, and March has been a quiet month with respect to severe weather so far.

A paper published this week in Environmental Research Letters suggests that climate models are underestimating the emission of atmospheric pollutants from the African continent. Using a compilation of emission data derived from studies in 2005 the researchers estimated the expected pollution emissions in the year 2030 for three scenarios using various policy protocols for future emissions. They found that in the absence of any regulatory measures there may be errors in estimating future climate change over the continent because of underestimating the overall emission of pollutants from countries that compose the continent. You can read more about this at....

http://www.sciencedaily.com/releases/2014/03/140313092406.htm

A recently published study from the University of California-Sand Diego Scripps Institution of Oceanography describes the nature of a changing climate in the Amazon, Central America, and Indonesia that will lead to fewer days with rainfall in the future. Some areas will have up to 30 fewer days with rain as the nature and quantity of precipitation change with changing atmospheric patterns. You can read more about this at..

http://www.sciencedaily.com/releases/2014/03/140314095100.htm

MPR listener question: When was the last "Minnesota State tournament blizzard" of note?

Answer: In the context of the State Basketball Tournament season, the most recent "Tournament Snowstorm" was over March 22-23, 2011 when 4 to 7 inches of snow fell in the Twin Cities area. Previous to that storm was the now famous March 17-18, 2005 "Tournament Snowstorm" which brought 4 to 6 inches of snow to the Twin Cities and 10 to 20 inches of snow to southern counties. Historical probability for a significant (4 inches or greater) "Tournament Snowstorm" is about one year in every ten, but there have certainly been some memorable ones which caused disruption, power outages, and travel difficulties. Perhaps two of the most memorable were 1952 (10-15 inches of snow in the Twin Cities), and 1966 (10-14 inches of snowfall in the Twin Cities) when a huge winter storm caused power outages and school closures, including the University of Minnesota. You can read more about the history of "Tournament Snowstorms" at...

http://climate.umn.edu/doc/journal/tournament2012.htm

Twin Cities Almanac for March 14th:

The average MSP high temperature for this date is 36 degrees F (plus or minus 12 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 14th:

MSP weather records for this date include: highest daily maximum temperature of 73 degrees F in 2012; lowest daily maximum temperature of 8 degrees F in 1906; lowest daily minimum temperature is -10 degrees F in 1897; highest daily minimum temperature of 48 F in 2012; record precipitation of 0.81 inches in 1989; and a record 9.0 inches of snow fell on this date in 2002. Maximum snow depth on this date was 26 inches in 1962.

Average dew point for March 14th is 21 degrees F, with a maximum of 57 degrees F in 1990 and a minimum of -16 degrees F in 1960.

All-time state records for March 14th:

The state record high temperature for this date is 74 degrees F at Rochester (Olmsted County) in 2012. The state record low temperature for this date is -40 degrees F at

Detroit Lakes (Becker County) in 1897. State record precipitation for this date is 2.20 inches at Fort Ripley (Crow Wind County) in 1852; and state record snowfall for this date is 18.0 inches at Grand Marais (Cook County) in 1917.

Past Weather Features:

A severe blizzard was noted at both Fort Ripley and Fort Snelling over March 14-16, 1855. This storm brought an inch or more of precipitation and several inches of snowfall buried the fort grounds.

March 14-16, 1870 brought a severe blizzard to northern Iowa and southwestern Minnesota, with some observers reporting 16 inches of snowfall and huge drifts. This storm inspired the first use of the term blizzard which appeared in the Estherville, Iowa Vinda\icator Newspaper. The U.S. Army Signal Corps did not adopt the use of this term to describe a storm until 1876.

March 14, 1897 was the coldest in state history with over 30 communities reporting morning low temperatures of -20 degrees F or colder. Some western and northern areas started the day at -30 degrees F or colder and remained below 0 F all day. Bemidji reported a daytime high of only -13 degrees F.

March 13-14, 1917 brought a blizzard and heavy snowfall, especially to eastern sections of Minnesota. Snowfall accumulations ranged from 10 to 20 inches in many places, with Duluth reporting 21 inches. Roads and schools were shut down for a week. This storm followed an exceptionally severe winter, as many seasonal snowfall records were set around the state. Duluth received over 48 inches of snowfall in March of 1917.

March 14, 2012 was the warmest in state history. Over 70 Minnesota communities reported new record daily high temperatures, with several readings of 70 degrees F or higher during a sunny afternoon. March of that year proved to be the warmest in state history with 80 degree F temperatures reported on St Patrick's Day.

Outlook:

Cooler than normal over the weekend, with a chance for snow in the south. Very cold Sunday morning but more sunshine. Temperatures will warm on Monday and Tuesday but there will be an increased chance for snow and mixed showers, especially southern portions of the state. Some snowfall accumulations may be significant. Cooler and drier by Thursday and Friday.

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 21, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, March 21, 2014

HEADLINES
-Minnesota's reputation for cold continues
-Significant snow this week
-Spring climate outlook
-Weekly Weather potpourri
-MPR listener question
-Almanac for March 21st
-Past weather
-Outlook

Topic: Minnesota's reputation for cold continues

Since last Friday Minnesota has reported the coldest temperature in the contiguous states of the USA two more times: -15 degrees F at Crane Lake on Saturday, March 15; and -27 degrees F at Crane Lake, Babbitt, and Embarrass on Sunday, March 16th. In fact, Sunday the 16th brought record daily low temperatures to several northern Minnesota climate observers, including -27 degrees F at Babbitt and Crane Lake, -23 degrees F at International Falls, Ely, and Isabella, -21 degrees F at Orr and Kabetogama, -19 at Grand Portage, and -18 degrees F at Cook. These exceptionally cold temperatures gave way to moderating tempertures on St Patrick's Day.

Topic: Significant snow this week

A relatively narrow band of heavy snow crossed the state over March 18 and 19 this week, bringing amounts ranging from 2 to 8 inches across central portions of the state. Some observers reported new record daily amounts, including 9.5 inches at Onamia, 8 inches at Collegeville, Dawson and Little Falls (tied record from 1908); 7.2 inches at Pine City and Madison; 7.0 inches at Benson, 6.2 inches at Milan; 5.0 inches at Marshall and 4.5 inches at Kimball. Some even larger amounts of snow fell in eastern South Dakota and northwestern Wisconsin. Water content of the snow ranged from 0.2 to 0.5 inches.

Then again early Friday morning, March 21st a band of snow crossed northern Minnesota bringing amounts that ranged from 1 to 4 inches. Blizzard warnings were issued for portions of the Red River Valley as strong winds reduced visibility there and caused a good deal of drifting snow. A few places received new record daily amounts of snowfall for March 21st, including 8.6 inches at International Falls and 6.5 inches at Kabetogama.

MSP Airport reported a more modest 2.9 inches of new snow this week, increasing the seasonal total for the Twin Cities to 61.5 inches. For comparison Duluth has now reported a seasonal total snowfall of 91.8 inches.

Topic: Spring climate outlook

The NOAA-Climate Prediction Center released a new seasonal outlook on Thursday this week (Mar 20). For the period from April through June the outlook favors cooler than normal temperatures across the northern plains and the Great Lakes region, including Minnesota. This outlook follows the recent trend in our region of cooler than normal temperatures since November of 2013. The outlook for precipitation over the April through June period is uncertain with equal chances for below or above normal values. Wetter than normal conditions are expected to start the month of April and there is a moderate risk of flooding along the Red River between North Dakota and Minnesota. More information can be found at...

http://www.noaanews.noaa.gov/stories2014/20140320_springoutlook.html

Topic: Weekly Weather Potpourri

The current issue of Weatherwise magazine has an interesting article by Ed Darack titled "The 10 Best Places in the World." It provides an evaluation of climates that are most suitable to human habitation. Among those on the list is Lisbon, Portugal and Casablanca, Morocco. San Diego, CA also made the list. Number 1 on the list was Vina del Mar, Chile. You can read the full article at....

http://www.weatherwise.org/Archives/Back%20Issues/2014/March-April%202014/10-best-full.html

The Chinese military ordered the bombing of an ice jam in the Yellow River in Inner Mongolia to alleviate the threat of spring snow melt flooding this week as the river begins its thaw cycle. A 500 km section of the river is plagued with ice jams, but this is something that happens with some regularity in that part of the China.

The Climate Adaptation Knowledge Exchange (CAKE) features a description of the "Climate Resilence Framework-Training Materials for urban planners and city managers to use in building more local capacity to cope with a changing climate. Case studies and technical papers are available to examine that relate to adaptation strategies related to public health, transportation, water, and even hazard mitigation associated with severe weather events and the aftermath. You can read more about this at.....

http://www.cakex.org/tools/climate-resilience-framework-training-materials

Canada's efforts to cope with climate change may be scaled back over the next three years due to budget cuts at Environment Canada. A recent report indicates that Environment Canada's climate change and clean air program budgets may be reduced from about $234 million to $55 million. Number of FTE working within Environment Canada may be scaled back from the current level of 6400 people to less than 5350 people. These cuts could be tempered by extending or altering some temporary programs within the agency, depending on which direction the conservation government chooses to go. You can read more about these proposed cuts at....

http://www.thestar.com/news/canada/2014/03/12/environment_canada_braces_for_belttightening.html

MPR listener question: I understand that March is no longer the snowiest month in Minnesota on average, although there was a time when it was. But isn't the state record for the greatest monthl snowfall still associated with March?

Answer: You are correct. For most of Minnesota January is on average the snowiest month of the year. But the record for the greatest monthly snowfall is from March of 1965 when Collegeville reported an astonishing 66.4 inches, with measurable snowfalls on 16 days that month, including 23.6 inches on the 17th.

Twin Cities Almanac for March 21st:

The average MSP high temperature for this date is 41 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 21st:

MSP weather records for this date include: highest daily maximum temperature of 76 degrees F in 1938; lowest daily maximum temperature of 13 degrees F in 1965; lowest daily minimum temperature is -8 degrees F in 1965; highest daily minimum

temperature of 55 F in 2012; record precipitation of 0.83 inches in 1904; and a record 3.9 inches of snow fell on this date in 2008. Maximum snow depth on this date was 23 inches in 1951.

Average dew point for March 21st is 22 degrees F, with a maximum of 56 degrees F in 2012 and a minimum of -11 degrees F in 1965.

All-time state records for March 21st:

The state record high temperature for this date is 81 degrees F at Montevideo (Chippewa County) in 1910. The state record low temperature for this date is -33 degrees F at Cotton (St Louis County) in 1965 and at Roseau (Roseau County) in 1975. State record precipitation for this date is 2.00 inches at Ortonville (Big Stone County) in 1893; and state record snowfall for this date is 10.0 inches at Worthington (Nobles County) in 1932.

Past Weather Features:

March 21, 1910 was the warmest in state history with over 40 communities reporting daytime highs of 70 degrees F or greater. The temperature reached 81 degrees F at Montevideo. In western Minnesota farmers were seen plowing fields and planting small grains.

March 21, 1953 brought an exceptionally early tornado to Minnesota. It formed and touched down about 4:45 pm in central Minnesota moving across portions of Stearns and Benton Counties northwest of St Cloud. It was rated F-2 (winds 113-157 mph) and destroyed a church and a warehouse along its 11 mile path. A child was killed in a laudromat which was struck by the storm, one of the earliest spring tornadoes in state history.

A major winter storm brought heavy snowfall to many parts of the state over March 20-22, 1955. Snowfall amounts ranging from 6 to 9 inches were common across eastern portions of Minnesota. Winds over 30 mph blew the snow into huge drifts in southeastern counties, closing some roads there.

Arctic cold gripped the state over the week of March 19-25, 1965 bringing record-setting low temperatures to nearly all reaches of the state. On March 21st that year record lows were reported from over 70 locations in Minnesota, including readings of -30 degrees F or colder in the northern counties. Winona reported a record low of -1 degrees F. March of 1965 was the second coldest in state history trailing only that of 1899.

Outlook:

Cold weekend coming up with some below zero F readings Saturday night in northern counties. Continued cooler than normal early next week with a chance for rain or snow later on Monday and into early Tuesday. Moderating temperatures by Wednesday, then a warming trend towards next weekend with another chance for precipitation.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, March 28, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, March 28, 2014

HEADLINES
-Preliminary March climate summary
-Cold climate anomaly for Dec-Mar
-Weekly Weather potpourri
-MPR listener question
-Almanac for March 28th
-Past weather
-Outlook

Topic: Preliminary March climate summary

With just four days left in March it is possible to make some general remarks about the weather this month. Cold and dry are the most appropriate words for many areas of the state. Average monthly temperatures are ranging from 7 to 11 degrees F colder than normal. For many observers this March has been among the coldest ten in history including Rochester (8th), St Cloud (10th), and Duluth (5th). For MSP it may rank as 12th coldest in history (back to 1871). The extremes of temperature for the month ranged from 60 degrees F at Browns Valley on the 13th (may be exceeded yet by afternoon temperatures this coming Sunday, March 30), to -44 degrees F at Embarrass on March 3rd (which was a new state record for the date). The cold temperature pattern in March helped to drive the frost layer in the ground to extraordinary depth and contributed to widespread freezing up of residential water utility lines. On a statewide basis March was the 5th consecutive month with colder than normal average temperatures.

Most observers reported a drier than normal month, although precipitation through the coming weekend may bring these values closer to average for March (Thursday, March 27 delivered 2 to 6 inches of snow across much of central Minnesota). Kabetogama, Sandstone and La Crescent all reported over 1.5 inches of precipitation for the month. The majority of observers reported less than 10 inches of snowfall for the month. A few who received more than 15 inches included Austin, Babbitt, Orr, Dawson, International Falls, and Isabella. Kabetogam and Duluth were the only stations to report over 20 inches.

Topic: Cold climate anomaly for December through March

This has been without question a tough winter season, for many the coldest since that of 1978-1979, and for some the coldest since 1935-1936. Persistent cold has been the theme rather than individual record-setting cold days (there have been a few). Average temperatures for the December through March period in Minnesota have been roughly two standard deviations colder than normal and fall in the coldest 5 or 6 winters in history for most locations. It is a remarkable deviation from the trend of mild winters over the past three decades. Five consecutive months have delivered colder normal mean monthly temperature values to the state and since December 1st 71 to 75 percent of all daily observations have shown cooler than normal temperatures, a significant statistical measure of the persistence of cold.

Since December 1, 2013 Minnesota has reported the coldest temperature in the nation (excluding interior Alaska) 56 times. The specific dates and numbers are given in the listing below:
Dec 10 -33 F Crane Lake and INL
Dec 11 -31 F Fosston and Orr
Dec 12 -32 F INL
Dec 13 -26 F Kabetogama
Dec 15 -32 F INL
Dec 16 -29 F Crane Lake
Dec 18 -20 F Embarrass
Dec 19 -16 F Kabetogama
Dec 24 -34 F INL
Dec 26 -28 F Embarrass
Dec 29 -33 F Warroad
Dec 30 -40 F Embarrass
Dec 31 -43 F Embarrass
Jan 1 -43 F Embarrass
Jan 2 -47 F Babbitt and Embarrass
Jan 3 -36 F Embarrass
Jan 5 -40 F Babbitt and Embarrass
Jan 6 -37 F Babbitt
Jan 7 -35 F Brimson and Embarrass
Jan 8 -35 F Crane Lake
Jan 9 -35 F Brimson
Jan 14 -17 F Embarrass
Jan 15 -24 F Crane Lake and Embarrass
Jan 17 -24 F Fosston
Jan 18 -22 F Embarrass

Jan 20 -17 F Grand Marais
Jan 21 -37 F Embarrass
Jan 23 -39 F Embarrass
Jan 27 -31 F Brimson
Jan 28 -35 F Longville
Jan 29 -26 F Crane Lake
Jan 31 -30 F Babbitt and Embarrass
Feb 2 -38 F Embarrass
Feb 4 -29 F Brimson
Feb 8 -32 F Babbitt and Embarrass
Feb 9 -27 F Crane Lake
Feb 10 -30 F Embarrass
Feb 11 -36 F Embarrass
Feb 14 -27 F Babbitt and Crane Lake
Feb 16 -31 F Embarrass
Feb 22 -9 F Fosston
Feb 23 -8 F Fergus Falls and Fosston
Feb 25 -27 F Longville and Fosston
Feb 27 -36 F Crane Lake, Kabetogama, and INL
Mar 2 -44 F Embarrass
Mar 3 -40 F Embarrass
Mar 5 -31 F Babbitt
Mar 8 -19 F International Falls (INL)
Mar 12 -15 F Crane Lake
Mar 15 -15 F Crane Lake
Mar 16 -27 F Crane Lake, Babbitt, and Embarrass
Mar 20 0 F Flag Island
Mar 22 -11 F International Falls and Waskish
Mar 23 -26 F Crane Lake and International Falls
Mar 24 -27 F Embarrass
Mar 28 -8 F Crane Lake
In addition, another measure of persistent cold is that Embarrass has reported a low temperature of -30 F or colder 37 times this winter (a state record) and a reading of -40 F or colder has been reported ten times.

Snow cover has been generally heavier and more persistent this winter in the eastern portion of the state. Snow depths have exceeded 40 inches at some spots in the northeast, where some seasonal snowfalls totals have been over 100 inches.

For many Minnesota citizens this will be a memorably cold and long winter, perhaps so rare that it will not be repeated in their lifetime.

Topic: Weekly Weather Potpourri

A team of Midwestern universities have pulled together a new web site to furnish climate data, data tools, and assessments useful to agricultural producers. The new web site is designated "U2U" (useful to usable) and can be found at...

https://drinet.hubzero.org/groups/u2u/decision_resources

As we approach the start of the 2014 growing season it may be a good time to browse and get familiar with the data and products at this web site. There are tools to help with nitrogen fertilizer management and irrigation scheduling among others.

NOAA offers a short retrospective on the famous Alaska earthquake of March 27, 1964, one of the most powerful to every hit North America. With a magnitude of 9.2 the quake generated a huge tsunamis which devastated many coastal communities and contributed to the $1 billion in damages. After this event the US government established a National Tsunami Warning Center. You can read more about this at....

http://nws.noaa.gov/com/weatherreadynation/news/140319_alaska.html#.UzWeEVea-qD

There was much discussion this week in the social media about the sculpture in Berlin titled "Polictician discussing global warming." It depicts a number of people in flood waters up to their necks talking about global warming. The piece of art was done by Spanish street artist Isaac Cordal and you can view it and read more about it at...

http://www.globalpost.com/dispatch/news/culture-lifestyle/140325/street-art-politicians-discussing-global-warming

The NOAA-Storm Prediction Center sees a more active spring weather pattern coming up as we enter the month of April. Despite a relative quiet year so far with respect to severe convective weather, SPC filed 8 tornado reports from MO and IA on March 27th, along with 58 reports of large hail. A more active pattern across the Midwest is seen for next week.

MPR listener question: Here in Carlton County, I've recorded 91 days at or below 0F this winter season. I'm wondering if there are any records of MN stations or observers with more than 100 days of sub-zero lows in a winter season.

Answer: You have raised a good point and I can find no record of 100 days or more of sub-zero temperature readings in any given winter for anywhere in the state. In fact, those winters which have produced 90 or more days are rare indeed. Embarrass and

Tower, locations in Minnesota noted for cold temperatures report 97 days and 96 days, respectively of sub-zero readings this winter. Historically some of the coldest winters have produced similar numbers, including 97 days of sub-zero F readings at Fort Ripley in the winter of 1874-1875 and at St Vincent in the winter of 1887-1888. Bigfork reported 95 days of sub-zero temperatures in the winter of 1964-1965, and St Vincent reported 95 days of such readings in the winter of 1886-1887. Tower also reported 91 such days in the winter season of 1897-1898. With some additional cold temperature days ahead into early April, Embarrass or Tower may report 100 or more sub-zero low temperature readings this winter season. We'll see and report it if they do.

Twin Cities Almanac for March 28th:

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 9 degrees F standard deviation).

MSP Local Records for March 28th:

MSP weather records for this date include: highest daily maximum temperature of 78 degrees F in 1946; lowest daily maximum temperature of 21 degrees F in 1899; lowest daily minimum temperature is -1 degrees F in 1923; highest daily minimum temperature of 51 F in 1946; record precipitation of 1.08 inches in 1896; and a record 6.5 inches of snow fell on this date in 1894. Maximum snow depth on this date was 22 inches in 1965.

Average dew point for March 28th is 28 degrees F, with a maximum of 57 degrees F in 2004 and a minimum of -9 degrees F in 1923.

All-time state records for March 28th:

The state record high temperature for this date is 84 degrees F at Bemidji (Beltrami County) in 1946. The state record low temperature for this date is -30 degrees F at Roseau (Roseau County) in 1923 and at Roseau (Roseau County) in 1975. State record precipitation for this date is 2.60 inches at Canby (Yellow Medicine County) in 1924; and state record snowfall for this date is 13.0 inches also at Canby (Yellow Medicine County) in 1924.

Past Weather Features:

Although the official Twin Cities climate record does not include measurements made from old Fort Snelling an argument can be made that March 28, 1843 was the coldest

in state history. The low temperature at Fort Snelling in the morning was -4 degrees F and the afternoon high only climbed to 18 degrees F, giving a mean daily temperature value of 7 degrees F. This is roughly 32 degrees F colder than the modern average temperature for the date.

March 27-29, 1924 brought a strong winter storm to the state with rain, sleet, and snow. The brunt of the storm hit central Minnesota counties bringing 10 to 20 inches of snowfall. Canby and Maple Plain reported over 20 inches. Many schools were closed on Friday, March 28th giving the children a long 3-day weekend.

March 28, 1946 was the warmest of record on a statewide basis. Nearly every spot in the state except Grand Marais saw the thermometer climb to 70 degrees F or higher. Over two dozen Minnesota communities reported record-setting daily highs in the 80s F and farmers were seen working fields up for spring planting.

Outlook:

Generally warmer than normal temperatures over the weekend, with highs reaching into the 50s F on Sunday in many places. Increasing clouds and wind Sunday night with a chance for mixed precipitation on Monday. Some areas may get significant snowfall. Cooler on Tuesday and Wednesday with another storm system crossing the state on Thursday of next week, bringing a mixture of precipitation as well.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, April 4, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, April 4, 2014

HEADLINES
-Perhaps a singular event
-Heavy snow up north on April 1st
-Widespread snow over April 3-4
-Projected Ice-Out Dates
-Classes Without Quizzes
-Weekly Weather potpourri
-MPR listener question
-Almanac for April 4th
-Past weather
-Outlook

Topic: Perhaps a singular event

Can a tornado, thunder-snow, and a blizzard converge on the same geography on the same day? Yes, apparently.

Earlier this week on March 31st a strong winter storm crossed the Dakotas and Minnesota bringing a variety of weather. Ahead of the storm temperatures in southwestern Minnesota soared into the upper 50s F (61 F at Marshall), then high winds, rain, freezing rain, sleet, and snow brought blizzard warnings to many western counties, including Yellow Medicine and Lac Qui Parle. At 4:10 pm a Yellow Medicine County Sheriff confirmed a tornado touched down near St Leo causing damage to some nearby farm buildings. This tornado was rare in historical terms, just the 21st such storm reported in the month of March during the modern era (post 1950), but it was remarkably rare and perhaps the only case in state history where a tornado was confirmed in a county with an active blizzard warning! The real blizzard conditions that day ended up further north in the Red River Valley which reported its 11th blizzard of the 2013-2014 season, accompanied by thundersnow. The last March tornado reported in Minnesota was during the unusually warm spring of 2012 on March 19 near Elysian (Le Sueur County).

Topic: Heavy snow up north on April 1st

The storm system on March 31-April 1 this week brought heavy snow to many northern parts of the state. New record daily amounts were observed at a number of locations including Warroad (11"), Grand Forks, ND (11.5"), Argyle (15.5"), Hallock (14.0"), Bemidji (12"), Wannaska (13"), Crookston (13"), Red Lake Falls (8"), Warren (18"), Thief River Falls (18"). Winds peaked at 35 to 40 mph causing a great deal of blowing and drifting snow which closed many roads and highways in North Dakota and northern Minnesota as well. A few observers reported over an inch of precipitation in the snow that fell.

Topic: Widespread snow over April 3-4

A large winter storm system passed across the state from the southwestern corner northeast through Duluth-Superior over April 3-4 bringing snowfall amounts ranging from 2 to 12 inches. The snow snarled Friday morning traffic patterns and produced a number of accidents. Several roads and highways were closed for a time. The moisture content of the snow ranged from 0.50 to 1.00 inches in many places and was certainly welcome in the drier counties of southwestern Minnesota. You can read more comprehensive descriptions of the storm at the NOAA-National Weather Service web site or the Updraft Blog on the MPR web site written by Craig Edwards....those links are...

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=mpx&storyid=101561&source=0
http://blogs.mprnews.org/updraft/2014/04/snow-storm-departs-and-chilly-winds-diminish-today/

It is hard to believe that the Twins host their first home game of the MLB baseball season at Target Field this coming Monday. But it is supposed to be in the 50s F by then.

Topic: Projected Ice-Out Dates

The Minnesota State Climatology Office posted a summary of the climatology of ice-out dates for area lakes on our web site this week. Based on current and forecasted conditions lake ice will persist beyond the normal dates of loss this spring. It is difficult to project how delayed beyond the median dates for ice-out this may be. Ice thickness has been unusually large this winter. A recent report from Rainy Lake showed 55 inches of ice thickness, a number larger than any observed in many decades there. You can read more about lake ice-out dates at....

http://www.dnr.state.mn.us/ice_out/2014.html

Topic: Classes Without Quizzes

The annual University of Minnesota College of Food, Agricultural and Natural Resource Sciences Classes Without Quizzes will take place at the Continuing Education Center on the St Paul Campus this Saturday (April 5th) from 8:00 am to 12:30 pm. Dr. Ted Labuza from the Department of Food Science will provide the keynote on "Making Sense of Food Labels." This will be followed by several concurrent sessions on a variety of topics including: Moose in Minnesota; Minnesota's Changing Economy; Extending the Commercial Strawberry Season; Renewable Energy and others. I will be presenting a session on Severe Weather Trends in Minnesota. This is an excellent program and value for the money, just $35. You can go to the web site for more information.....

http://www.cfans.umn.edu/AlumniFriends/Events/CWQ/2014/index.htm

or register by calling 612-624-0822 or just show up on Saturday morning.

Topic: Weekly Weather Potpourri

United Nations Secretary-General Ban Ki-moon this week urged European leaders to advance a legally binding climate change treaty for implementation next year (2015) in order to set an example to the rest of the world. He thinks that most of the nations in the European Union are ready to do so.

Earlier this week the IPCC released the latest segment of its 5th Assessment Report (AR5) titled "Climate Change 2014: Impacts, Adaptation and Vulnerability." This report provides a comprehensive look at impacts of climate change already occurring and an assessment of climate adaptation practices that need to be made to become more resilient to climate change and to mitigate risk. You can read the whole report at...

http://www.ipcc.ch/

The UK Met Office was forecasting high air pollution levels across portions of south England, East Anglia, and the Midlands on Wednesday and Thursday this week. Thick layers of dust were seen in some parts of the country. The high level of pollution was blamed on a static air mass with light winds and convergence of local emissions with pollution blown in from the European continent, and dust blown in from the Sahara. With a weather system coming in from the North Atlantic air quality was expected to improve this weekend. You can read more about this episode of foul air at the BBC web site.....

http://www.bbc.com/news/uk-26844425

MPR listener question: How common is April snowfall in Minnesota?

Answer: Depends on where you are. For the Twin Cities measurable snowfall in April is three years out of every four, and a daily snowfall of 4 inches or greater occurs about once every four years. A similar frequency of measurable April snowfall occurs at Rochester, except they measure a daily amount of 4 inches or greater about once every 5 years.

Up north the frequencies are higher. At International Falls over 9 out of every 10 Aprils deliver measurable snowfall, and 1 in 3 bring a daily snowfall of at least 4 inches or greater. Similar frequencies of April snowfall show up in the climate history of Duluth. Remember that last April was the snowiest month in the history of Duluth with 50.8 inches of snowfall, with over half the days of the month bringing snowfall, and seven days bringing 4 inches or greater.

Twin Cities Almanac for April 4th:

The average MSP high temperature for this date is 49 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 31 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 4th:

MSP weather records for this date include: highest daily maximum temperature of 81 degrees F in 1921; lowest daily maximum temperature of 25 degrees F in 1874; lowest daily minimum temperature is 5 degrees F in 1995; highest daily minimum temperature of 62 F in 1921; record precipitation of 0.77 inches in 1932; and a record 7.2 inches of snow fell on this date in 1957. Maximum snow depth on this date was 9 inches in 1975.

Average dew point for April 4th is 26 degrees F, with a maximum of 65 degrees F in 1929 and a minimum of -9 degrees F in 1995.

All-time state records for April 4th:

The state record high temperature for this date is 89 degrees F at Tracy (Lyon County) in 1929. The state record low temperature for this date is -17 degrees F at Tower (St Louis County) in 1975. State record precipitation for this date is 2.57 inches at Hokah (Houston County) in 1981; and state record snowfall for this date is 18.0 inches also at Meadowlands (St Louis County) in 1968.

Past Weather Features:

Strong winds associated with thunderstorms brought a great deal of structural damage to the communities of Elk River and Anoka on April 4, 1928. In addition many telephone and telegraph poles were blown down, disrupting communications for several days.

April 4, 1929 was the warmest in state history with over 20 communities reporting daytime high temperatures in the 80s F. By the second week of the month daytime temperatures had fallen off into the 30s and 40s.

A big winter storm crossed the state over April 3-4, 1945. Several observers reported over 10 inches of new snowfall including Wells, Jordan, Albert Lea, Austin, Grand Meadow, Rochester, and Winona.

April 4, 1975 was the coldest in state history with over 40 communities reporting morning low temperatures that were below 0 degrees F. As far south as Springfield it was -1 degrees F. Temperatures remained cold the rest of the month making April of 1975 the 6th coldest in state history.

A strong winter storm brought rain, sleet, hail, and snow to many parts of Minnesota over April 3-4, 1981. Golf ball size hail was reported from several southern cities and wind gusts up to 60 mph were observed in the southeastern portions of the state. A number of observers reported over 2 inches of precipitation, and up to 8 inches of snow fell in central Minnesota.

Outlook:

Cooler than normal temperatures to start the weekend with increasing clouds on Sunday and Monday and a chance for rain or snow mostly in the north. Temperatures warm to above normal levels by mid week with much more sunshine.

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Minnesota WeatherTalk Newsletter for Friday, April 11, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, April 11, 2014

HEADLINES
-Spring is here!
-New record sub-zero F days
-Weekly Weather potpourri
-MPR listener question
-Almanac for April 11th
-Past weather
-Outlook

Topic: Spring is here!

Many Minnesota climate observers reported 5 consecutive days with warmer than normal temperatures this week, a trend which rapidly diminished the landscape snow cover. On Wednesday, April 9th a number of observers reported their first 70 degrees F or greater since the second week of October 2013. A few places reached 80 degrees F or greater including Browns Valley, Madison, Milan, Wheaton, Canby, and Ortonville.

Many places have lost all of their seasonal snow cover over the past week with consistent melting, even during the overnight hours when temperatures have remained above freezing. The snow-free line on the satellite image of Minnesota migrated north through Ottertail and Wadena Counties this week. Even in the far northeastern counties, snow cover diminished over the course of the week by 6 to 12 inches.

In addition frost was rapidly coming out of the ground, especially in southern Minnesota where there was no snow cover. Soil temperatures climbed into the 30s and 40s F by the end of the week.

Topic: A new record for sub-zero temperatures

You may recall that earlier this winter an MPR listener asked me if there had ever been a heating season (Oct-Apr) in Minnesota history when a weather observer reported 100 days or more of sub-zero F low temperatures. The most I could find were

97 days of sub-zero F readings at Fort Ripley in the winter of 1874-1875 and at St Vincent in the winter of 1887-1888. By a recent count of sub-zero F low temperature readings reported this heating season (2013-2014) some observers have now reached 100 days or more. Embarrass reports 100 days exactly with sub-zero F low temperatures, Babbitt reports 102 days, and Kabetogama on the door step of Voyageurs National Park reports 104 days of such temperatures. I think these numbers are truly a marker of how persistently cold this past winter has been, and perhaps they will be added to yet this month when colder than normal weather returns to the state.

Topic: Weekly Weather Potpourri

Tropical Cyclone Ita was bringing high seas, strong winds, and heavy rains to northeastern Australia this week. Winds ranged as high as 160 mph, with gusts over 180 mph. Sea wave heights of 30-35 feet were reported. Bands of heavy rain were supposed to lash the coastline through the weekend, with the strongest coastal storm surge expected between Cape Melville and Cape Tribulation. Ita is feared to be one of the strongest cyclones to strike Queensland in many years. It was not expected to dissipate until the middle of next week.

Somewhat cool weather is expected for the London Marathon this Sunday with temperatures climbing into 50s F by afternoon. There is little chance that rain will be a factor.

Colorado State University experts in tropical weather predicted a quiet Atlantic Hurricane Season for 2014 in their press release on Thursday (Apr 10) this week. They see nine tropical storms, but only three that may develop into hurricanes. Much of their forecast is weighted to the formation of an El Nino episode in the equatorial Pacific Ocean which tends to suppress tropical storm development in the Atlantic Ocean. You can read more at...

http://www.usatoday.com/story/weather/2014/04/10/colorado-state-hurricane-forecast/7544005/

MPR listener question: This winter was the second coldest on record for Duluth, and now is in the top 10 snowiest. How common is it for a winter to be both cold and snowy in the same year?

Answer: In general heavy snow seasons in Minnesota are indeed associated with colder than normal meteorological winters (Dec-Feb). But the correlation is NOT PERFECT. Here is a list of all historical snow seasons in Duluth (20 in number) which have produced 95 inches or more of total snowfall, along with the mean

temperature departure from normal (ave for 1981-2020) for meteorological winter (Dec-Feb):
1995-1996 135.4" -4.6 F
1949-1950 131.8" -4.8 F
2012-2013 129.4" +1.7 F
1996-1997 128.2" -2.5 F
1968-1969 121.0" -2.2 F
1988-1989 119.1" -2.7 F
2013-2014* 117.6" -9.5 F
1970-1971 116.9" -4.8 F
1964-1965 110.8" -6.8 F
2003-2004 109.9" +1.0 F
1950-1951 109.1" -4.9 F
1993-1994 108.3" -6.2 F
1983-1984 107.3" -3.0 F
1971-1972 107.1 " -6.2 F
1955-1956 103.5" -2.7 F
1974-1975 100.4" +0.4 F
1991-1992 100.0" +4.5 F
2000-2001 99.3" -3.4 F
1982-1983 96.5" +4.6 F
1981-1982 95.7" -6.0 F

As you can see 15 of the 20 cases depicted in the Duluth climate history for snow seasons show high seasonal snowfall amounts associated with colder than normal meteorological winter temperatures (Dec-Feb). In a couple of cases, those of 2012-2013 and 1991-1992 when above normal temperatures for meteorological winter are shown, it must be noted that over two-thirds of the snowfall occurred outside the months of meteorological winter (Dec-Feb). Also note that the recent winter (2013-2014) with a temperature departure from normal of -9.5 degrees F, is the 2nd coldest all-time at Duluth, trailing only the winter of 1874-1875.

Twin Cities Almanac for April 11th:

The average MSP high temperature for this date is 53 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 34 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 11th:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1890 and 1968; lowest daily maximum temperature of 25 degrees F in

1940; lowest daily minimum temperature is 12 degrees F in 1940; highest daily minimum temperature of 59 F in 2006; record precipitation of 1.58 inches in 1887; and a record 5.7 inches of snow fell on this date in 1929. Maximum snow depth on this date was 4 inches in 1980.

Average dew point for April 11th is 29 degrees F, with a maximum of 59 degrees F in 1945 and a minimum of -1 degrees F in 1940.

All-time state records for April 11th:

The state record high temperature for this date is 92 degrees F at Browns Valley (Traverse County) in 1977. The state record low temperature for this date is -4 degrees F at Baudette (Lake of the Woods County) in 1940. State record precipitation for this date is 3.75 inches at Rochester (Olmsted County) in 2001; and state record snowfall for this date is 13.0 inches at Ortonville (Big Stone County) and at Pipestone (Pipestone County) in 2013 (last year).

Past Weather Features:

April 9-10, 1931 brought a dust storm to many parts of southwestern Minnesota. Dust was noted in weather observations across central Minnesota as well, including the Twin Cities. So much dust was in the air that several people reported a midday solar halo. This was the first of many dust storms throughout the 1930s.

A short-live cold snap brought the coldest ever April 11th to the state in 1940. Many observers reported lows in the single digits F, and at least five communities reported morning lows below 0 degrees F. It was as cold as 9 degrees F as far south as Tracy. Temperatures rebounded into the 70s F just three days later.

April 9-12 brought an exceptional warm spell to the state in 1977, allowing farmers to get an early start on planting. Daily afternoon high temperatures ranged from the mid 70s F to mid 80s F under bright sunny skies. In western Minnesota Browns Valley, Madison, and Campbell set new daily temperature records for so early in April with daytime readings in the 90s F.

Just last year at this time, April 9-14, 2013 it snowed on 6 consecutive days bringing significant amounts to many parts of the state and causing travel difficulty for many. Many observers reported over 10 inches of snow, with Duluth getting close to 17 inches. It turned out to be the snowiest month in Duluth history with over 50 inches of snow in April.

Outlook:

Mostly a wet weekend coming up, with some thunderstorms and perhaps even snow showers in the north. Much cooler temperatures too will settle in Sunday night and into early next week, with readings well below normal. Drier by the middle of next week with continued cooler than normal temperaturs.

Further Information:

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

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Minnesota WeatherTalk Newsletter for Friday, April 18, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, April 18, 2014

HEADLINES
-Coldest April 15th (Tax Day)
-Record-setting snowstorm
-New seasonal climate outlook
-Weekly Weather potpourri
-MPR listener question
-Almanac for April 18th
-Past weather
-Outlook

Topic: Coldest April 15th

The week started over April 14-15 with strong cold air advection from the polar latitudes, ushered in by very strong winds. Wind gusts were well over 40 mph at a number of places, driving windchill values down to single digit readings on Sunday night. The cold high pressure system that settled over the state on Monday (April 14) kept daytime afternoon temperatures below the freezing mark (32 F) at a number of locations, setting up an extremely cold night Monday night.

Tax filing day in 2014 will likely be remembered as the coldest April 15th in state history (or at least a rival to 1875, 1935, and 1962 as among the coldest). Scores of Minnesota weather observers reported new record lows for April 15th, and the National Weather Service Cooperative weather observer at Camp Norris (Lake of the Woods County) reported a new all-time statewide low temperature for the date with a reading of -4 degrees F. The invasion of such cold air was associated with abundantly clear skies and very low dewpoints. In fact MSP set a new low depoint record for April 15th with a reading of 0 degrees F late in the afternoon. Further north the dewpoints were as low as -5 degrees F at Bemidji, remarkably dry air.

Among those setting new low temperature records for April 15th were:
Crane Lake and Flag Island 1 degrees F
Bemidji 2 degrees F
Cass Lake and Kabetogama 4 degrees F

International Falls 5 degrees F
Isabella 6 degrees F
Waskish, Park Rapids, Cook, and Orr 7 degrees F
Pokegama 8 degrees F
Long Prairie and Browns Valley 10 degrees F
East Grand Forks 11 degrees F
Morris, Wheaton, and Moorhead 12 degrees F
Willmar and Montevideo 13 degrees F
Marshall 14 degrees F
Wells 15 degrees F
St Cloud 16 degrees F
MSP Airport 18 degrees F (tied 1875 and 1935)

In addition some of the stations in Canada reported new record low temperature values as well, including -17 degrees F at Thompson, Manitoba; -6 degrees F at Sioux Lookout, Ontario; and 1 degrees F at Kenora, Ontario. Since last November 1st (2013) Minnesota has reported the coldest temperature in the 48 contiguous states 61 times, more than any other state.

Topic: Record-setting snowstorm

April 16th brought widespread snow to many parts of the state. The slow moving low pressure system delivered heavy snow across central portions of the state over most of the day and well into the evening. A number of observers broke the all-time state record snowfall for April 16th of 13.0 inches at Itasca State Park in 1945. Many observers reported amounts ranging from 2 to 6 inches, and a number reported new daily record amounts. Among those setting new records for daily snowfall were:
8.5" St Cloud
8.0" Olivia, Hutchinson, and Sauk Centre
16.0" Cambridge
7.0" Milan
5.1" Madison
6.2" Willmar
6.4" Duluth
4.0" Montevido (tied record from 1945) and Dawson
5.0" Morris and Glenwood
9.5" Collegeville
12.5" Milaca
13.8" Mora
10.0" Kimball
13.0" Little Falls and Onamia

14.0" Litchfield and St Francis
10.5" Hinckley
5.5" Grand Portage and Silver Bay
7.5" Cloquet and Two Harbors
7.8" Moose Lake
14.6" Bruno
19.0" Isanti

The snowfall at Duluth pushed their seasonal total to 125.3 inches, the 5th most in history at that location. Fortunately thawing temperatures rapidly diminished the mid-April snow cover. You can read more about this storm on the web at....

http://www.crh.noaa.gov/mpx/?n=snowtotals

Topic: New seasonal climate outlook

The NOAA-Climate Prediction Center issued a new seasonal climate outlook on Thursday (April 17) this week. For the period May through July they call for equal chances of above or below normal temperatures. For Minnesota citizens this should be a relief after bearing six consecutive months of colder than normal temperatures (Nov-Apr). Some moderation in temperature is seen for May, with more days of above normal temperatures. The outlook for precipitation over the May-July period also calls for equal chances of above or below normal values.

Topic: Weekly Weather Potpourri

The coldest home baseball game in Twins history was played on Thursday afternoon (April 17) this week with a temperature of 31 degrees F under overcast skies at the start of the game just past noon. Fans were allowed to bring sleeping bags to cover up with in the stands. The fans were treated to a fine hitting display, great pitching, and a 7-0 win by the Twins. The 31 F temperature broke the record for coldest game start in team history which formerly was 32 degrees F for the May 2, 1967 game against the NY Yankees at the old Met Stadium. Must have been a good day for hot chocolate and coffee vendors.

NOAA reported a summary of the March climate highlights this week noting that it was the coldest month of March in the contiguous USA states since 2002. The eastern half of the country was colder than normal during March, with Vermont reporting its coldest March in history. You can read more at...

http://www.ncdc.noaa.gov/sotc/national/2014/3

Fire was continuing to plague the city and area around Valparaiso, Chile this week. Dry weather has kept the fire threat elevated there, but they are on the verge of entering a rainy period laster tis month. Some have called it the worst fire since 1953, as over 11,000 people have been evacuated and over 2500 homes destroyed.

Early assessment of last week's Category 4 Cyclone Ita and its impact on the coastal areas of Queensland, Australia suggest it may have inflicted about $1 billion in damages. No loss of life was reported, but many agricultural fields (sugar cane, banana, beans, and grains) were flattened. Widespread power outages and flooding occurred as a result of the storm. Remnants of Cyclone Ita struck parts of New Zealand this week bringing heavy rains and high winds which blew down many trees.

MPR listener question: It seems that this winter and early spring have brought a good deal of windy days to Winona, many more than usual. Is this true?

Answer: The data show that average wind speeds at Winona during December and February were less than normal, but they were greater than normal during January and March, and they have been greater than normal so far in April. The number of days with peak wind gusts over 30 mph was 13 in the month of January and has been 9 days already in April. Those numbers represent high frequencies for such wind speeds. On April 12th a peak wind gust of 44 mph was reported from Winona.

MPR listener question: Duluth has now reported back to back snow seasons which delivered over 125 inches of snowfall, 254.7 inches for the past two seasons. How does this biennial snowfall compare to other two-year periods in Duluth's past? And is it a record?

Answer: The past two season total of 254.7 inches ranks 2nd among two-year periods in Duluth climate history, trailing only 1995-1996 and 1996-1997 when 264 inches fell. Third place in the ranking of two-year snowfall totals at Duluth belongs to 1949-1950 and 1950-1951 which totaled 240.9 inches. The largest biennial total snowfall in the Twin Cities record is from 1982-1983 (74.4") and 1983-1984 (98.6") for a total of 173 inches, while the top ranked two-year total in St Cloud's record is 2012-13 (78.5") and 2013-2014 (75.5") with a total of 154 inches.

Twin Cities Almanac for April 18th:

The average MSP high temperature for this date is 58 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 38 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 18th:

MSP weather records for this date include: highest daily maximum temperature of 89 degrees F in 1985; lowest daily maximum temperature of 31 degrees F in 1953; lowest daily minimum temperature is 21 degrees F in 1953; highest daily minimum temperature of 61 F in 1915 and 2005; record precipitation of 1.04 inches in 2004; and a record 6.4 inches of snow fell on this date in 2013. Maximum snow depth on this date was 4 inches in 1983.

Average dew point for April 18th is 33 degrees F, with a maximum of 64 degrees F in 2004 and a minimum of 3 degrees F in 1988.

All-time state records for April 18th:

The state record high temperature for this date is 94 degrees F at Marshall (Lyon County) in 1985. The state record low temperature for this date is 2 degrees F at Gunflint Lake (Cook County) in 1983. State record precipitation for this date is 4.80 inches at Bingham Lake (Cottonwood County) in 1898; and state record snowfall for this date is 13.0 inches at Beaver Bay (Lake County) in 1869.

Past Weather Features:

April of 1894 was one of the wettest of the 19th Century in Minnesota. In the Red River Valley at Moorhead it rained on 9 consecutive days from April 12 to 20. Seventeen days that month brought rain so farmers had little opportunity to plant. Some fields were not planted until the end of May.

Mid-April of 1983 brought 5-10 inches of snow to southern and eastern Minnesota counties. Cold air swept in behind the storm bringing record low temperatures as well by April 18th. Many observers reported minimum temperatures in the single digits to teens F. Fortunately temperatures warmed into the 70s F the last week of the month, allowing farmers to make rapid progress in planting.

April 17-19, 1985 brought plenty of early spring heat to Minnesota, producing the warmest April 18th in history. It was 86 degrees F as far north as Detroit Lakes, and over 40 communities in central and southern Minnesota reported daytime highs in the 90s F. Some farmers were already busy planting crops.

A major late winter storm crossed the state over April 17-19, 2013 (last year) bringing a mixture of heavy precipitation and strong winds. Snowfall amounts ranged from 2 inches to 9 inches around the state, but a number of observers reported over 10 inches. Among those reporting the largest amounts were: Isabella 29.0", Babbitt 23.2", Hibing 19.1", Floodwood 19.0", Two Harbors 18.2", Embarrass 18.0", Duluth 17.7", and Gunflint Lake 17.5 inches.

Outlook:

Warmer over the weekend, but with a chance for showers and thunderstorms on Saturday. Warmer and brighter on Easter Sunday with a chance for widely scattered showers mostly in southern counties. Generally dry Monday and Tuesday, then increasing clouds with cooler temperatures for Wednesday and Thursday as a chance for showers and thunderstorms returns.

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Minnesota WeatherTalk Newsletter for Friday, April 25, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, April 25, 2014

HEADLINES

-Spring field work stopped
-Soil temperature update
-Weekly Weather potpourri
-MPR listener question
-Almanac for April 25th
-Past weather
-Outlook

Topic: Spring field work stopped

Just as the Minnesota agricultural landscape had finally thawed and dried enough to permit field work earlier this week, a large storm system brought widespread precipitation to the state over April 23-25, stopping any significant progress in field work by farmers. Widespread amounts ranging from 0.50 inches to 1.30 inches occurred around the state, falling mostly as rain. Several observers did report over 1 inch of rainfall with little runoff, so that much of the moisture was obviously going into the soil. Some northern observers did record snowfall as well, and in some cases it was record-setting. Those reporting daily record snowfall amounts included: Silver Bay 7.5", Tofte 10.2", Grand Portage 10.0", Kabetogama 4.1", Cook 6.0", Embarrass and Isabella with4.0", Duluth 4.3", and International Falls 2.8 inches. The Duluth Weather Service Office now reports a snow season total of 129.6 inches, ranking 3rd most in history, while International Falls now reports 100.6 inches for the season, ranking 5th most historically.

Topic: Soil temperature update

Soil temperature have been moderating this week ranging from the mid 40s F to mid 50s F at the 4 inch depth, except for some far northern locations which have seen average soil temperatures in the mid 30s F. A number of observers report a frost layer between 20 and 30 inches which is the last remnant of deep ground frost from this long, cold winter. Surface mulches should be removed by now so the soil can take in

more spring moisture and also warm up more directly from the higher spring sun angles. With the threat of frost seen for the early to middle parts of next week, it is wise to hold off on transplanting any potted plants from the indoors to outdoors until after next week.

Weekly Weather potpourri:

The Canada-based Climate Solutions Centre has released a series of short educational documentaries related to climate change and addressing its consequences. These are intended for educational use and to provoke discussion in the classroom or among community groups. You can view the series at...

http://climatesolutionscentre.com/

A paper published this week in the journal Nature describes the decline of the tropical rain forest in the Congo. Using NASA satellite image data to assess greenness over this area of Africa, researchers from Albany State University in NY show the decline is related to persistent drought over the area. Authors note that continued drought will lead to a change in forest composition and biodiversity in this area of Africa. You can read more at...

http://www.sciencedaily.com/releases/2014/04/140423170909.htm

Northwestern portions of China were plagued by sand storms this week which closed schools and caused widespread power outages. Persistent strong winds (55-65 mph) lifted sands out of the Gobi Desert and carried them over China in waves of sand clouds. You can see and hear more about this story from the BBC Weather Centre at...

http://www.bbc.com/weather/features/27115306

Persistent drought in Brazil has resulted in higher prices for coffee beans. Production estimates have been lowered for the coffee crop and since Brazil supplies a large fraction of beans to the USA and other countries, the price has risen recently to a two-year high. You can read more about this at...

http://buzz.money.cnn.com/2014/04/24/coffee-brazil-drought/

The cooler than normal April temperatures have extended the ice fishing season in northern Minnesota, notably on Lake Bemidji, Lake of the Woods, and Rainy Lake. Anglers are advised to check with local resorts and sport shops about ice safety before going out, as the ice is deteriorating with each passing day. Fishing is reported to be good in most places up north.

MPR listener question: Following last week's snow I noticed my car was covered with a light brown coating of dirt. I noticed a number of other cars showing the same thing. Did this dirt arrive with the snow and where did it come from?

Answer: Yes, I think the dirt (soil) did arrive with the snow, especially because a number of MPR listeners reported the same observation, including a glass greenhouse that got covered with brown spots after the snow melted. The low pressure system which brought the snowfall to Minnesota last week over April 16-17 came out of eastern Colorado and moved ENE across the Great Lakes region. In doing so there was strong low level flow (850 mb or about 5000 ft) from the southwestern USA. Examining the upper air patterns last week can allow me to back track source regions for this soil carried by the air, and it appears that NM and west TX had been reporting dust storms earlier this month. So some of this dirt in the snow may have come from those areas of the country. In addition farmers in the states of CO, TX, OK, and KS were busy with tillage and planting last week, and strong surface winds may have caused some soil to be airborne. In CO they were planting spring barley and spring wheat last week, in KS and OK they were planting corn, sorghum, and soybeans, and in TX farmers were planting similar crops plus cotton. Soil from all of these states is lighter in color and could therefore leave a light brown stain or residue after snow melt. I think this is the most logical conclusion to draw about observations in our state of "dirty snow."

Twin Cities Almanac for April 25th:

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 41 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for April 25th:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1962; lowest daily maximum temperature of 37 degrees F in 1950; lowest daily minimum temperature is 25 degrees F in 1907; highest daily minimum temperature of 66 F in 1915 and 1990; record precipitation of 1.47 inches in 1902; and a record 3.2 inches of snow fell on this date in 1950.

Average dew point for April 25th is 36 degrees F, with a maximum of 63 degrees F in 1990 and a minimum of 9 degrees F in 1933.

All-time state records for April 25th:

The state record high temperature for this date is 96 degrees F at Madison (Lac Qui Parle County) in 1962. The state record low temperature for this date is 5 degrees F at Leech Lake (Cass County) in 1909. State record precipitation for this date is 3.55 inches at Hokah (Houston County) in 1994; and state record snowfall for this date is 16.0 inches at Two Harbors (Lake County) in 1950.

Past Weather Features:

The coldest April 25th in history occurred in 1909 when freezing temperatures prevailed across all parts of the state. Many areas saw low temperatures dip into the teens F, while Detroit Lakes reported a low of just 9 degrees F and it was only 5 degrees F at Leech lake. The temperature at Leech Lake climbed to 64 degrees F the next day, but it was short-lived. The thermometer remained below freezing all day at Kelliher (Beltrami County) achieving an afternoon high of just 30 degrees F. Widespread snow kept temperatures cooler than normal most of the month, with April of 1909 being the 5th coldest in state history.

April 24-26, 1950 brought a late winter snow storm to northern counties, dropping over a foot of snow in many places and causing some school closures. April of 1950 was one of the snowiest in history for many northern Minnesota communities.

The warmest ever April 25th occurred in 1962 when over 25 Minnesota communities reported a daytime high temperature of 90 degrees F or greater. It was 88 degrees F as far north as Itasca State Park. The warm spell ended on April 27th when temperatures fell off into the 50s and 60s F.

Outlook:

Sunny and breezy on Saturday, with near normal temperatures in most places. Increasing cloudiness on Saturday night and continued windy with periods of showers on Sunday. Chance for snow in the northeastern counties. Breezy conditions will also prevail early next week with daily chances for showers and thunderstorms. Temperatures will run cooler than normal most of the week, with some overnight lows in the 30s F in the south, and perhaps more snow showers in the north.

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Minnesota WeatherTalk Newsletter for Friday, May 2, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, May 2, 2014

HEADLINES

-April climate summary
-Daily record rainfall amounts reported
-Weekly Weather potpourri
-MPR listener question
-Almanac for May 2nd
-Past weather
-Outlook

Topic: April climate summary

Cooler and wetter than normal describes the month of April in Minnesota for a second consecutive year. April of 2014 was the 6th consecutive month with cooler than normal mean monthly temperatures reported. Most observers reported mean values for April temperature that were from 4 to 6 degrees F cooler than normal. Extremes for the month ranged from 82 degrees F at Madison (Lac Qui Parle County) on April 9th to -11 degrees F at Hallock (Kittson County) on April 2nd. Only 9 days during the month brought above normal temperatures. Minnesota reported the coldest temperature in the nation on four dates during the month.

Precipitation was abundant and above normal in most counties, with the exception of a portion of southwestern Minnesota which received below normal precipitation. In several areas the month concluded with 8 consecutive days of rainfall. Many observers reported twice the normal amounts of April precipitation, and for many this was among the wettest five Aprils in history. Some of these included:
Faribault 8.03" wettest all-time
New Hope 8.97" wettest all-time
Chaska 8.40" wettest all-time
Jordan 7.51" wettest all-time
Thorhult 4.18" wettest all-time
Grand Portage 5.82" 2nd wettest
Wolf Ridge Environmental Learning Center (near Finland) 5.91" 2nd wettest
MSP airport 6.27" 2nd wettest

University of Minnesota St Paul Campus 6.94" 2nd wettest
Forest Lake 7.33" 2nd wettest
St Cloud 5.90" 3rd wettest
La Crescent 7.88" 3rd wettest
Ottertail 5.01" 4th wettest
Waseca 5.57" 4th wettest
Milan 5.91" 4th wettest
Zumbrota 6.18" 4th wettest
Rochester 5.64" 5th wettest
Wells 5.60" 4th wettest

The abundant precipitation (approximately half of the days of the month brought precipitation) combined with colder than normal temperatures to deliver significant snowfall to some parts of the state. Some of those reporting a snowy month of April include: Grand Portage 27.5 inches; Rush City 26.7 inches; Duluth, Tofte, and Forest Lake 26.0 inches; Two Harbors 25 inches; Princeton 23.0 inches; Mora 22.5 inches; and Cloquet 20.2 inches. The snow season at Duluth has brought a total of 131 inches, 3rd all-time highest for that city. Grand Portage has had a record snow season with 116.8 inches, while just north of Tofte they have reported 141.1 inches. Others reporting a record snow season included Babbitt with 117.1 inches and Isabella with 129.5 inches.

The month of April was also very windy, with wind gust exceeding 30 mph on numerous days.

Topic: Daily record rainfall amounts reported

A very slow moving, closed low pressure system brought persistent clouds and precipitation to the state over the last week of April. Most areas of the state received measurable rainfall, some reported snowfall, and several received mixed precipitation. Thunderstorms were reported as well as occasional heavy rainfall rates which produced some daily record amounts. Many observers reported 7 or more consecutive days with precipitation.

Several new daily record precipitation amounts were reported from the observer networks in Minnesota, including the following:

On April 24, 2.25 inches at Thorhult and 2.03 inches at Grand Portage
On April 25, 1.56 inchs at Grand Marais and 1.51 inches at Tofte
On April 27, 1.40 inches at Amboy and 1.35 inches at Benson
On April 28, 1.58 inches at St Cloud, 2.35 inches at Mankato, 2.34 inches at Wells, 2.12 inches at Litchfield, 2.00 inches at Forest Lake, 1.91 inches at Chaska, 1.87

inches at the U of MN St Paul Campus, 1.83 inches at Waseca, 1.81 inches at Albert Lea, 1.75 inches at Jordan, and 1.55 inches at Collegeville
On April 29, 1.06 inches at Montevideo and 1.28 inches at Watson

Weekly Weather potpourri:

While Minnesota was receiving persistent rainfall this week, many southern states reported severe weather, especially over April 27 and 28. On the 27th 39 tornado reports were filed with the NOAA Storm Prediction Center. Most of these were from the states of NE, IA, AR, OK, MO, and LA. On the 28th another 110 tornado reports were filed mostly in the states of AL, TN, MS, and GA. The flourish of severe weather near the end of the month brought the total number of tornado reports nationwide during April to 173, a number that is below the average of recent years. Following these tornadoes, the same overall weather system brought heavy thunderstorms to portions of GA and FL which produced widespread flooding. The National Weather Service reported 10-20 inches of rainfall in portions of southern Alabama and the panhandle of Florida over April 29-30, with a maximum value of 22.26 inches. You can read more about these storms at...

http://www.srh.noaa.gov/mob/?n=flashflood_04292014

Highlights from the weekly briefing on drought by the USDA's Brad Rippey:

During the four-week period ending on April 29, 2014, contiguous U.S. drought coverage remained virtually unchanged (up 0.06 percentage point) at 38.43%. Nevertheless, drought coverage is at its highest point since October 8, 2013, and up 7.48 percentage points from the beginning of the year. The southwestern area of Minnesota designated to be in moderate drought declined by nearly half over this past wet week. With the agricultural focus turning toward spring planting – nearly one-fifth (19%) of the intended U.S corn acreage was planted by April 27 – it is worth noting that drought lingers in portions of the western Corn Belt. By April 29, about one-quarter (26%) of the U.S. corn production area was in drought, down 5 percentage points from four weeks ago. Similarly, 19% of the soybean production area was in drought on April 29, down 5 points from April 1.

A recent study from Brigham Young University documents the drought history of the Utah landscape in pre-pioneer times back to the 15th Century using tree rings. This study suggests that earlier droughts were much more severe and longer lasting than even those of the 1930s. You can read more about this study at...

http://www.sciencedaily.com/releases/2014/05/140501101123.htm

For almond lovers here is the USDA forecast for almond production in California this year: The subjective forecast for the 2014 California almond production is 1.95 billion pounds. This is 2.5 percent below last year's production of 2.00 billion pounds. Yield is expected to average 2,270 pounds per acre, down 4.6 percent from the 2013 yield of 2,380 pounds per acre. Forecasted bearing acreage for 2014 is 860 thousand. After the warmest winter on record for California, the almond bloom began in early February. The 2014 bloom was one of the earliest almond blooms in memory. Orchards required irrigation in the winter months due to the lack of precipitation, but rain early in the season offered some temporary relief. Pest and disease pressure has been lower than last year. Overall, the 2014 crop is developing faster than last year and harvest is expected to start early. Water is a concern for many growers this year.

Speaking of California and the embedded serious drought conditions there, the first significant wildfire of the season occurred this week in the San Bernardino hills east of Los Angeles. Over 500 firefighters wee battling this fire, but it consumed over 1600 acres. You can read more about it at...

http://time.com/84851/southern-california-blaze-kicks-off-what-could-be-especially-dangerous-wildfire-season/

MPR listener question: The day after day of rainfall really bothered me, as well as my children this week. What is the record for consecutive days with rain in Minnesota during the month of April?

Answer: For the Twin Cities the record is 10 consecutive days of measurable rainfall, which occurred just last year (April 5-14). Similarly Duluth recorded 10 consecutive days with measurable rainfall in 1938 from April 12-21. Rochester reported 9 consecutive days with precipitation in 1996 from April 18-26. My wife Cindy points out too that 5 of the past 6 Thursdays have brought precipitation to Minnesota. Thus this might be a day of the week to avoid being outside. Thankfully, though cooler, next week looks like drier weather overall.

Twin Cities Almanac for May 2nd:

The average MSP high temperature for this date is 63 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for May 2nd:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1959; lowest daily maximum temperature of 38 degrees F in 1909;

lowest daily minimum temperature is 24 degrees F in 1875 and 1961; highest daily minimum temperature of 70 F in 1959; record precipitation of 1.49 inches in 1944; and a record 2.2 inches of snow fell on this date in 1954

Average dew point for May 2nd is 38 degrees F, with a maximum of 66 degrees F in 1959 and a minimum of 12 degrees F in 2005.

All-time state records for May 2nd:

The state record high temperature for this date is 99 degrees F at Wheaton (Traverse County) in 1959. The state record low temperature for this date is 4 degrees F at Pine River (Crow Wing County) in 1909. State record precipitation for this date is 3.05 inches at Trail (Polk County) in 1950; and state record snowfall for this date is 15.4 inches at Dodge Center (Dodge County) in 2013.

Past Weather Features:

Following a May 1st snow storm, the coldest May 2nd of all-time occurred in 1909. Polar air moved over the state following a cold front and drove temperatures down into the 20s and 30s F. Many daytime high temperatures remained in the 30s F and recently emerged crops were damaged by frost.

The warmest start to the month of May was in 1959 when daily temperatures soared into the 90s over May 1st and 2nd. Over 60 Minnesota communities set new daily high temperature records with readings of 90 degrees F or higher. It was 90 degrees F as far north as Bemidji.

Perhaps the wettest start to May occurred in 2001 for southern Minnesota counties. It rained every day, and some amounts brought by thunderstorms were very heavy. Total rainfall exceeded 3 inches at several locations, while Albert Lea, Owatonna, Harmony, and Rochester reported over 4 inches. Soggy fields meant that farmers had to wait until the second wait of May to get started on planting.

The first three days of May brought record snowfalls to many parts of southern Minnesota in 2013. New daily snowfall records were set at a number of locations, especially on May 2nd, including 7 inches at Albert Lea, 10 inches at Bricelyn, Austin, and Wells, 15 inches at Owatonna, 8.9 inches at Waseca, 14 inches at Rochester, and 15.4 inches at Dodge Center.

Outlook:

Cooler than normal over the weekend with a chance for widely scattered showers in the northeast on Saturday. Chance of showers in the south on Sunday, warming up closer to normal on Monday and Tuesday with a chance for showers. Warmer yet on Wednesday and Thursday with a chance for thunderstorms.

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, May 9, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, May 9, 2014

HEADLINES

-Anniversary of Extension
-Thunderstorms and hail
-Overnight heat burst
-Fishing Opener
-Weekly Weather potpourri
-MPR listener question
-Almanac for May 9th
-Past weather
-Outlook

Topic: 100th Anniversary of the USDA Cooperative Extension System

On May 8, 1914 the Smith-Lever Act was signed creating the USDA National Cooperative Extension System to provide the public with research-based knowledge and tools to improve their lives and livelihoods. This was administered through the land-grant university system in cooperation with counties. Thus the birth of the outreach arm of the University of Minnesota which I work for. Something to celebrate and acknowledge as for over 100 years Extension has improved the lives of Minnesota citizens.

Topic: Thunderstorms and hail

Wednesday and Thursday (May 7-8) brought significant thunderstorms to the state. There were over 50 reports of hail from 20 different counties in Minnesota. Hail over 2 inches in diameter was reported from portions of Stevens, Big Stone, and Dakota Counties, and hail damage to cars was reported from the Duluth area. Some peak wind gusts over 50 mph were reported, and wind damage was evident in a number of communities, including Waseca, Wanamingo, Lonsdale, and Lakeville. Tornadoes were reported near St James, Lake Crystal, and Gaylord, mostly striking the rural landscape, so inflicting little damage. The relatively fast moving thunderstorms left many areas with a quarter to a half inch of rainfall. A number of observers reported over 1 inch including Hewitt (Todd County), Pennock (Kandiyohi County), Ogilvie (Kanabec County), Milaca (Mille Lacs County), Floodwood (St Louis County), Sandy

Lake (Aitkin County), Royalton (Morrison County), New Ulm (Brown County), Rush City (Chisago County), Spring Grove (Houston County), Glencoe (McLeod County), and St Cloud (Stearns County). The largest amount of rainfall reported was from Princeton (Sherburne County) with 3.10 inches on the 7th.

Topic: Overnight heat burst

Decaying thunderstorms over northern Iowa and southern Minnesota during the overnight hours of May 8th produced a significant "heat burst" at some reporting stations. A "heat burst' is produced by descending unsaturated (dry) air aloft as clouds from the thunderstorms decay and lift. As the unsaturated air descends pressure increases, temperature increases (by compression), and dewpoints collapse, producing a very warm downburst of wind. Though somewhat rare in occurrence some "heat bursts" have produced significant rises in temperature in just minutes. Such was the case between 1:00 am and 3:00 am Thursday, May 8th at Clear Lake, IA, Mason City, IA, Albert Lee, MN, and Hollandale, MN. The temperature rose dramatically, with a rise in wind speed, and a drop in dewpoints. The overnight temperature spiked at 76 degrees F at Clear Lake, 79 degrees F at Mason City, 77 degrees F at Hollandale, and 82 degrees F at Albert Lea. At Albert Lea between 1:00 and 2:00 am the temperature rose from 66 degrees F to 82 degrees F, the dewpoint dropped from 57 degrees F to 37 degrees F (a drop of 83 percent RH to 26 percent RH), and winds increased from 8 mph to 25 mph. It also is extremely rare that the high temperature for the day would occur at 2:00AM!

Topic: Fishing Opener

The Minnesota State Climatology Office has posted an interesting narrative about the weather history of the Fishing Opener in our state. For example, those who choose to fish the waters in or near Voyageurs National Park have seen temperature extremes range from 88 degrees F in 1977 to 24 degrees F as recently as 2004. Dense fog occurs about one year in every ten for the Fishing Openeer. You can read more at

http://climate.umn.edu/doc/journal/fish14.htm

Greg Spoden, Minnesota State Climatologist notes that of 122 Minnesota lakes with lake ice-out history, the composite statistics show that this year (2014) average ice out dates are up to 10 days earlier than last year (2013 was one of the latest of all-time), but approximately 8 days later than median ice-out dates. Some far northern lakes still have ice cover this year. For the 2014 Fishing Opener it looks like the morning will start out in the mid 30s to mid 40s F and climb into the 60s F by afternoon on Saturday. There will be an increasing chance for rain showers by mid to late afternoon and into Saturday evening, with somewhat cooler temperatures on Sunday.

Weekly Weather potpourri:

The Office of National Climate Assessment Program issued their latest full report on Climate Change earlier this week. It is officially cited as
Melillo, Jerry M., Terese (T.C.) Richmond, and Gary W. Yohe, Eds., 2014: Climate Change Impacts in the United States: The Third National Climate Assessment. U.S. Global Change Research Program, 841 pp. doi:10.7930/J0Z31WJ2.
It covers all regions of the country as well as all sectors of our natural resources and economy that are being affected by climate change. You can find the report at...

http://nca2014.globalchange.gov/report

It is an 840 page report, too voluminous for most of us, but has very relevant chapters on agriculture, energy, transportation, and other economic sectors, as well as a good narrative on the Midwest landscape including Minnesota. I encourage everyone to read at least a few chapters of this important document. Portions of the report summary, including sections related to specifically to Minnesota and an FAQ chapter can be found posted on our web site at....

http://www.climate.umn.edu/doc/climate_change.htm

USDA Secretary Tom Vilsack offered comments this week on implementation of the new Farm Bill, signed into law on February 7, 2014. He noted that implementation of the new program, especially provisions for the use of risk management tools, were making good progress. You can read more of his comments at....

http://content.govdelivery.com/accounts/USDAOC/bulletins/b643f2

The United Kingdom Meteorological Office announced this week a new partnership with Public Health England and the University of Exeter to look at policy changes and mitigation steps associated with climate change impacts to public health. They will conduct research to improve resilience of health care infrastructure, study how urban planning might be improved, and assess the ecology of infectious diseases. You can read more about this new partnership at...

http://www.metoffice.gov.uk/news/releases/archive/2014/health-hpru

The UCAR COMET program released a new online educational module this week on "Weather Observing Fundamentals." For those educators and organizations that work with volunteer observers this resource has some valuable recommendations and

lessons. You can access this through the MetEd section of the UCAR web site, and use the lesson plan if you sign up as a MetEd user.....

https://www.meted.ucar.edu/training_module.php?id=1097#.U2o-NCiZhVC

Recent research finds that the Emerald Ash Borer was in the USA many years before it was first detected by in 2002. A paper by researchers at Michigan State University published in the journal Diversity and Distributionns documents the presence of this insect in southern Michigan in the early 1990s. It probably arrived by wood crating materials or wooden pallets that came from shipments of goods from Asia. You can read more about this paper at...

http://www.sciencedaily.com/releases/2014/05/140507132746.htm

MPR listener question: When is the peak hail season in Minnesota?

Answer: Recent studies by NOAA's Severe Storms Lab in Oklahoma show the peak of the hail season in Minnesota centers on June 1st. So a few weeks either side of that date encompass a high population of the historical hail storms.

Twin Cities Almanac for May 9th:

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 45 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 9th:

MSP weather records for this date include: highest daily maximum temperature of 91 degrees F in 1887 and 1987; lowest daily maximum temperature of 40 degrees F in 1924; lowest daily minimum temperature is 27 degrees F in 1966; highest daily minimum temperature of 69 F in 1896; record precipitation of 1.14 inches in 1918; and a record 0.4 inches of snow fell on this date in 1924

Average dew point for May 9th is 39 degrees F, with a maximum of 66 degrees F in 1985 and a minimum of 10 degrees F in 1966.

All-time state records for May 9th:

The state record high temperature for this date is 99 degrees F at Milan (Chippewa County) in 1928. The state record low temperature for this date is 9 degrees F at Isabella (Lake County) in 1966. State record precipitation for this date is 3.22 inches

at St Cloud (Stearns County) in 1979; and state record snowfall for this date is 4.0 inches at Leech Lake in 1902, at Farmington in 1924, and at Maple Plain and New Ulm in 1938

Past Weather Features:

Snowfall dominated the weather scene in Minnesota over May 6-10, 1924. With temperatures steadily in the 30s and 40s F it snowed almost everyday. Little field work could be done as fields remained too wet and cold during the week. Snowfall totals ranged from 4 to 9 inches in many places.

May 8-10, 1928 brought a spring Heat Wave to Minnesota with dozens of record-setting high temperatures. Over 20 communities reported daytime highs of 90 degrees F or greater, setting many records for heat that still stand today.

By far the coldest May 9th of all-time occurred in 1966. A cold front on May 8th ushered in very cold polar air across Minnesota. Nearly all observers reported frost on the morning of May 9th, with many reports of low temperatures in the teens and twenties F. Temperatures fell into the teens F as far south as Preston and Caledonia.

Strong thunderstorms brought large hail and heavy rains to Wright, Mille Lacs, Kanabec, Isanti, and Brown Counties over May 9-10, 1979. Rainfall totals ranging from 3-8 inches caused flooding on the Rum
River and washed out or flooded a number of roads.

Outlook:

Mostly dry to start Saturday, with near normal temperatures. A chance for showers and thunderstorms later in the day. Cooler on Sunday, with an increasing chance for showers toward evening. Chance for showers and thunderstorms Monday and Tuesday as well, with cooler than normal temperatures. Drier weather towards the end of next week.

Further Information:

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

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Minnesota WeatherTalk Newsletter for Friday, May 16, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, May 16, 2014

HEADLINES

-Rain followed by frost
-New Seasonal Climate Outlook
-May sunshine
-Weekly Weather potpourri
-MPR listener question
-Almanac for May 16th
-Past weather
-Outlook

Topic: Rain followed by frost

The latter part of the weekend and early part of the week brought significant rainfalls to many parts of the state, putting a halt to farm field work. Some observers reported record-setting rainfalls on May 12th, including: 2.08 inches at Hastings; 1.55 inches at Winnebago; 1.42 inches at Waseca; 1.40 inches at Springfield; 1.13 inches at Marshall; and 1.02 inches at Windom. It has been so rainy in some parts of the state that a few observers have already reported well over a full May's worth of rain, including Floodwood with 4.27 inches and Hibbing with 4.01 inches.

Following the rain, skies cleared, humidity dropped, and the nights got very cool, bringing frosts to many areas of the state. In southwestern Minnesota, Windom and Pipestone both reported just 32 degrees on Thursday morning (May 15th), while in west-central Minnesota Browns Valley reported a new record low for May 15th of just 30 degrees F. Further north in the Red River Valley low temperatures at St Vincent and Hallock were 27 degrees F and 28 degrees F, respectively on Thursday. Friday morning brought more widespread frosts, and some new record daily low temperatures, including 25 degrees F at Crane Lake, 27 degrees F at Kabetogama, and 27 degrees F at Worthington.

Topic: New Seasonal Climate Outlook

On Thursday, May 15th the NOAA Climate Prediction Center (CPC) issued a new seasonal outlook for the nation covering the period from June through August. For the Western Great Lakes and High Plains Regions (including Minnesota) the outlook favors cooler than normal temperature conditions. The outlook stipulates equal chances for above or below normal precipitation over this time period. With the month of May trending cooler than normal, Minnesota is in a period of 7 consecutive months with cooler than normal average monthly temperatures.

Topic: May sunshine

Given the very slow onset of spring this year, and only 3 sunny days in the month of May so far, I thought it would be good to remind you of the power of the spring sun, so well depicted in this Robert Louis Stevenson poem:

Great is the sun, and wide he goes,
Through empty heaven without repose;
And in the blue and glowing days
More thick than rain he showers his rays.
Above the hills, along the blue,
Round the bright air with footing true.
To please the child, to paint the rose,
The gardener of the World, he goes.

Weekly Weather potpourri:

The IPCC has posted an excellent explanation of climate change detection techniques used to quantify both natural and humani-induced climate change with respect to temperature. You can view this online at

http://www.climatechange2013.org/images/report/WG1AR5_Ch10SM_Box10.2Fig1animation.mp4

Scientists from the University of Reading published a recent article in Environmental Research Letters which documents a relationships between the solar wind fluctuations from the sun and lightning strikes on Earth. The scientists found that when the speed and intensity of the solar wind striking the Earth's atmosphere increasing, so does the rate of lightning strikes. You can read more about this study at....

http://www.bbc.com/news/science-environment-27406358

NOAA scientists published a paper in the journal Nature this week that documents a poleward migration in the maximum intensity of tropical cyclones, most notably in

the Pacific Ocean and the Southern Indian Ocean. This study suggests that some regions closer to the equator may experience less risk of tropical cyclones, while coastal regions and infrastructure located at higher latitude positions may experience more risk. You can read more about this study at...

http://www.noaanews.noaa.gov/stories2014/20140514_tropicalcyclone_poleward.html

The National Wildlife Federation released a new report titled "Climate-Smart Conservation: Putting Adaptation Principles into Practice." It is a very interesting and comprehensive report. The report was a joint effort with the National Park Service, US Forest Service, US Fisheries and Wildlife Service, NOAA, USGS, and EPA. You can find the report at...

http://www.nwf.org/pdf/Climate-Smart-Conservation/NWF-Climate-Smart-Conservation_5-08-14.pdf

MPR listener question: Here in Grand Rapids, MN the month of May is averaging colder than normal, same as the previous 7 months (back to October of 2013). So this will be 8 consecutive months with colder than average monthly temperatures. Is this close to a record string of colder than normal months?

Answer: No it is not a record, but you are in rare statistical territory. Using the statewide climate data base and reference to the 20th Century monthly normal temperatures for Minnesota, there have only been 8 cases when the number of consecutive cooler than normal months was 7 or greater. The only persistence of cooler than normal months lasting longer than the present streak (8 months) were: December 1949 to August 1950 (9 months); November 1978 to August 1979 (10 months); and November 1903 to October 1904 (12 months).

MPR listener question: With the reluctant spring we're having and only a few 70+ high temperatures, I'm wondering what is the latest into the spring the Twin Cities has gone without an 80+ F temperature?

Answer: I am not surprised that this question should come up. Seven consecutive months with below normal average monthly temperatures across our state, and over 73 percent of all days so far in 2014 have brought below normal temperature readings. In the Twin Cities the thermometer has touched 70 degrees F or higher only 3 times this year (high of 74 F on April 20). Since 1873 there have only been 10 years when spring did not bring an 80 degrees F temperature to the Twin Cities until the month of June, the last of which was 1983 (first reading of 80 F for the year on June 8th). The

latest ever first reading of 80 degrees F or higher in the Twin Cities climate record occurred on June 16th in both 1878 and 1883.

Twin Cities Almanac for May 16th:

The average MSP high temperature for this date is 69 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 48 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for May 16th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1934; lowest daily maximum temperature of 48 degrees F in 1950 and 1968; lowest daily minimum temperature is 31 degrees F in 1890 and 1929; highest daily minimum temperature of 68 F in 1962; record precipitation of 1.10 inches in 1905; and a record 0.1 inches of snow fell on this date in 1929

Average dew point for May 16th is 42 degrees F, with a maximum of 71 degrees F in 1962 and a minimum of 16 degrees F in 1973.

All-time state records for May 16th:

The state record high temperature for this date is 100 degrees F at at several locations, including Milan (Chippewa County) and Beardsley (Big Stone County) in 1934. The state record low temperature for this date is 12 degrees F at Meadowlands (St Louis County) in 1929. State record precipitation for this date is 5.00 inches at St Cloud (Stearns County) in 1894; and state record snowfall for this date is 2.5 inches at Mahoning Mine (St Louis County) in 1932.

Past Weather Features:

May 15-16, 1929 brought a statewide cold snap to Minnesota with widespread frosts. Fortunately many crops had only recently been planed so they were not exposed to frost damage. Overnight temperatures fell into the teens and twenties nearly everywhere. It was just 26 degrees F as far south as Waseca and Pipestone, while in the north Grand Rapids fell to 14 degrees F.

It is not surprising that the hottest May 16th in state history is from 1934. Over 40 Minnesota communities reported daytime highs in the 90s F and several reached 100 degrees F. May of 1934 was the 2nd hottest in state history overall, as many observers reported several 90 F days during the month.

A winter type storm brought snow to northern Minnesota over May 16-17, 1950. Among the observers reporting measurable snowfall, Hibbing, Duluth, Virginia, and Pokegama Dam.

May 15-16, 1969 heavy thunderstorms brought heavy rains to the central and northern counties of the state. Many observers reported 2-3 inches and some roads were flooded and close for a time. The heavy rains significantly delayed small grain planting in the Red River Valley.

Outlook:

Mostly sunny over the weekend with warmer temperatures (at least closer to normal). Increasing cloudiness on Monday and Tuesday with a chance for showers and thunderstorms. Warmer and drier on Wednesday and Thursday as temperatures approach normal for this time of year.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, May 23, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, May 23, 2014

HEADLINES

-Record rains on May 19th
-New climate data retrieval service
-Weekly Weather potpourri
-MPR listener question
-Almanac for May 23rd
-Past weather
-Outlook

Topic: Record rains on May 19th

Heavy thunderstorms brought record rainfall amounts on Monday, May 19th to parts of Minnesota. Artichoke Lake (Big Stone County) and Hibbing-Chisholm (St Louis County) reported a record 1.13 inches, while Hastings Dam (Dakota County) reported a record 1.10 inches. In and around the Twin Cities a number of observers reported new daily rainfall records as well. MSP Airport received 2.25 inches, St Paul Downtown airport received 2.07 inches, Stillwater 1.82 inches, and Farmington 1.67 inches. The University of Minnesota St Paul Campus also received a record 1.81 inches. For some observers this was the second consecutive May 19th that brought record rainfall. MSP had reported a new record amount of 1.16 inches on that date in 2013.

Many areas of the state have now reported over 4 inches of rainfall for the month including, Grand Portage, Floodwood, Hibbing, Embarrass, St Cloud, Lester Prairie, Mora, Chanhassen, and Hastings. Paul Huttner wrote this week in the Updraft blog about the Twin Cities also setting a pace for one of its wettest years in history, with a precipitation total of 13.80 inches so far this year. Other locations that fall into the category of extremely wet years so far include: St Cloud with 13.76 inches, New Hope with 15.04 inches, Caledonia with 14.85 inches, and Forest Lake with 13.84 inches.

Topic: New climate data retrieval service

The Minnesota State Climatology Office now offers a new, simpler climate data retrieval service online. This allows free public access to climate histories from both cooperative observer locations, as well as automated weather stations used by the National Weather Service and the Federal Aviation Administration. You can access this new data service at....

http://www.dnr.state.mn.us/climate/historical/acis_stn_meta.html

Weekly Weather potpourri:

NOAA reported this week that April was the 350th consecutive month with a global average monthly temperature that was at or above 20th Century mean value. The last time a global monthly average temperature was below the 20th Century mean value was February of 1985. So far 2014 is tracking to be the 6th warmest year on record when looking at combined land and ocean temperatures.

Brad Rippey, meteorologist for the USDA commented this week that California is locked in on drought for the summer of 2014 and it will likely be compounded by warmer than normal temperatures as well. The Sierra Nevada snow pack this winter was only about 24 percent of normal, providing much less water than it usually does. Some California crops will go unplanted, including some cotton, rice and vegetables. Farmers may leave fields fallow in some areas and then plant next year.

The NOAA Midwestern Regional Climate Center released the newest version of their newsletter "The Climate Observer" this week. It contains interesting articles about winter impacts on vineyards in Ohio, the forming El Nino in the equatorial Pacific Ocean, and an assessment of the unusual spring season. You can read it online at....

http://mrcc.isws.illinois.edu/cliwatch/eNews/observer_201405_full.html?utm_source=eNews%202014-0521&utm_medium=email&utm_campaign=eNews

The NOAA National Hurricane Center was issuing advisories on Tropical Storm Amanda in the Eastern Pacific Ocean this week. It formed about 620 miles southwest of Manzanillo, Mexico this week and is expected to strengthen somewhat over the weekend and into early next week, perhaps reaching Category I hurricane status. This storm is expected to remain out to sea and not threaten the west coast of Mexico.

MPR listener question: I have been waiting to transplant some vegetable crops from their potted homes on my front porch to the garden outside. Do you think we are now past the threat of frost for the spring?

Answer: Yes for most of the state except the extreme northeast where they are still reporting some soil frost (St Louis, Lake, and Cook Counties). In fact it looks like most overnight low temperatures will be in the 40s and 50s F to finish out May and start the month of June.

Twin Cities Almanac for May 23rd:

The average MSP high temperature for this date is 71 degrees F (plus or minus 8 degrees F standard deviation), while the average low is 50 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for May 23rd:

MSP weather records for this date include: highest daily maximum temperature of 88 degrees F in 1874 and 2010; lowest daily maximum temperature of 52 degrees F in 2001 and 2004; lowest daily minimum temperature is 28 degrees F in 1963; highest daily minimum temperature of 73 F in 2010; record precipitation of 1.56 inches in 1975; and there has been no snow on this date.

Average dew point for May 23rd is 47 degrees F, with a maximum of 69 degrees F in 1991 and a minimum of 22 degrees F in 2009.

All-time state records for May 23rd:

The state record high temperature for this date is 97 degrees F at Fergus Falls (Otter Tail County) in 1928. The state record low temperature for this date is 18 degrees F at Sawbill Camp (Cook County) in 1935. State record precipitation for this date is 4.54 inches at Park Rapids (Hubbard County) in 1933; and state record snowfall for this date is 0.7 inches at Fergus Falls (Otter Tail County) in 1924.

Past Weather Features:

May 23, 1924 brought snow to parts of western and northern Minnesota. It was very short-lived as temperatures warmed into the 60s and 70s F.

May 23-25, 1926 brought summer heat to many parts of western and southern Minnesota. Over 10 communities reported daytime highs in the 90s F, but the air was exceptionally dry, so it cooled down in to the 40s and 50s F overnight. It was a warm month overall and most of the crops were planted by the third week of May.

May 23, 1933 brought one of the strongest thunderstorms to occur during the Dust Bowl Era. Heavy rains brought flash flooding to parts of northwestern Minnesota.

Ada and Mahnomen received over 2 inches of rain, while Park Rapids received over 4.5 inches.

The last episode of damaging spring frost so late in May occurred over May 21-23, 1963 when overnight temperatures fell into the 20s F on a statewide basis. Temperatures fell as low as 21 degrees F in the Red River Valley, and even in the normally moderate climate of southeastern Minnesota, Preston dropped to just 22 degrees F. Some corn fields were damaged and had to be replanted.

Outlook:

Warmer than normal temperatures for the Memorial Weekend with increasing chances for showers and thunderstorms later on Sunday and Monday. Drier, but continued warm by mid-week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, May 30, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, May 30, 2014

HEADLINES

-Heat and dewpoints
-Preliminary climate summary for May
-Oxfam Forum, June 3rd
-Weekly Weather potpourri
-MPR listener question
-Almanac for May 30th
-Past weather
-Outlook

Topic: Heat and dewpoints

The Memorial Weekend began a string of warmer than normal days (8 days in a row) in Minnesota not seen since the end of last September. The long wait for the return of 80 F weather ended as many observers reported consecutive days with afternoon highs of 80 degrees F or above. Some individual climate observers reported new record daily high temperatures this week, including the following:
May 24: 91 degrees F at Crookston (tied 1967), 87 degrees F at Thorhult, and 84 degrees F at Duluth
May 25: 85 degrees F at Duluth
May 26: 88 degrees F at Minnesota City
May 27: 87 degrees F at Aitkin, and 88 degrees F at Wolf Ridge

In addition, dewpoints rose to near record levels at many southern Minnesota locations, making the outside temperatures feel tropical and more like mid-summer. Over May 26-27 dewpoints ranged between 65 and 70 degrees F in many counties.

Topic: Preliminary climate summary for May 2014

Despite the warmer than normal temperatures over the last week of the month, some observers around the state are reporting average May temperatures that are 1 to 2 degrees F cooler than normal. A number of other observers are reporting near normal May mean temperature values (plus or minus 1 F of normal). Extremes for the month

ranged from 91 degrees F at Crookston on the 24th to 23 degrees F at Park Rapids and Crane Lake on the 17th.

Moisture wise, many central and northern Minnesota communities reported above normal rainfall for May, while some areas of western and southern Minnesota reported less than normal. This pattern may be modified by the expected heavy rainfall on Saturday, May 31st. A number of communities had a very wet May indeed, including Hibbing and Mora with 5.06 inches, Milaca with 5.14 inches, Cambridge with 5.18 inches, and Lester Prairie with 5.23 inches. There were numerous reports of hail during the month, and two tornadoes were reported on May 8th, near St James and Madelia. Straight line wind damage occurred near Waseca, Montgomery, and Red Wing damaging buildings, trees, and powerlines.

This cool, wet spring produced a late planting season for farmers, but nearly all of the state corn acreage was planted by May 30, and over half of the soybean acreage was planted as well. Southern Minnesota farmers began harvesting alfalfa the last week of the month. Moderate drought remained in the extreme southwestern counties of the state.

Topic: Oxfam Forum on June 3rd

On Tuesday, June 3, 2014 beginning at 6:30pm Oxfam America will host a forum titled "Rising Water, Dwindling Rain: Our Food System Challenged by Climate Change." This will take place at the Institute on the Environment (1954 Buford Ave) on the University of Minnesota St Paul Campus. The program includes Peruvian farmer, Virginia Ñuñonca, who will speak about her experience adapting to climate change. Joining her, will be Jerry Hatfield, USDA-ARS scientist (Ames, IA) and lead author of the agriculture chapter in the Nobel Prize winning 2007 IPCC report; and Richard Oswald, writer and president of Missouri Farmers Union whose farm was flooded when the Missouri River levees breached in the floods of 2011. I will be moderating the discussion. We will hear about climate change impacts on agriculture that are already occurring, and discuss recommendations for effective mitigation and adaptation. If interested in this program, please contact Jim French at 620-757-3325 or jfrench@oxfamamerica.org

Weekly Weather potpourri:

EPA administrator Gina McCarthy visited St Paul this week and briefly toured the Science Museum of Minnesota where she saw the highly efficient heat-recovery system that recycles waste energy and cuts the overall museum's energy usage by 40 percent. She was visiting with city and state officials about energy conservation and

the need for community engagement as the EPA moves forward next week with new, flexible regulations to curb carbon emissions from coal-burning power plants.

Heavy rains and strong thunderstorms battered the coastlines of LA, MS, and AL on May 29th. Many observers reported 6-8 inches of rainfall, with widespread street flooding. Fortunately the weekend includes a drier forecast for residents there.

As of May 28th ice floes were still present on some southern shoreline of Lake Superior. In addition over 70 percent of Hudson Bay was still covered with sea ice. You can check the daily and weekly charts for ice coverage at the Environment Canada web site.....

http://www.ec.gc.ca/glaces-ice/

A Heat Wave plagued portions of northern and central China this week with record-setting high temperatures. Daytime highs ranged from 102 to 112 degrees F in many cities. Beijing hit a new record high temperature of 104 degrees F on Thursday, May29th. The highest reading in that city since 1951.

A study published this week in the journal Environmental Research Letters finds that streaming video to a laptop or tablet computer is much better for the environment than using DVD players because it requires less energy and leaves a smaller carbon footprint. The study is a comprehensive examination of the energy consumed in producing and watching video streaming. You can read more about it at....

http://www.sciencedaily.com/releases/2014/05/140528204303.htm

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 19 minutes north latitude, Flag Island on Lake of the Words is the most northerly climate station in Minnesota, and the most northerly in the contiguous 48 states. 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 425 miles. Obviously, Flag Island is a much colder place on average than either Spring Grove or Harmony. For example earlier this month on May 21st when Lake of the Woods still had ice cover, Flag Island reported an afternoon high temperature of 48 degrees F, while Spring Grove reported an afternoon high of 80 degrees F.

Twin Cities Almanac for May 30th:

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 53 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for May 30th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1934; lowest daily maximum temperature of 54 degrees F in 1922; lowest daily minimum temperature is 37 degrees F in 1947; highest daily minimum temperature of 69 F in 1988; record precipitation of 2.04 inches in 1877; and there has been no snow on this date.

Average dew point for May 30th is 51 degrees F, with a maximum of 72 degrees F in 1918 and a minimum of 24 degrees F in 1964.

All-time state records for May 30th:

The state record high temperature for this date is 108 degrees F at Pipestone (Pipestone County) in 1934. The state record low temperature for this date is 20 degrees F at Pokegama Dam (Itasca County) in 1889. State record precipitation for this date is 5.63 inches at Preston (Fillmore County) in 1980; and state record snowfall for this date is 0.1 inches at Bemidji (Beltrami County) in 1897.

Past Weather Features:

The hottest May 30th in state history occurred in 1934. The month concluded with a 5-day Heat Wave and on the 30th when nearly every observer in the state set a new high temperature record. Over 55 communities hit 100 degrees F or higher that day. The cool spot in the state was Grand Marais which reported a high of 69 degrees F.

May 30, 1947 brought widespread damaging frost to many agricultural counties in Minnesota. Many observers reported morning lows in the 20s F, including 28 degrees F at Campbell and Beardsley, and 29 degrees F at Windom and Crookston.

Very heavy thunderstorms flood farm fields in northwestern Minnesota over May 29-30, 1949. The rain was accompanied by hail and high winds. Over 4 inches of rain fell at Oklee, Twin Valley, and Red Lake. Mahnomen and Leonard reported over 5 inches, while Thief River Falls received over 8 inches of rainfall.

In the midst of the drought year of 1980, very heavy thunderstorms brought flooding rainfall to southern counties over May 30-31, 1980. Blue Earth, Grand Meadow,

Preston, and Winona received over 5 inches of rainfall, while Lanesboro reported 6.36 inches.

Outlook:

Continued warmer than normal temperatures through the weekend, with daily chances for showers and thunderstorms. Drier and cooler by Tuesday and Wednesday next week with temperatures closer to normal, then increasing chances for showers and thunderstorms later in 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

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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.

Minnesota WeatherTalk Newsletter for Friday, June 6, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, June 6, 2014

HEADLINES

-Wet start to June
-Weekly Weather potpourri
-MPR listener question
-Almanac for June 6th
-Past weather
-Outlook

Topic: Wet start to June

Last weekend the month of May concluded on a wet note, and the month of June began very wet as well. Many weather observers around the state reported 1-2 inches of rainfall over June 1-2, while a few others received nearly a month's worth of rain producing flood warnings on several local rivers and streams. In the northern counties both Hibbing and Kabetogama reported over 3.5 inches of rainfall, while in west-central areas Dawson reported over 3 inches. The heaviest rains were concentrated in central and southern counties. Belle Plaine reported nearly 5 inches as did Onamia. In the south Redwood Falls reported 4.75 inches, Luverne 4.13 inches, and Winnebago 5.29 inches. Many farmers reported standing ponds of water in their freshly planted fields. Portions of the Crow River, Sauk River, and Buffalo Creek all rose to near or above flood stage due to heavy runoff.

Yet more rainfall for the weekend is predicted, though more modest amounts ranging from 0.25 to 0.75 inches. Some farmers are still trying to wrap-up soybean planting for the season and they are hoping the rainfall will miss them this weekend. In addition a number of growers are concerned about the loss of nitrogen fertilizer through the soil profile as a result of the heavy rains that came at the end of May and beginning of June. Where there is a question or concern about whether to apply additional nitrogen to a corn crop that has already emerged, growers are encouraged to read the latest edition of Extension Crop News where you can find recommendations related to this topic. Please go to.....

http://blog.lib.umn.edu/efans/cropnews/2014/06/the-annual-nitrogen-newsletter.html

More large hail was reported on Thursday, June 5th in some southwestern counties, but much of the other severe weather remained well south of Minnesota.

Weekly Weather potpourri:

The United Kingdom Meteorological Office had two significant press releases this week: one described their work in assessing future climate change implications for heavy rainfall events and they found that rainfalls of 1 inch or greater will like increase in frequency a great deal; the other press release is a fascinating description of the forecasting tools that were used to assist the Allies in the D-Day invasion of Normandy 70 years ago. You can read more at....

http://www.metoffice.gov.uk/news/in-depth/D-Day-70th-anniversary

Tuesday, June 3rd brought an outbreak of severe weather to portions of NE, IA, KS, and MO. There were 15 reports of tornadoes and hundreds of reports of large hail and strong thunderstorm winds. One observer in NE reported 3-inch diameter hail, tea cup size hail according to the NOAA Storm Prediction Center.

According to the weekly USDA drought assessment "drought in the U.S. improved slightly in May 2014, but most of the improvements were in the central states. Intense drought was entrenched in California, parts of the West and Southwest, and in Texas, Oklahoma, and Kansas. The NDMC and drought observers documented impacts related to water supply for agricultural and municipal use, wildfire, and forecasts of reduced agricultural production. Moderate drought is only present on less than 4 percent of the Minnesota landscape.

As of Thursday, June 5, 2014 there was still some ice on Lake Superior around Picture Rocks National Lakeshore in upper Michigan. It was expected to remain a few more days, the latest appearance of ice on the big lake since 1996.

MPR listener question: How does the daily maximum temperature in Minnesota vary from summer to winter in terms of the time of occurrence? It seems in the summer that it actually occurs after I get home from work.

Answer: Assuming you have a day job, you are absolutely right! In winter, the time of the daily maximum temperature is most generally between 2:00 and 3:00 pm, lagging solar noon (maximum elevation of the sun) slightly. However, in the summer (June, July, August), the time of maximum daily temperature is typically 5:00 to 6:00 pm, lagging solar noon by several hours. Thus, that cold lemonade, ice tea, or beer you are drinking on the front porch after work is not just to relieve the stress of your work day, it is also intended to make the hottest time of the day a little more tolerable!

Twin Cities Almanac for June 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 55 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for June 6th:

MSP weather records for this date include: highest daily maximum temperature of 97 degrees F in 2011; lowest daily maximum temperature of 52 degrees F in 2009; lowest daily minimum temperature is 36 degrees F in 1897; highest daily minimum temperature of 74 F in 1925; record precipitation of 1.59 inches in 1974; and there has been no snow on this date.

Average dew point for June 6th is 53 degrees F, with a maximum of 73 degrees F in 1925 and a minimum of 26 degrees F in 1926.

All-time state records for June 6th:

The state record high temperature for this date is 106 degrees F at Pipestone (Pipestone County) in 1933. The state record low temperature for this date is 20 degrees F at Warroad (Roseau County) in 1952 and at Remer (Cass County) in 1985. State record precipitation for this date is 6.51 inches at Luverne (Rock County) in 1896; and no measurable snowfall has occurred on this date.

Past Weather Features:

June 5-8, 1896 brought very heavy rains to many parts of the state. Bird Island and Detroit Lakes received over 5 inches of rainfall, while Luverne and Fergus Falls receiver over 6 inches. Many fields were underwater for several days, and some crops had to be replanted.

The coldest June 6th in state history was in 1897 when widespread frosts were reported. Overnight temperatures fell into the 20s F, and not just in the northern counties either. Farmington (Dakota County) reported a morning low of 28 degrees F. At Grand Portage on the north shore of Lake Superior the temperature got no higher than 40 degrees F that day.

By far the hottest June 6th in state history occurred in 1933. Most weather observers, except for those in northeastern counties, reported a maximum temperature of 90 degrees F or greater. Pipestone, New Ulm, and Fairmont reported highs over 100 degrees F. June of the 1933 turned out to be the hottest in state history as well.

Three tornadoes rolled across Roseau County on June 6, 1999 between 3pm and 4pm. Fortunately none did any serious damage. In southern Minnesota widespread thunderstorms brought large hail and damaging winds, with reported gusts of 60 mph.

Outlook:

Cooler than normal temperatures through the weekend and early next week, with chances for showers and thunderstorms early Saturday. Mostly sunny on Sunday. Warmer temperatures by Tuesday and Wednesday, with more showers and thunderstorms towards the end of next week.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, June 13, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, June 13, 2014

HEADLINES

-Above normal June rainfall already!
-Temperature comparisons
-Weekly Weather potpourri
-MPR listener question
-Almanac for June 13th
-Past weather
-Outlook

Topic: Above normal June rainfall already!

The Waskish observer reported a thunderstorm rainfall of 3.46 inches on June 12 (Thursday), a record for the date and the second greatest daily amount ever measured at that station in Beltrami County. Several observers have already reported heavy thunderstorms this month.

Barely two weeks into June a number of climate observers have already reported well above normal rainfall for the month, thanks to some heavy doses from thunderstorms. Aome locations will abundant amounts of rainfall so far include:
5.67 inches at Hibbing
4.25 inches at Benson
4.69 inches at Dawson
4.77 inches at Pine River Dam
5.36 inches at International Falls
5.11 inches at Leech Lake
5.51 inches at Belle Plaine
4.86 inches at Prior Lake
5.17 inches at Waskish
5.71 inches at Onamia
5.92 inches at Kabetogama
6.01 inches at Luverne
5.35 inches at Redwood Falls

5.56 inches at Faribault
5.52 inches at Winnebago
6.30 inches at Cass Lake
6.78 inches at Watertown

Topic: Temperature Comparisons

Much of Minnesota was 10-15 degrees F cooler than normal with highs only in the 50s and 60s F on Thursday, June 12. This followed a string of days with daytime temperatures primarily in the 70s and 80s F. Elsewhere, Death Valley has seen a run of above normal temperatures prevail; Here are the highs, lows, and departure from normal for recent days in June there:

Date High Low Mean Departure from Normal
June 6 116 F 85 F 100 F +7 F
June 7 118 F 85 F 101 F +8 F
June 8 120 F 83 F 101 F +8 F
June 9 120 F 82 F 101 F +8 F

In the climate of Death Valley air conditioning is not a matter of comfort, it is a matter of survivability!

Weekly Weather potpourri:

NOAA has released a new fact sheet on "How Climate Change Affects Extreme Events." It provides a good background on how climate science uses both observations and models to address this question. Further it shows the basis for expectations that Heat Waves and intense rainfall events will continue to increase in frequency with climate change. You can find a version of this fact sheet online at...

http://nrc.noaa.gov/sites/nrc/Documents/SoS%20Fact%20Sheets/SoS.Fact.Sheet_Extremes_April.2014_FINAL.pdf

Tropical Cyclone Nanauk was churning in the Arabian Sea this week well off to the east of Oman. It reached peak intensity on Thursday with wind gusts over 80 mph and sea wave heights over 20 feet. By the weekend it is expected to dissipate at seaa.

Hurricane Cristina was being watched by the NOAA National Hurricane Center in the Eastern Pacific Ocean well off to the west of Puerto Vallarta, Mexico. It had maximum wind gusts over 120 mph and sea wave heights up to 25 feet. Over the weekend the cloud shield from Cristina may bring rain to the southern portion of Baja

California, but the storm is mostly expected to remain out to sea and dissipate by Monday.

MPR listener question: With the wet start to this month I realized that we have had a string of years bringing wet Junes to Minnesota. How many June monthly record rainfalls have been set in recent years?

Answer: Indeed, beginning with June of 2010 we have seen a remarkable string of wet Junes prevail. Some of the monthly records set include the following,
For 2010: 9.64 inches at Waseca, 10.66 inches at La Crescent, and 15.63 inches at Mapleton
For 2011: 8.11 inches at Slayton
For 2012: 10.03 inches at Duluth (modern era record), 13.93 inches at Floodwood, 13.86 inches at Two Harbors, 12.64 inches at Cloquet, 13.03 inches at Wright, 15.11 inches at Cannon Falls, and 13.08 inches at Red Wing
For 2013: 10.10 inches at Glencoe, 12.58 inches at Wells, and 13.26 inches at Spring Grove,

With the very wet start to this month some observers may approach their record wettest June, we'll see.

Twin Cities Almanac for June 13th:

The average MSP high temperature for this date is 79 degrees F (plus or minus 9 degrees F standard deviation), while the average low is 58 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for June 13th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1956; lowest daily maximum temperature of 49 degrees F in 1947; lowest daily minimum temperature is 37 degrees F in 1969; highest daily minimum temperature of 77 F in 1956; record precipitation of 2.37 inches in 2001; and there has been no snow on this date.

Average dew point for June 13th is 55 degrees F, with a maximum of 74 degrees F in 2001 and a minimum of 29 degrees F in 1933.

All-time state records for June 13th

The state record high temperature for this date is 104 degrees F at Redwood Falls (Redwood County) in 1956. The state record low temperature for this date is 25

degrees F at Cotton (St Louis County) in 1969. State record precipitation for this date is 6.08 inches at Red Wing (Goodhue County) in 1950; and no measurable snowfall has occurred on this date.

Past Weather Features:

June 10-13, 1956 brought a Heat Wave to Minnesota. Nearly every observer in the state saw daytime temperatures reach into the 90s F, except for Grand Marais which only reached a maximum of 82 degrees F. A dozen Minnesota cities hit the century mark in temperature with nighttime lows only falling into the 70s F.

The coldest June 13th in state history occurred in 1969 when frost swept across many northern communities. Over a dozen communities saw the thermometer drop into the 20s F, and ground frost was reported as far south as Luverne.

June 13, 1991 brought dangerous and disruptive weather to the U.S. Open Golf Championships being held at Hazeltine National Golf Club in Chaska. During first round play a thunderstorm brought rain and lightning to the course suspending play shortly before 1:00 pm. Six spectators taking cover were injured when the tree nearby the 11th hole tee was struck by a lightning bolt. One of the people died of cardiac arrest. For the past several years meteorologists from Schneider Electric (with offices in Burnsville, MN) have provided on-site forecasting for PGA events.

Outlook:

Cooler than normal temperatures prevalent throughout the weekend, with daily chances for showers and thunderstorms, especially late Saturday into early Sunday. Warming up to near normal Monday and mostly dry, then increasing cloudiness for Tuesday through Thursday with chances for showers and thunderstorms.

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Minnesota WeatherTalk Newsletter for Friday, June 20, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, June 20, 2014

HEADLINES

-Historic Heavy Rainfall
-New Seasonal Climate Outlook
-Summer Solstice
-Weekly Weather potpourri
-MPR listener question
-Almanac for June 20th
-Past weather
-Outlook

Topic: Historic Heavy Rainfall

For the first time since July of 2011 there is no spot on the Minnesota landscape designated to be in drought! I think we all know why, another historically wet month of June is upon us. Four of the last five Junes have brought record setting rainfalls to some parts of the state. The most remarkable feature of this June is how widespread (geographically) these record-setting rainfalls have been.

Many of these record rains have occurred in the past week. A sampling of day to day values includes:
June 15: 5.20" at Lake Wilson; 4.41" at Red Wing; 3.73" at Worthington; 3.57" at Luverne; 3.34" at Tracy; 3.30" at Slayton; 3.29" at Springfield; 2.80" at Marshall; 2.33" at Hastings; 2.18" at Pipestone; 2.01" at Hawley; and 1.87" at Ada.
June 16: 2.00" at Amboy; 1.49" at Waskish; and 1.23" at Red Lake Falls
June 17: 3.70" at Winona; 3.29" at Lakefield; 3.29" at Austin; 2.95" at Grand Meadow; 2.95" at Minnesota City; 2.79" at Albert Lea; 2.64" at Spring Valley; 2.57" at Wells; 2.53" at Luverne; 2.37" at Sherburn; 2.13: at Blue Earth; and 2.02" at Winnebago.
June 18: 3.51" at North Mankato; 2.37" at Redwood Falls; and 2.14" at New Ulm.
June 19: 5.10: at Redwood Falls; 4.87" at Gaylord; 4.75" at Belle Plaine; 4.13" at MSP Airport; 3.50" at Springfield; 3.31" at Hawley; 3.22" at Chaska; 3.13" at Milan;

3.06" at Glencoe; 2.68" at Breckenridge; 2.20" at Bird Island; and 2.08" at Rosemount.

Daily reports from observers outside the National Weather Service Cooperative Network indicated additional daily rainfall amounts ranged from 5 to 6 inches in some places, but to the best of my knowledge no statewide daily rainfall records were broken. The associated effects of a historically wet week included uncomfortably high dewpoints (as high as 72 F in some southern counties), and widespread flood warnings for many of Minnesota's rivers including the Rock River in the SW where a record flood crest was observed, and the Rainy River along the Canadian Border, also where a record flood crest was observed.

Monthly totals for June rainfall already stand at record values for many observer locations, including: 13.69" at Redwood Falls, 13.20" at Chaska; 13.00" at Luverne; 12.23" at Waseca; 8.26" at Ada; 10.20" at Lakefield; and 9.62" at Kabetogama. The 10.76" of rain at MSP so far this June ranks 2nd historically to 11.67" which fell in 1874. Pending further additions to these remarkable June rainfall totals, this June will rank among the wettest of all-time on a statewide basis. The all-time state record June rainfall is 15.63" at Mapleton (Blue Earth County) in 2010, so some observers may yet approach this record before the end of the month. Governor Mark Dayton declared an emergency for 35 counties, bringing Minnesota National Guardsmen to help with flood relief and storm damage recovery efforts.

Topic: New Seasonal Climate Outlook

The NOAA Climate Prediction Center issued a series of new monthly and seasonal climate outlooks this week. Despite a projected warmer than normal start to the month of July, for the remainder of the growing season (July-September) their outlook favors cooler than normal temperature in our region, with wetter than normal conditions in western parts of Minnesota. Equal chances for above or below normal rainfall apply for the rest of the state.

Topic: Summer Solstice

The summer solstice will occur on Saturday, June 21st as the midday sun stands over the Tropic of Cancer, 23.5 degrees north latitude, producing the longest day of the year for the
northern hemisphere. Here in Minnesota that translates to a day length ranging from 15 hours and 20 minutes in southern counties to 16 hours and 10 minutes in Lake of the Woods. Looks like it will be an enjoyable sunny day.

Saturday is also the 38th running of Grandma's Marathon from Two Harbors to Duluth. Looks like the morning will start in the high 40s to low 50s F with only a slight chance for showers, then warm into to upper 50s F to near 60 F by afternoon with drier conditions prevailing. Winds will be light and off of Lake Superior for a cooling effect. Overall it should be good conditions for runners.

Weekly Weather potpourri:

It was reported this week in the LA Times newspaper that two California fish hatcheries are evacuating their rainbow trout, salmon, and steelhead to save the fish from rising water temperatures induced by the prolonged drought in the Sacramento Valley. It was estimated that the low water flows into the hatcheries would bring such warm water later in the summer, that it would be inhabitable for these fish species. You can read more about this story at....

http://www.latimes.com/local/lanow/la-me-ln-fish-hatcheries-evacuated-20140617-story.html

The United Kingdom Meteorological Office reports that the weather for the start of the Wimbledon Tennis Tournament next Monday should be fine and dry, with comfortable temperatures and light winds prevailing during the first week.

The U.S. Seasonal Drought Outlook released by NOAA this week depicts no sign of drought left in Minnesota, and forecasts improvements to drought conditions for portions of NE, IA, MO, and KS. Drought is expected to persist throughout the summer in portions of Texas, Oklahoma and the far western states. You can read more at....

http://www.cpc.ncep.noaa.gov/products/expert_assessment/sdo_summary.html

MPR listener question: Astute weather observer Dave Ruschy noted this week that Waseca reported three separate thunderstorms that each delivered over 2 inches of rainfall. He asked how often our climate history shows three separate thunderstorms of that magnitude in one week?

Answer: After scanning the state climate data base I cannot find another week when three separate thunderstorms have delivered 2 or more inches of rainfall to a location in Minnesota. There are many instances of two such storms during a week, and some instances of back to back days. So the degree of thunderstorm intensity from separate storms this week in Waseca, MN is indeed exceptional. The nearly 7 inches of rain that fell in 4 days (June 15-18) at Waseca this week has about a 1 in 50 year recurrence interval. In the context of their records (dating back to 1914), there has

been only one year when their climate station recorded 5 separate thunderstorms that delivered 2 or more inches of rainfall (1991), yet so far this month they have already recorded 4 such storms.

Twin Cities Almanac for June 20th:

The average MSP high temperature for this date is 78 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 20th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1933; lowest daily maximum temperature of 54 degrees F in 1946; lowest daily minimum temperature is 41 degrees F in 1992; highest daily minimum temperature of 75 F in 1943; record precipitation of 1.92 inches in 1927; and there has been no snow on this date.

Average dew point for June 20th is 55 degrees F, with a maximum of 78 degrees F in 1909 and a minimum of 31 degrees F in 1992.

All-time state records for June 20th

The state record high temperature for this date is 104 degrees F at Olivia (Renville County) in 1988. The state record low temperature for this date is 23 degrees F at Remer (Cass County) in 1985. State record precipitation for this date is 10.45 inches at Two Harbors (Lake County) in 2012; and no measurable snowfall has occurred on this date.

Past Weather Features:

June 19-22, 1988 brought a Heat Wave to many parts of Minnesota. For many nighttime lows remained in the 70s F, while daytime highs soared well into the 90s F. Over 20 communities saw the thermometer rise above the century mark, setting a record daily maximum temperature.

June 20-21, 1992 brought the record summer solstice frost to many parts of Minnesota. Frost was observed as far south as Zumbrota, damaging a number of crop fields. This remains the only occurrence of widespread frost on the longest day of the year in Minnesota.

The flash flood of June 19-20, 2012 will long be remembered by many citizens of northern Minnesota. Much of the intense thunderstorm rain fell overnight, washing out roads, culverts, bridges, and hill slopes. Jay Cooke State Park was completely flooded and closed and damages were widespread in the cities of Duluth and Two Harbors. Some rainfall amounts were all-time records for the dates, including: 5.44" at Grand Rapids; 6.62" at Moose Lake; 6.61" at Floodwood; 7.25" at Duluth Airport; 7.63" at Island Lake; 8.35" at Cloquet; and 10.69" at Two Harbors.

Outlook:

Generally warmer than normal over the weekend (except for the north shore areas) with a chance for widely scattered showers and thunderstorms mostly on Sunday. Cooler with a chance for showers by Tuesday through Thursday of next week.

Further Information:

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For access to other information resources go to

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Minnesota WeatherTalk Newsletter for Friday, June 27, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, June 27, 2014

HEADLINES

-Preliminary June Climate Summary
-Weekly Weather potpourri
-MPR listener question
-Almanac for June 27th
-Past weather
-Outlook

Topic: Preliminary June Climate Summary

Most observers report a mean monthly June temperature that is close to normal. Extremes for the month ranged from 90 degrees F at Marshall on the 20th and Madison on the 21st to just 30 degrees F at Crane Lake on the 13th.

Though June temperatures around the state were near normal, rainfall was far from it, in fact record-setting for many communities. On a statewide basis the average rainfall for June so far has been about 7.29 inches, just behind the all-time wettest June of 1914 when the statewide average was 7.32 inches, a record likely to be broken by next Monday. Flooding has been widespread on many Minnesota watersheds as a result of the heavy rains.

Many observers reported measurable rainfall on over half of the days during the month of June, and several reported record-setting daily values including: Luverne with 3.39 inches on the 1st and 3.57 inches on the 15th; Redwood Falls with 3.41 inches on the 1st and 5.10 inches on the 19th; Gaylord with 4.87 inches on the 19th and 2.92 inches on the 20th; Lake Wilson with 5.20 inches on the 15th; Redwing with 4.41 inches on the 15th; Rushford with 2.95 inches on the 26th; and MSP with 4.13 inches on the 19th (largest June daily rainfall in history).

Those already setting records for the wettest June include:
Ada 8.56 inches
Littefork 9.14 inches

International Falls 9.93 inches
Kabetogama 10.46 inches
Dawson 8.27 inches
Chaska 13.22 inches
Glencoe 14.15 inches
Lakefield 10.92 inches
Luverne 13.44 inches
Redwood Falls 14.22 inches
Springfield 10.88 inches
Waseca 12.31 inches

The acknowledged statewide June rainfall record from the Cooperative Observer network in Minnesota is 15.63 inches at Delano in 2002. This may be threatened or broken by month's end next Monday. MSP with climate records all the way back to 1871 shows 10.85 inches of rain for June so far, trailing only 11.67 inches in 1874. This record too may be broken by next Monday.

Peak wind speeds on the 15th and 16th exceeded 50 mph in many places, causing some tree damage.

Final June climate summaries will be available on our web site early next week.

http://www.climate.umn.edu/

Weekly Weather potpourri:

Dennis Todey, South Dakota State Climatologist reported this week that the Canton, SD cooperative observer just south of Sioux Falls reports 18.75 inches of rainfall so far in June, a new statewide record for the month, breaking the old record by more than 2.5 inches.

In the Southern Hemisphere, where it is winter, portions of New South Wales and Victoria in Australia were blanketed by the season's first heavy snowfall this week, up to 20 inches reported by some observers. Ski resorts opened for business, but strong winds contributed to travel difficulties and power outages in some areas. Winds over 60 mph were also reported, producing blizzard conditions in some areas.

On Tuesday, June 24th Environment Canada reported the 6th tornado of the season in Ontario Province. The storm was classified as an EF1 (winds 86-110 mph) and was on the ground for about 4 miles near Laurel Station. About 17 tornadoes are reported each year across the Provinces of Ontario and Quebec.

A report released by NASA this week revealed the air pollution over major US cities has been improving in recent years, at least as measured by the sensors aboard the Aqua satellite system. There has been a reduction in nitrogen dioxide in many areas. You can read more about this report at...

http://www.sciencedaily.com/releases/2014/06/140626115946.htm

MPR listener question: I have your "Minnesota Weather Almanac" as a reference for all the state daily climate records. I note that maximum daily rainfalls exceeding 10 inches have occurred around the state in July and August, but not in June. Didn't the great June flash flood in Duluth, Cloquet, and Two Harbors bring a daily rainfall of 10 inches back in 2012?

Answer: Indeed you are correct. The observer at Two Harbors reported 10.45 inches on June 20, 2012, setting a new statewide record for daily rainfall in June. Also Two Harbors reported their wettest June in history back to 1894 with a total of 13.86 inches in June of 2012.

Twin Cities Almanac for June 27th:

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 27th:

MSP weather records for this date include: highest daily maximum temperature of 104 degrees F in 1934; lowest daily maximum temperature of 61 degrees F in 1888 and 1911; lowest daily minimum temperature is 44 degrees F in 1925; highest daily minimum temperature of 79 F in 1933; record precipitation of 2.00 inches in 1953; and there has been no snow on this date.

Average dew point for June 27th is 59 degrees F, with a maximum of 76 degrees F in 1959 and a minimum of 36 degrees F in 1925.

All-time state records for June 27th

The state record high temperature for this date is 108 degrees F at New London (Kandiyohi County) in 1934. The state record low temperature for this date is 29 degrees F at Sawbill Camp (Cook County) in 1940. State record precipitation for this date is 6.46 inches at Zumbrota (Goodhue County) in 1998; and no measurable snowfall has occurred on this date.

Past Weather Features:

June 27, 1894 brought the largest outbreak of tornadoes of the 19th Century in Minnesota. Between 5:00 pm and 9:00 pm at least 12 different tornadoes formed and moved southwestern and central Minnesota. The most long lived tornado was on the ground for 30 miles across Meeker and Stearns Counties, destroying dozens of farms and killing two people. One of the last tornadoes of the day passed across Lake Harriet in Minneapolis where some homes were destroyed.

Probably the coldest June 27th in state history was in 1925 when a cool and dry Canadian air mass settled over the state, dropping overnight lows into the 30s F, even at Beardsley, normally one of the hottest places in the state. Several communities reported frosts including, Cloquet, Pine River Dam, Meadowlands, Grand Rapids, and Warroad.

The hottest June 27th in state history occurred in 1934 when over 20 communities reported a daytime high of 100 degrees F or higher. A temperature of 90 degrees F was reported at Leech Lake, but over on the north shore of Lake Superior the high at Two Harbors only reached 60 degrees F.

June 26-27, 1998 brought severe weather to many parts of Minnesota. There were widespread reports of damaging winds (50-70 mph) and large hail (up to 1.75 inch diameter), especially in southeastern counties. Tornadoes were reported in seven counties and flash flooding occurred in a number of communities, particularly Jordan where over 6 inches of rain provoked historic flooding on Sandy Creek.

Outlook:

Mostly cloudy, warmer than normal temperatures into the weekend with a chance for showers and thunderstorms each day. Late Sunday may bring some strong thunderstorms to the state. Continued chance for showers on Monday, but with cooler temperatures. Drier by the middle of next week, with cooler than normal temperature going into the July 4th holiday on 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, July 4, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, July 4, 2014

HEADLINES

-EARLY EDITION
-June Record Rainfalls
-Weekly Weather potpourri
-MPR listener question
-Almanac for July 4th
-Past weather
-Outlook

Topic: Early Edition

With the July 4th holiday on Friday this year, there will not be an MPR segment associated with the Minnesota WeatherTalk weekly newsletter, so I am sending this abbreviated version out early, to enjoy the 3-day weekend.

Topic: June Record Rainfalls

Though June temperatures around the state were near normal, rainfall was far from it, in fact record-setting for many communities. On a statewide basis the average rainfall for June was 8.09 inches, a record historical high not only for June, but for any month of the year. The previous wettest months in Minnesota history on a statewide basis were June of 1914 and July of 1897 with values of 7.32 inches.

Those individual climate stations setting records for the wettest June include:
Ada 9.20 inches
International Falls 10.24 inches
Littefork 9.23 inches
Waskish 8.93 inches
Kabetogama 11.58 inches
Benson 10.49 inches
Dawson 8.27 inches
Chaska 13.84 inches
Glencoe 14.61 inches
Lakefield 10.96 inches

Luverne 13.84 inches
Redwood Falls 14.24 inches
Amboy 10.29 inches
Faribault 12.96 inches
Waseca 12.93 inches
Hastings Dam 10.69 inches

Many observers reported measurable rainfall on over half of the days during the month of June, and over 90 climate stations recorded 10 or more inches for the month. Several reported record-setting daily values. In fact well over 100 daily record rainfall values were measured during June, including: Luverne with 3.39 inches on the 1st and 3.57 inches on the 15th; Redwood Falls with 3.41 inches on the 1st and 5.10 inches on the 19th; Waskish with 3.46 inches on the 12th; Worthington with 3.73 inches on the 15th; Gaylord with 4.87 inches on the 19th and 2.92 inches on the 20th; Lake Wilson with 5.20 inches on the 15th; Redwing with 4.41 inches on the 15th; and MSP with 4.13 inches on the 19th (largest June daily rainfall in history).

The acknowledged statewide June rainfall record from the Cooperative Observer network in Minnesota is 15.63 inches at Delano in 2002. This record was not broken. MSP Airport with a June rainfall total of 11.26 inches marked the 2nd wettest June month in history, trailing only 11.67 inches in 1874.

At one point during June over 80 percent of all the stream gages in Minnesota watersheds were reported volume flows in above the historical 90th percentile or above flood stage, a remarkably high fraction for the state in historical terms.

Final June climate summaries are available on our web site.

http://www.climate.umn.edu/

Weekly Weather potpourri:

Iowa reported a remarkable wet June as well, with many new station records set. At least 90 weather observers reported total monthly rainfall of 10 inches or greater. Among the new records were 15.90 inches at Greenfield, 16.65 inches at Sioux City, 16.33 inches at Sioux Rapids, and 16.92 inches at Cherokee.

Similarly, South Dakota reported a very wet June, with over 30 climate stations receiving 10 or more inches of rainfall. Dennis Todey, South Dakota State Climatologist reported that the Canton, SD just south of Sioux Falls received 18.75 inches of rainfall, a new statewide record for the month, breaking the old record by more than 2.5 inches.

A hot and stormy month of June for parts of France, ended with a hail storm over the Burgundy areas this past weekend. Golf ball size hail caused widespread damage to vineyards there with reported losses of 50 to 90 percent of the grapes in some areas. Reports indicate it will not be a good harvest for wind grates this year in the Burgundy area.

During the four-week period ending on July 1, 2014, contiguous U.S. drought coverage declined 3.31 percentage points to 34.01%. Coverage reached its year-to-date peak of 40.06% on May 6, but subsequent rainfall across portions of the nation's mid-section has reduced drought's imprint.

A nationwide drought update from Brad Rippey of the USDA this week included these comments:
Drought still covers a substantial portion of the central and southern Plains and the western U.S. On July 1, the highest level of droughtD4, or exceptional droughtwas noted in portions of California (36%), Nevada (11%), Oklahoma (7%), Texas (5%), and Colorado (2%). California also led the nation with 79% coverage of extreme to exceptional drought (D3 to D4). According to the latest "agriculture in drought" statistics, based on the July 1 Drought Monitor, 25% of the domestic hay acreage and 36% of the U.S. cattle inventory were located in a drought-affected area. Near-record to record-setting June rainfall eradicated residual drought from the Midwest. As a result, drought covered just 5% of the U.S. soybean area and 8% of the corn area by July 1. Consequently, roughly three-quarters of the U.S. corn and soybeans were rated in good to excellent condition by the end of June. Corn, rated 75% good to excellent on June 29, has not been rated as highly at this time of year since 2003. That year, on the same date, corn was also rated 75% good to excellent. Soybeans, rated 72% good to excellent on June 29, have not been rated as highly at this time of year in the last two decades.

The National Hurricane Center was issuing advisories for Hurricane Arthur this week off the southeast coast. It was bringing some rain and wind to the coastal areas of SC and NC and was expected to persist into the weekend, before dissipating on Monday (July 7th).

MPR listener question: How often has the daytime temperature remained below 80 degrees F on July 4th in the Twin Cities, as it is expected to do this year?

Answer: Actually this probably happens more frequently than you think, about 30 percent of the time since 1873. The last 4th of July in the Twin Cities when the temperature did not reach 80 degrees F was in 2009, when the high was 78 degrees F.

Twin Cities Almanac for July 4th:

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 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for July 4th:

MSP weather records for this date include: highest daily maximum temperature of 100 degrees F in 1949; lowest daily maximum temperature of 58 degrees F in 1967; lowest daily minimum temperature is 43 degrees F in 1972; highest daily minimum temperature of 80 F in 1999; record precipitation of 2.27 inches in 1900; and there has been no snow on this date.

Average dew point for July 4th is 59 degrees F, with a maximum of 79 degrees F in 1999 and a minimum of 40 degrees F in 1972.

All-time state records for July 4th:

The state record high temperature for this date is 107 degrees F at Pipestone (Pipestone County) and Worthington (Nobles County) in 1936. The state record low temperature for this date is 27 degrees F at Tower (St Louis County) in 1972. State record precipitation for this date is 9.78 inches at Milan (Chippewa County) in 1995; and no measurable snowfall has occurred on this date.

Past Weather Features:

The warmest ever July 4th on a statewide basis was in 1949 when 18 communities reported an afternoon high temperature of 100 degrees F or greater. The heat was compounded by very high dewpoints that day (low to mid 70s F), sending the Heat Index soaring to the range of 110 to 115 degrees F. The lemonade and beer vendors were very busy.

The coldest 4th of July probably occurred in 1972 when many central and northern Minnesota climate stations reported low temperatures in the 30s F. Even daytime high temperatures remained in the 60s F as far south as Winnebago and Zumbrota.

Heavy thunderstorms moved across the state on July 4, 1995. Observers in Benson and New London reported over 4 inches of rain, with flash flooding, while the observer at Milan reported the heaviest rain in history with 9.78 inches.

The famous "derecho" storm (straight line winds) devastated the BWCA of northeastern Minnesota on July 4, 1999. Winds from 80 to 100 mph cut a damage swath of 600 square miles through Superior National Forest.

Outlook:

Warming temperature over the weekend with a chance for widespread showers and thunderstorms. Quite warm on Sunday. Cooler next week with a chance for showers on Tuesday and Wednesday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, July 11, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, July 11, 2014

HEADLINES

-Cool July, sporadic rainfall
-Weekly Weather potpourri
-MPR listener question
-Almanac for July 11th
-Past weather
-Outlook

Topic: Cool July, sporadic rainfall

The month of July has started cool with most observers reporting average temperature for the month that ranges from 2-4 degrees F cooler than normal. Eight of the first ten days of the month were cooler than normal at Rochester, for example. Statewide this is the coldest first ten days of July since 2009. Some observers have reported daily record values of temperature. Starting on July 1st a few locations reported new record cold high temperature values for the date including a high of just 57 degrees F at Crookston and Tamarac Wildlfe Refuge, and a high of only 63 degrees F at Wheaton. On July 3rd Brimson (St Louis County) reported a new record minimum temperature of 36 degrees F, as did Long Prairie (Todd County) with a record minimum of 41 degrees F. On the holiday, July 4th observers at Crane Lake, Embarrass, Babbitt, and Brimson reported morning lows in the 30s F, though none of these were new record values. More recently this week on July 9th (Wed.) Hibbing reported a record low of 42 degrees F and Crane Lake a record low of 41 degrees F.

After a record-setting wet June, rainfall in July so far has been moderate to scarce in many areas, especially western counties. On the other hand northeastern and some central Minnesota counties have seen some heavy thunderstorms. These areas have reported over 2 inches of rainfall so far this month, while Grand Portage and Tofte have received over three inches, and Wadena has received over six inches. Heavy thunderstorms on Friday morning, July 11th brought some record-setting daily rainfall amounts. Based on preliminary reports these record amounts included 2.75" at Park

Rapids, 4.83" at Wadena, 3.75" at New York Mills, 3.43" at Little Falls, and 2.33" at Onamia.

Weekly Weather potpourri:

A tropical storm was passing near Guam in the Western Pacific Ocean this week. It was expected to strengthen before striking the Philippines early next week. Further to the north in the Western Pacific Ocean Basin TropicaL Storm Neoguri brought heavy rains and high winds to parts of Japan this week, causing landslides and flash flooding in some areas.

Flash floods and large hail were reported in parts of Bulgaria, Poland, and Italy this week as a strong low pressure system made its way across eastern Europe. More showers with the possibility of hail were expected into the weekend.

A study released this week by the Children's Hospital of Philadelphia suggests a strong relationship between rising temperature and increased patient visits for kidney stones. Apparently as temperatures rise, especially in urban settings, there is a greater risk of dehydration and expression of kidney stone symptoms. You can read more about this study..

http://www.sciencedaily.com/releases/2014/07/140710081057.htm

MPR listener question: I have hard Paul Huttner speak about the Twin Cities rainfall setting a pace to be the wettest year in history. What about other areas of the state and how about the frequency of rainfall, which seems unusually high as well?

Answer: Indeed, the Twin Cities reports 26.49 inches of precipitation so far this year, still on a record-setting pace. In addition precipitation has been recorded on about 10 more days than average for the Twin Cities (71 days so far compared to an average of 61). There are other communities that are also on pace to record their wettest year. Among these are:

Waseca with 26.21 inches so far and 74 days with measurable precipitation compared to an average of 59 days.
Redwood Falls with 22.25 inches so far and 67 days with measurable precipitation compared to an average of 43 days.
Itasca State Park with 20.19 inches so far and 75 days with measurable precipitation compared to an average of 52 days.
International Falls with 19.91 inches so far and 76 days with measurable precipitation compared to an average of 49 days.

Twin Cities Almanac for July 11th:

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 11th:

MSP weather records for this date include: highest daily maximum temperature of 106 degrees F in 1936; lowest daily maximum temperature of 66 degrees F in 1941; lowest daily minimum temperature is 49 degrees F in 1945; highest daily minimum temperature of 82 F in 1936; record precipitation of 3.75 inches in 1909; and there has been no snow on this date.

Average dew point for July 11th is 60 degrees F, with a maximum of 80 degrees F in 1966 and a minimum of 35 degrees F in 2009.

All-time state records for July 11th

The state record high temperature for this date is 111 degrees F at Ada (Norman County) in 1936. The state record low temperature for this date is 30 degrees F at Meadowlands (St Louis County) in 1985. State record precipitation for this date is 7.47 inches at Rochester (Olmsted County) in 1981; and no measurable snowfall has occurred on this date.

Past Weather Features:

July 11, 1936 was not only the hottest in Minnesota history but marked the mid-point of a two-week long Heat Wave which brought day after day of 100 degrees F or greater to many communities. It was by far the most intense and longest Heat Wave in state history, contributing to the death of over 900 citizens. Over 75 communities reported temperatures of 100 degrees F or higher.

Powerful thunderstorms crossed the state over July 11, 1981 bringing strong winds and heavy rains. Rainfall was especially heavy and intense in Olmsted, Fillmore, and Wabasha Counties where many roads and highways were flooded. The Rochester Airport was also closed for a period of town and many residents of Preston were evacuated from their homes because the Root River as flooding over its banks. Rainfall amounts included 3.27" at Grand Meadow, 4.10" at Zumbrota, 5.85" at Lanesboro, 7.30" at Preston, and 7.47" at Rochester.

July 11-12, 1985 brought a cold snap to northern Minnesota communities. Seven communities reported morning lows in the 30s F, with some ground frost at Cotton, Tower, Virginia, and Babbitt. It was short-lived as temperatures warmed into the 80s F by the afternoon of the 12th.

On July 11, 2005 three tornadoes were spotted in northwestern Minnesota, two in Roseau County and one in Marshall County. Fortunately they occurred in rural areas and did little damage.

Outlook:

Near normal temperatures to start the weekend, but with higher humidity and chances for scattered showers and thunderstorms Saturday and Saturday night. Somewhat cooler and drier on Sunday, then significantly cooler on Monday with a chance for scattered showers and thunderstorms. Continued cool weather for Tuesday and Wednesday and mostly dry weather. Chance for showers and thunderstorms each day, with temperatures significantly cooling off on Sunday and Monday. Cooler than normal next week and generally dry weather. Warming to near normal temperatures by next weekend.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, July 18, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, July 18, 2014

HEADLINES

-Record cool spell for mid-July
-New Seasonal Climate Outlook
-Anniversary week for Minnesota's top rain storm
-Weekly Weather potpourri
-MPR listener question
-Almanac for July 18th
-Past weather
-Outlook

Topic: Record cool spell for mid-July

On Monday, July 14 a cold air mass from Canada invaded the state and brought record-setting cold high temperatures to scores of communities. Winds were strong from the north and remained so throughout much of the day and the night, so no overnight minimum temperature records were set. But the cooler, drier air from the north held down daytime temperatures into the 50s and 60s F across the state. Some observers reporting new record cold highs for the date included: 57 degrees F at Silver Bay, Isabella, Bigfork, and Embarrass; 59 degrees F at Crane Lake, Cloquet, and Ely; 60 degrees F at International Falls, Brimson, Leech Lake and Mora (tied with 1960); 61 degrees F at Moose Lake, Grand Rapids, and Bemidji (tied with 1961); 62 degrees F at Park Rapids; 63 degrees F at Moorhead, Alexandria, and Waskish (tied with 1994); 64 degrees F at Brainerd, Wheaton, Dodge Center, and Detroit Lakes; 65 degrees F at MSP, St Cloud, Baudette, Preston, and Waseca. High wind gusts over 30 mph were prevalent with the cold air advection at places like St Cloud, Warroad, Alexandria, Grand Rapids, and even the Twin Cities.

The cold air took residence for about 48 hours and brought new record cold mean daily temperatures (average of the maximum and minimum values for the day) to many communities on Tuesday, July 15th. Some of these records include: 55 F at Pipestone; 57 F at Windom; 58 F at Waseca and Grand Meadow; 59 F at Zumbrota, Austin, and Winnebago; and 60 F at Rochester.

Finally, clear skies, high pressure, and calm winds brought some record minimum temperature values on Wednesday morning to northern and western parts of Minnesota. Some of the new records included; 35 F at Brimson; 38 F at Hibbing (tied 2007); 39 F at International Falls, Silver Bay, Crane Lake, Eveleth, and Orr; 45 F at Wheaton; and 46 F at Marshall and Worthington. The cold air finally cleared out on Thursday, and in contrast much of the balance of the month looks to be warmer than normal with above normal rainfall as well. That's Minnesota!

Topic: New Seasonal Climate Outlook

The NOAA Climate Prediction Center released new seasonal climate outlooks this week for the period August through October. The outlook favors cooler than normal temperatures for the western Great Lakes Region, including Minnesota. This is consistent with the pattern so far observed in July which shows most observers reporting mean monthly temperatures that range from 3 to 5 degrees F colder than normal.

The precipitation outlook is neutral, with equal chances for above or below normal values across the region during the August to October time frame. In any event, rainfall for the balance of the 2014 growing season is likely to be more variable across the Minnesota landscape.

Topic: Anniversary Week for Minnesota's Top Rain Storm

Today (July 18) is the anniversary of perhaps the most prolonged intense rainfall ever recorded in the state. This thunderstorm complex occurred in 1867 over western and central Minnesota, but was especially heavy in parts of Douglas, Pope and Stearns Counties, affecting the pioneer communities of Osakis, Westport, and Sauk Centre. Beginning late on Wednesday, July 17th, lasting all day July 18th, and into the early morning of Friday July 19th, heavy thunderstorms drenched the landscape with up to 30 inches of rainfall. Unfortunately measurements of the storm were not made by official rain gages in those days, but several people did record measurements via buckets and barrels which filled up. George B. Wright, a pioneer land surveyor in the area, documented the event and reported on it in some detail to the Minnesota Academy of Natural Sciences years later (1876). In his account, the Pomme de Terre, Chippewa, and Sauk Rivers, normally creeks at that time of year, became lakes several miles wide. The storm generated runoff caused the Mississippi to rise several feet (up to 12 ft in places), washing out bridges and logging booms right through the Twin Cities area. The total number of logs washed away was estimated to exceed 25 million. The mosquito population was reported as the worst ever for the balance of that 1867 summer. Even throught the modern era this storm rainfall total has not even

been approached. The greatest in the modern era was 17.21 inches near La Crescent, MN during the famous August 19, 2007 flash flood there.

Weekly Weather potpourri:

NOAA released its State of the Climate in 2013 report this week. It highlights continued warm temperature trends and rises in sea level. It also highlights changes in Arctic sea ice, and regional climate trends. The report is 232 pages, but you can read the highlights at...

http://www.ncdc.noaa.gov/bams-state-of-the-climate/2013.php

With a return to warm, humid weather across the state next week, we may seen some Heat Advisories issued by the National Weather Service. In this context it might be wise to review some tips for maintaining good health during these hot spells. NOAA Public Affairs has issued four tips on preparing for heat spells. You can find them on their web site

http://www.noaa.gov/features/earthobs_0508/heat.html

In addition, the EPA offers a guide book on coping with excessive heat and it too is available on-line as a .pdf file. You can find it at....

http://www.epa.gov/heatisland/about/heatguidebook.html

Late last month the city of Denver, CO released its first Climate Adaptation Plan. It is a comprehensive look at preparing for three features of the climate which are expected to change there: Increased temperature and urban heat island effects; Increased extreme weather events; Reduced snowpack and earlier snowmelt season. You can read more about this plan from the press release at...

http://www.denvergov.org/environmentalhealth/EnvironmentalHealth/AboutUs/NewsRoom/tabid/444681/Default.aspx

NOAA National Climatic Data Center recently released the statewide ranks for June temperature and precipitation in 2014. The Great Lakes Region had the wettest June in history, while the far west, notably CA and AZ had one of the warmest June months in history. You can view these rank maps at the NCDC web site...

http://www.ncdc.noaa.gov/sotc/national/2014/6

Additional news from the western states is that Lake Mead is now at a historical low due to persistent drought in the west. Formed by the Hoover Dam, Lake Mead is the largest reservoir in the western states NV and AZ.

The Joint Typhoon Warning Center was issuing statements this week on Super Typhoon Rammasun which was headed for Vietnam and South China. Wind gusts were over 160 mph, creating sea wave heights of 35-40 feet. It will bring heavy rains to coastal areas throughout the coming weekend. Further north Tropical Storm Matmo was heading towards the coast of China between the Philippines and Japan. It was expected to strengthen over the weekend.

A NASA press release this week celebrates the 10th anniversary of the Aura Satellite system. Its package of instruments measures many of the greenhouse gases in the atmosphere and tracks their seasonal distribution. These data have been useful in tweeking climate models. You can read more about this at....

http://www.nasa.gov/content/goddard/a-ten-year-endeavor-nasa-s-aura-and-climate-change/#.U8fvbrGa9nY

MPR listener question: It seems like our temperatures in Minnesota are always well above or well below normal. How do the standard deviations of temperature vary by season and are the standard deviations of daily temperatures larger here than in other states?

Answer: Indeed the standard deviations in daily temperature do vary considerably by season. They are at their lowest values now (July). For example in July for the Twin Cities the standard deviations of daily maximum and minimum temperature are about plus or minus 6-7 degrees F. So the high temperature of 65 degrees F on Monday, July 14th in the Twin Cities was about 3 standard deviations from the mean maximum temperature value for the day (84 F). In contrast the standard deviations for daily maximum and minimum temperatures are plus or minus 13-15 degrees F during January when temperature variations are more amplified by cloud cover, air mass and presence or absence of snow cover.

Comparing to other geography, we can see that at Huntsville, Alabama this time of year the standard deviations of daily maximum and minimum temperature are just 3-4 degrees F, while in January they jump up to 10-11 degrees F, less than the variation we experience in Minnesota.

Twin Cities Almanac for July 18th:

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 18th:

MSP weather records for this date include: highest daily maximum temperature of 101 degrees F in 1940; lowest daily maximum temperature of 60 degrees F in 2000; lowest daily minimum temperature is 49 degrees F in 1873; highest daily minimum temperature of 80 F in 2011; record precipitation of 2.94 inches in 1895; and there has been no snow on this date.

Average dew point for July 18th is 62 degrees F, with a maximum of 81 degrees F in 2011 and a minimum of 44 degrees F in 2009.

All-time state records for July 18th

The state record high temperature for this date is 109 degrees F at Beardsley (Big Stone County) and Morris (Stevens County) in 1940. The state record low temperature for this date is 30 degrees F at Kelliher (Beltrami County) in 2003. State record precipitation for this date is 7.50 inches at Fort Ripley (Crow Wing County) in 1867; and no measurable snowfall has occurred on this date.

Past Weather Features:

One of the coldest mid-July spells of weather occurred over July 18-19, 1912. Many observers reported overnight lows dropping into the 30s F, and some like Cloquet, Littlefork, and Roseau reported a mid-summer frost that damaged plants.

The hottest July 18th in history was in 1940 when over 25 communities reported daytime highs of 100 degrees F or greater. The coolest spot in the state that day was the Grand Marais Harbor with a high of just 59 degrees F. The July 1940 Heat Wave lasted until the 26th when a cold front brought rain and temperatures dropped into the 60s F.

Very strong thunderstorms moved across central and northern counties of Minnesota over July 17-18, 1952. Many observers reported 2-3 inches of rainfall, and a number of country roads and highways were flooded. Some record setting rainfalls included 6.10 inches at Gull Lake, 7.75 inches at Moose Lake, and 10.17 inches at Aitkin.

Between 6:00pm and 7:00pm on July 18, 1970 two tornadoes formed over central Minnesota. The first with winds over 158 mph tracked 4 miles across Douglas County

near Lake Miltona, and it damaged several businesses, 28 homes, and 6 farms. The second tornado was on the ground in Anoka County for just 1 mile near Soderville. It damaged just a few homes.

Outlook:

Near normal temperatures on Saturday with a chance for showers and thunderstorms. Warmer on Sunday and Monday with a possibility of a heat advisory for some areas because of higher dewpoints. Chance for showers and thunderstorms on Tuesday and Wednesday of next week, with temperatures dropping back to near normal levels.

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 8, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, August 8, 2014

HEADLINES

-Wrap-Up on July Climate
-Scarcity of 90 F in July
-Concerns at Farmfest 2014
-Weekly Weather potpourri
-MPR listener question
-Almanac for August 8th
-Past weather
-Outlook

Topic: Wrap-Up on July Climate

Most observers reported a July mean temperature that was 2 to 4 degrees F cooler than normal. This pattern has been prevalent across the state since last October as 8 of the last 9 months have brought cooler than normal temperatures to the state. During the cool spell towards the end of the month, Ada set a new record cold maximum temperature on the 27th with 67 degrees, and Red Lake Falls did similarly with 66 degrees F on the 28th. Extremes for the month were 96 degrees F at Hutchinson on the 21st and 36 degrees F at Brimson on the 4th and Embarrass on the 16th.

Most of the state was drier than normal during July, many places 1 to 2 inches less than average for the month. Thanks to some intense thunderstorms there were some wet spots, including Grand Portage with 6.31 inches, Wadena with 7.78 inches, and Chaska with 5.05 inches. The drier than normal rainfall pattern of July caused Minnesota crops to deplete the soil moisture supplies significantly, so that by the end of the month many areas were showing less than normal values of stored soil moisture. Many areas of the state would welcome appreciable rainfalls during the first two weeks of August.

Topic: Scarcity of 90 F in July

Many citizens have remarked about the absence of 90 F temperatures this summer. July was unusual in this respect. The Twin Cities which normally sees 6 or 7 days of 90 F temperatures or greater in July reported only two. Saint Cloud which averages 5-6 90 F days in July reported only 2, and Rochester which averages 4-5 days of 90 F temperatures reported 0 days with temperatures that high in July. This was not uncommon as Morris, Wheaton, Windom, and Tracy also reported no days with 90 F temperatures in July. For many locations this last happened in 1992.

Topic: Concerns at 2014 Farmfest

Many farmers were concerned about August rainfall at this year's Farmfest as southern agricultural areas of the state were drying out. Additional rainfall is needed to maintain good yield prospects for late planted corn and soybeans. In addition some farmers were concerned about early frost in the fall which might prevent crops from fully maturing. There are no indications that Minnesota will be threatened by early frost this year, but it is a concern nevertheless.

One of the program discussions there involved climate change consequences for Minnesota agriculture. There is widespread acceptance that Minnesota's climate is changing and farmers are adapting. Crop insurance has become more commonly used as a management tool, as has conservation tillage to protect the soil from erosion and better preserve stored soil moisture. Clearly farmers are coping with a greater variability in climate.

Weekly Weather potpourri:

On Sunday, August 3rd Death Valley reported a daytime high of only 89 degrees F, 33 degrees F below normal. This was only the coldest summer daytime high measured there since 1984 and only the 5th time since 1911 that a summertime high has been measured that is less than 90 degrees F.

Another unusual weather report from the western states was a new record cold high at Reno, NV on Monday, August 4 with a high of only 76 degrees and 20 hours of rainfall, a highly odd weather day for a town used to summer drought and high temperatures in the 90s F.

California State Climatologist Michael Anderson announced this week the publication of California's Climate Change Research Plan to serve their state agencies. It is a fairly comprehensive plan and considers many socio-economic impacts on the state. You can read the plan at...

http://climatechange.ca.gov/climate_action_team/research.html

In the western Pacific Ocean Typhoon Halong was spinning off the south coast of Japan with winds up to 100 mph producing sea wave heights well over 30 feet. It is expected to bring high winds and heavy rains to parts of Kyoto on Saturday. Meanwhile Super Typhoon Geneviieve was located between Wake Island and Midway Island producing wind gusts in excess of 170 mph and over 40 foot seas. It is expected to remain out to sea throughout the weekend. Tropical Storm Iselle and Hurricane Julio were bringing storm warnings to Hawaii this week due to their strong winds, high seas, and heavy rains. Islanders were preparing for a 1-2 punch from these storms which may last through the weekend and bring well over a foot of rain to some places.

The NOAA-Climate Prediction Center (CPC) released an updated North Atlantic Hurricane Season Outlook this week showing a 70 percent chance of a below-normal season in terms of number of Tropical Storms and Hurricanes. You can read more about it at...

http://www.noaanews.noaa.gov/stories2014/20140807_hurricaneoutlook_atlantic_update.html

MPR listener question: How many weekends this summer (since May 1st) have brought rainfall to the Twin Cities? It seems like a lot to me.

Answer: Since May 1st 8 out of 13 weekends (over 61 percent) have seen measurable rainfall occur in the Twin Cities. Indeed this is greater than the historical frequency for weekend rainfalls which is about one weekend in every three.

Twin Cities Almanac for August 8th:

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 63 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 8th:

MSP weather records for this date include: highest daily maximum temperature of 96 degrees F in 1894, 1914, and 2010; lowest daily maximum temperature of 62 degrees F in 1888; lowest daily minimum temperature is 47 degrees F in 1888; highest daily minimum temperature of 77 F in 2001; record precipitation of 2.22 inches in 1987; and there has been no snow on this date.

Average dew point for August 8th is 59 degrees F, with a maximum of 76 degrees F in 2010 and a minimum of 37 degrees F in 1927.

All-time state records for August 8th

The state record high temperature for this date is 105 degrees F at Beardsley (Big Stone County) and Wheaton (Traverse County) in 1936. The state record low temperature for this date is 33 degrees F at Tower (St Louis County) in 1898 and at Thorhult (Beltrami County) in 1964. State record precipitation for this date is 5.30 inches at Waseca (Waseca County) in 1991; and no measurable snowfall has occurred on this date.

Past Weather Features:

By far the warmest August 8th in state history was 1936 as virtually all observers in the state reported daytime highs in the 90s F and seven communities saw the thermometer soar to 100 degrees F or greater. The heat spell lasted until August 13th when temperatures dropped off into the 70s and 80s F.

Perhaps the coldest August 8th in state history was in 1964 when a dozen northern Minnesota communities reported morning low temperatures in the 30s F. Ground frosts were reported by observers in Lake of the Woods, Clearwater, and Beltrami Counties. It was as cold as 41 degrees F at Theilman in southeastern Minnesota.

August 7-8, 1991 brought strong thunderstorms and heavy rains to many parts of southern Minnesota. Many observers reported over 3 inches of rain, including 3.23" at Austin, 3.57" at New Ulm, and 3.89" at Rochester. Waseca reported a total rainfall of 5.35 inches flooding streets in that community.

Outlook:

Near normal temperatures over the weekend with a chance for widely scattered thunderstorms, mostly Sunday night. Slightly cooler on Monday with a continued chance for widely scattered showers, then cooler temperatures for the balance of next week, and a growing chance for showers by next Thursday.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, August 15, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, August 15, 2014

HEADLINES

-Cool Air This Week
-Dry in southern Minnesota
-Congratulations to Waseca
-State Fair
-Weekly Weather potpourri
-MPR listener question
-Almanac for August 15th
-Past weather
-Outlook

Topic: Cool Air This Week

A dry, cool air mass from Canada settled over Minnesota on August 13-14 (Wed-Thu) this week bringing very cool temperatures to northern parts of the state. The dry air allowed overnight lows to drop into the 30s F at several locations including Isabella, Babbitt, Embarrass, Crane Lake, and Hibbing. Both Ely and Orr set new record low temperature values on August 14th with a morning reading of 37 degrees F.

With the dry air mass and calm winds, Thursday morning (Aug 14th) temperatures in the Twin Cities Metro Area really showed the urban heat island. At 5:00 am St Louis Park reported 64 degrees F, Eden Prairie reported 63 degrees F, MSP Airport and downtown St Paul reported 61 degrees F, and Richfield and Roseville 60 degrees F. Further out from the heart of the Metro Area it was cooler with 54 degrees F at Lake Elmo, Stillwater, and Lakeville, and just 56 degrees F at Eagan and Cottage Grove.

Topic: Dry in southern Minnesota

Most climate observers have reported less than an inch of rainfall since the last week of July, and in southern counties a number of observers report less than a half inch. Some crops are showing symptoms of drought stress in these southern areas.

As a result of the rainfall deficiencies, the U.S. Drought Monitor placed portions of Freeborn and Faribault Counties in the abnormally dry category (D0) this week. This is the first return of any drought designation in the state since the week of June 10th.

Topic: Congratulations to Waseca

Congratulations are in order for the University of Minnesota Research and Outreach Center at Waseca, MN. The NOAA National Weather Service will honor them with a 100 year award at a ceremony on Wednesday, August 20th next week. Staff there have provided 100 years of daily weather observations for Waseca County, a rich data base that has served the agricultural community, energy and water providers, and the insurance industry among many others.

Topic: State Fair Coming Up:

This year our State Fair runs from August 21st to September 1st. I will be appearing on TPT's Almanac Program at noon on August 22nd at the MPR stage (corner of Judson and Nelson Streets) at the State Fair this year, and again at the MPR stage on Wednesday, August 27th at noon broadcasting the "Annual Minnesota Weather Quiz" with Stephen John . Please drop by if you are at the State Fair.

The hottest day in the history of the Minnesota State Fair was on September 10, 1931 with 104 degrees. Note that the Minnesota State fair in 1931 ran eight days from September 5-12. The coldest maximum temperature for the fair is 52 degrees on September 7, 1911 and the coldest minimum temperature is 33 degrees on September 13, 1890. The coolest fair morning in recent decades was a chilly 36 degrees on September 1, 1974.

The Minnesota State Fair has been held at its current site since 1885. Beginning in 1975, the fair has a 12 day run each year ending with Labor Day. Thus since 1975, the fair begins on a Thursday in August. Before 1975 the fair was held for shorter durations. On average it rains about 3 to 4 days during the fair's 12 day run. The wettest fair was in 1977 with 9.48 inches, and the driest fair was 2003 with only .02 inch of rain. The largest rain event in the State Fair's history was August 30, 1977. At 8:20 pm heavy rains hit the State Fair. The U of M St. Paul Campus climate observatory ½ mile north of the fairgrounds saw 4.06 inches of rain. This caused some of the worst street flooding seen at the fairgrounds. The grandstand show was cancelled. More historical weather information on the State Fair by Pete Boulay of the State Climatology Office can be found at...

http://climate.umn.edu/doc/journal/state_fair_weather.htm

Weekly Weather potpourri:

The latest version of the NOAA Climate Connection newsletter was released this week. Among the topics featured in this edition there are articles on warm geologic periods in Earth's history, the El Nino Southern Oscillation the hypoxia zone in the Gulf of Mexico, and a teacher's guide on how to use the 2014 National Climate Assessment in the classroom. You can access these features and more at.....

http://www.climate.gov/news-features

The National Weather Service in New York City announced this week that a new 24-hr statewide rainfall record was set at Islip Long Island on the 13th of August with 13.57 inches of rain. Over 5 inches of rain fell in one hour, between 5:00 am and 6:00 am, with a total of over 12 inches coming in a six hour period of the early morning. Dewpoints were as high as 71 degrees F during the rain event. The resulting flash floods caused damage to many homes, closed many roads and highways and caused a huge sinkhole to appear.

http://www.npr.org/blogs/thetwo-way/2014/08/13/340129495/long-island-soaked-by-record-breaking-rainfall
http://www.nytimes.com/2014/08/14/nyregion/record-setting-rainfall-douses-new-york-area.html?_r=0

Remnants of ex-hurricane Bertha brought high winds and heavy rainfalls to parts of northern England and Scotland earlier this week. Some areas received over 4 inches of rainf, with wind gusts from 50 to 60 mph. High coastal sea waves were also reported in some areas. Some local road and highway flooding was reported.

A paper this week from the American Chemical Society documents that long distance transport of dust and airborne microbes from Asia can influence the intensity and distribution of precipitation in the western USA. Tracking the composition of these elements in the atmosphere may help forecasters do a better job with respect to precipitation. You can read more about this study at...

http://www.sciencedaily.com/releases/2014/08/140813103021.htm

Minnesota Public Television Association announced this week that there will be four re-broadcasts of the program "The Cost of Climate Change in Minnesota" during the month of September on the MN channel. This is a documentary produced from last fall's Climate Adaptation Conference held at the Science Museum of Minnesota in downtown St Paul, Here is the schedule.....

Sunday, September 14, 2014 at 9:00 PM
Sunday, September 21, 2014 at 3:00 AM
Sunday, September 21, 2014 at 9:00 AM
Sunday, September 21, 2014 at 3:00 PM

MPR listener question: Can you explain the "Sunday Effect" when it comes to air quality?

Answer: The term "Sunday Effect" was coined in the 1970s by atmospheric chemists who found that air quality in many urban areas seemed to have a distinctive pattern based on day of the week. Best air quality tended to occur with higher frequency on Sundays (when traffic and industrial activity was relatively minimal), and the worst occurred on Wednesdays (during the peak of the work week). Further studies have found that there are also patterns of sunshine, temperature and precipitation that may be correlated to day of the week as well, but these patterns depend on local topography, industry, and the way cities are laid out.

Twin Cities Almanac for August 15th:

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 62 degrees F (plus or minus 6 degrees F standard deviation).

MSP Local Records for August 15th:

MSP weather records for this date include: highest daily maximum temperature of 103 degrees F in 1936; lowest daily maximum temperature of 63 degrees F in 1897; lowest daily minimum temperature is 47 degrees F in 1960; highest daily minimum temperature of 76 F in 1937; record precipitation of 1.23 inches in 1966; and there has been no snow on this date.

Average dew point for August 15th is 59 degrees F, with a maximum of 75 degrees F in 1987 and a minimum of 41 degrees F in 1976.

All-time state records for August 15th

The state record high temperature for this date is 108 degrees F at Beardsley (Big Stone County) in 1937 and at Madison (Lac Qui Parle County) in 1988. The state record low temperature for this date is 26 degrees F at Tower (St Louis County) in 1976. State record precipitation for this date is 5.40 inches at St Peter (Nicollet County) in 1993; and no measurable snowfall has occurred on this date.

Past Weather Features:

August 15, 1911 brought an F-3 tornado (winds 158-206 mph) near Holloway (Swift County), MN. It struck about 7:00 pm and was on the ground for 5 miles. Some homes and farms were destroyed in the storm. The grand mother of TPT's Mary Lahammer (Margaret Trager) survived this storm but her mother and sister perished as their house was destroyed. This remains one of the worst tornadoes to strike the western part of the state. Public Television's documentary on "Minnesota's Deadliest Tornadoes" tells the story of this storm.

A 3-day heat wave gripped the state over August 14-16, 1937. Nearly every community in the state reported daytime temperatures in the 90s F, with a dozen western Minnesota cities reporting temperatures over 100 degrees F. August of 1937 was the 3rd warmest in state history.

August 15, 1979 was probably the coldest in history with dozens of observers reporting morning lows in the 30s F and some record-setting early frosts in many places. Sixteen communities in northern and central counties reported frosts, and temperatures fell into the 20s F at Roseau, Thorhult, Hibbing, Meadowlands, and Tower.

August 14-15, 1993 brought severe weather and extremely heavy thunderstorms to many parts of Minnesota. Large hail and damaging winds occurred in parts of central and southern Minnesota. Many observers reported over 3 inches of rainfall, with Waseca, Harmony, Austin, and Tyler reporting over 4 inches. At Albert Lea and St Peter over 5 inches of rain caused widespread street flooding. At Austin the Cedar River and Turtle Creek rose well above flood stage causing water damage to a number of buildings there.

Outlook:

Near normal to above normal temperatures into the weekend, with a chance for scattered showers and thunderstorms on Saturday, mostly in the south. Mostly dry Sunday, then another chance for showers on Monday and Tuesday. Yet another chance for showers towards Thursday when the State Fair opens.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, August 22, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, August 22, 2014

HEADLINES

-Wet August for only a few
-New Seasonal Climate Outlook
-State Fair
-Weekly Weather potpourri
-MPR listener question
-Almanac for August 22nd
-Past weather
-Outlook

Topic: Wet August for a few

Though most of the state has remained drier than normal for August, a few observers have reported above normal rainfall for the month thanks to some fairly isolated, but intense heavy thunderstorms. In the northern counties Backus, Duluth, and Brimson have received over 3.50 inches of rain so far this month, and Wadena and Little Falls report over 4 inches. In the west Glenwood, Hancock, Alexandria, Montevideo, and New York Mills have received over 3.50 inches, and Ortonville, Rothsay, Artichoke Lake, Madison, and Morris have reported over 4 inches. Dawson is the wet spot in the west with over 6 inches so far this month. In the southeastern counties Mantorville and Theilman have reported over 3.50 inches, while Zumbrota, Winona, Cannon Falls, and Minnesota City have reported over 4 inches.

Further, over August 20-21 this week fast-moving intense thunderstorms brought 2-4 inch rainfalls to some parts of the state. Some observers reported daily record rainfalls, including:
4.00 inches at St James
2.70 inches at Starbuck
2.64 inches at Morris
2.35 inches at Kimball
2.34 inches at Artichoke Lake
2.05 inches at Ottertail

2.04 inches at Glenwood
1.92 inches at Springfield
1.89 inches at North Mankato

As opposed to the widespread wetter than normal pattern that prevailed across the state during the first half of summer, August rainfall has been very spotty. The US Drought Monitor expanded the geographic designation for an abnormally dry landscape in Minnesota. Last week the designated area was Freeborn and Faribault Counties and this week the Drought Monitor designation for abnormally dry includes portions of Winona, Fillmore, Mower, Blue Earth, Waseca, and Le Sueur Counties. Heavier than normal rainfall for much of Minnesota is in the outlook for the remainder of August, so most areas should see some significant rainfall amounts before the end of the month.

Topic: New Seasonal Climate Outlook

The NOAA Climate Prediction Center issued new seasonal climate outlooks on Thursday this week. They call for equal chances of above or below normal temperatures and precipitation for September across Minnesota. For later in autumn and early winter, the outlook clearly favors warmer than normal temperatures for the western Great Lakes Region for October through February. This is predominately based on the formation of an El Nino episode this fall which is correlated mild winters in our region. More at...

http://www.cpc.noaa.gov/products/predictions/90day/

Topic: State Fair Coming Up:

This year our State Fair runs from August 21st to September 1st. I will be appearing on TPT's Almanac Program at noon on August 22nd at the MPR stage (corner of Judson and Nelson Streets) at the State Fair this year, and again at the MPR stage on Wednesday, August 27th at noon broadcasting the "Annual Minnesota Weather Quiz" with Stephen John . Please drop by if you are at the State Fair.

Some State Fair Weather History: All the climate data for the State Fair history has been compiled by Pete Boulay of the MN State State Climatology Office. This can be found on the web at....

http://www.dnr.state.mn.us/climate/journal/140808_Minnesota_State_Fair_Weather.html

The hottest day in the history of the Minnesota State Fair was on September 10, 1931 with 104 degrees. Note that the Minnesota State fair in 1931 ran eight days from September 5-12. The coldest maximum temperature for the fair is 52 degrees on September 7, 1911 and the coldest minimum temperature is 33 degrees on September 13, 1890. The coolest fair morning in modern history was a chilly 36 degrees on September 1, 1974.

The Minnesota State Fair has been held at its current site since 1885. Beginning in 1975, the fair has a 12 day run each year ending with Labor Day. Thus since 1975, the fair begins on a Thursday in August. Before 1975 the fair was held for shorter durations. On average it rains about 3 to 4 days during the fair's 12 day run. The wettest fair of the modern era (12-day runs) was in 1977 with 9.48 inches, and the driest fair was 2003 with only .02 inch of rain. The largest rain event in the State Fair's history was August 30, 1977. At 8:20 pm heavy rains hit the State Fair. The U of M St. Paul Campus climate observatory ½ mile north of the fairgrounds saw 4.06 inches of rain. This caused some of the worst street flooding seen at the fairgrounds. The grandstand show was cancelled.

Weekly Weather potpourri:

Environment Canada reported that two tornadoes touched down in Ontario on Tuesday (Aug 19) evening this week, one near South Windsor and the other near Harrow. These storms caused some damage to farm buildings but no fatalities.

The USGS and Army Corps of Engineers along with NOAA have released a new online training module called "Preparing Hydro-climate inputs for Climate Change in Water Resources Planning." This science-based self-taught course is supported by a variety of other online data and resources. For those interested in managing water resources by incorporating what we know about climate change, you can find this module on the web at...

http://www.ccawwg.us/index.php/preparing-hydro-climate-inputs-for-climate-change-in-water-resource-planning

MPR listener question: Which State Fairs have seen the greatest and least frequencies of daily rainfall?

Answer: Since 1885 the only State Fair to see no rainfall at all was in 1906, over a six day run from September 3 to September 8th. Probably the highest frequency of rainfall during the Fair dates to 1940 when it rained on the first 7 consecutive days. Fortunately the last three days of the State Fair that year were dry, boosting attendance. The 1940 State Fair was plagued by weather even before it started as a

strong thunderstorm dislodged and collapsed the Machinery Hill Big Top Tent before the fair even opened. It had to be repaired and resurrected in time for the start of the State Fair.

Twin Cities Almanac for August 22nd:

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 6 degrees F standard deviation).

MSP Local Records for August 22nd:

MSP weather records for this date include: highest daily maximum temperature of 97 degrees F in 1971; lowest daily maximum temperature of 60 degrees F in 1891; lowest daily minimum temperature is 43 degrees F in 1890; highest daily minimum temperature of 80 F in 1968; record precipitation of 3.32 inches in 1914; and there has been no snow on this date.

Average dew point for August 22nd is 58 degrees F, with a maximum of 75 degrees F in 1968 and a minimum of 38 degrees F in 1934.

All-time state records for August 22nd:

The state record high temperature for this date is 104 degrees F at Redwood Falls (Redwood County) in 1971. The state record low temperature for this date is 26 degrees F at Cotton (St Louis County) in 1967. State record precipitation for this date is 4.58 inches at Buffalo (Wright County) in 1999; and no measurable snowfall has occurred on this date.

Past Weather Features:

Slow moving thunderstorms brought heavy rains to many parts of the state over August 22-24, 1959. In southern counties rainfall amounts from 2 to 4 inches were quite common. Some communities experienced widespread flooding with heavier amounts of rainfall including 5.23 inches at Zumbrota, 5.94 inches at Austin, 6.01 inches at Blue Earth, and 7.53 inches at Bricelyn.

The coldest August 22nd in state history occurred in 1967 as many northern counties reported overnight lows in the 30s F and there were several reports of frosts. At Cook, Cotton, and Bigfork temperatures dropped into the upper 20s F, ending the gardening season for residence of those communities.

August 22, 1971 was probably the hottest in history across the southern half of the state as most observers reported afternoon highs in the 90s F and six cities in western Minnesota topped the 100 degrees F mark. Fortunately it just last one day, as a Canadian cold front dropped temperatures back into the 70s F the next day.

Outlook:

Still humid through the weekend and early next week with high dewpoints. Air temperatures will generally be warmer than normal, especially on Sunday. There will be chances for showers and thunderstorms each day. Cooler than normal temperatures will settle in for Tuesday through Thursday, but there will still be chances for showers.

Further Information:

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Minnesota WeatherTalk Newsletter for Friday, August 29, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, August 29, 2014

HEADLINES

-Preliminary August Climate Summary
-State Fair Weather Quiz
-Weekly Weather potpourri
-MPR listener question
-Almanac for August 29th
-Past weather
-Outlook

Topic: Preliminary August Climate Summary

Most climate observers in Minnesota are reporting a mean August temperature that is within plus or minus 1-2 degrees F of normal. Extremes ranged from 91 degrees F at Hutchinson on the 24th to 34 degrees F at Seagull Lake (Cook County) on the 14th. For a number of western Minnesota communities August did not bring a single day with 90 degrees F or higher, and for only the second time in 20 years, not a single reading of 90 F or higher was recorded in July and August.

MSP set a new high dewpoint record on August 24th with a reading of 76 degrees F as the Heat Index climbed to 95 degrees F for those attending the State Fair.

August precipitation was highly variable, with most observers reporting below normal values, especially in the south-central and southeastern counties. Thanks to a handful of scattered, but very heavy thunderstorms some observers reported over 5 inches of rain for the month including, Benson (5.27"), Brainerd (6.18"), Dawson (6.62"), Madison (5.39"), Montevideo (6.10"), Ottertail (6.00"), Ortonville (6.20"), Little Falls (6.05"), Morris (5.28"), Zumbrota (6.12"), and Forest Lake (5.10"). Starting Friday morning (Aug 29) additional rainfalls were expected through the end of the month and may bring more observers up closer to normal monthly values. Parts of southeastern Minnesota reported 1-2 inch rains on Friday, August 29th.

Some southern Minnesota counties were designated as abnormally dry by the US Drought Monitor this week, but hopes are that September will bring wetter than normal conditions.

Topic: State Fair Weather Quiz

I had fun doing the broadcast of the Minnesota Weather Quiz on Wednesday, August 27th with Steven John of MPR hosting. If you want to test your knowledge of Minnesota weather during 2014 you can still go to the MPR web site and take the quiz. You will find it at...

http://www.mprnews.org/story/2014/08/27/mpr_news_presents

Weekly Weather potpourri:

A recent paper in the Journal of Biometeorology examined whether or not there are any amplifications of pain induced by weather variables for those people who suffer chronic pain from fibromyalgia (like my wife does). This study found no symptoms of pain amplification brought on by weather variables, except for changes in barometric pressure where there was an inverse association between lower pressure values and higher pain. The abstract for this paper can be found online at....

http://www.ncbi.nlm.nih.gov/pubmed/24132549

Dennis Todey, South Dakota State Climatologist offered a perspective on early September weather in the "Sustainable Corn blog" this week.....

https://mygeohub.org/groups/u2u/decision_resources">https://mygeohub.org/groups/u2u/decision_resources

Warm weather should help maturing crops in many states of the Corn Belt during early September. You can also examine the frost dates and crop maturation progress around the region by using the U2U Decision Support web site at...

https://mygeohub.org/groups/u2u/decision_resources

Remnants of Hurricane Marie in the Eastern Pacific Ocean brought high surf to the Southern California coast this week. Surfers enjoyed riding the bigger than usual waves, but swimmers were warned to stay out of the rough surf. Some coastal properties there were flooded by the big waves at high tide.

MPR listener question: After hearing recently about the 100 years of daily weather observations at Waseca, MN, I was wondering what other Minnesota communities have been observing the weather for 100 years or more?

Answer: There are actually quite a few. At least 55 climate stations have kept records for over 100 years, but many of these have as much as 10 to 20 percent of their data missing due to various problems (faulty equipment, ill health or death of an observer, etc). Among the 55 stations perhaps as many as 20 have little if any missing data. Some of the other places with 100 years or more of daily data, include: Ada, Albert Lea, Argyle, Baudette, Bemidji, Cass Lake, Cloquet, Collegeville, Crookston, Detroit Lakes, Duluth, Fairmont, Farmington, Fergus Falls, Olivia-Bird Island, Grand Marais, Grand Meadow, Grand Rapids, Hallock, Hutchinson, International Falls, Itasca State Park, Leech Lake, Little Falls, Long Prairie, Mankato, Milan, Milaca, Montevideo, MSP, Mora, Morris, New London, New Ulm, Park Rapids, Pine River Dam, Pokegama Dam, Red Lake Falls, Red Wing, Redwood Falls, Rochester, Roseau, St Cloud, St Peter, Tower, Tracy, Two Harbors, Wadena, Warroad, Waseca, Willmar, Winnebago, Winnebigoshish Dam, Winona, and Zumbrota.

Twin Cities Almanac for August 29th:

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 59 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for August 29th:

MSP weather records for this date include: highest daily maximum temperature of 96 degrees F in 1969; lowest daily maximum temperature of 60 degrees F in 1915; lowest daily minimum temperature is 45 degrees F in 1911 and 1974; highest daily minimum temperature of 74 F in 1881, 1899, and 1969; record precipitation of 2.05 inches in 1964; and there has been no snow on this date.

Average dew point for August 29th is 58 degrees F, with a maximum of 76 degrees F in 1949 and a minimum of 34 degrees F in 1931.

All-time state records for August 29th:

The state record high temperature for this date is 103 degrees F at Beardsley (Big Stone County) in 1921. The state record low temperature for this date is 22 degrees F at Tower (St Louis County) in 1976. State record precipitation for this date is 5.32 inches at Thorhult (Nicollet County) in 1980; and no measurable snowfall has occurred on this date.

Past Weather Features:

August 29, 1976 was the coolest in state history as low temperatures in the 30s F were measured even in southern Minnesota communities (38 F at Preston). Many frosts were reported in northern counties and eight Minnesota cities saw the thermometer drop into the 20s F.

Strong thunderstorms brought heavy rains to northern Minnesota over August 29-30, 1980 (a drought year). Many observers reported over 2 inches, while Baudette, Red Lake Falls, and Babbitt received over 4 inches of rain. Some large hail was reported as well.

August 28-29, 1984 brought a widespread Heat Wave to Minnesota. Nearly every location saw 90 degrees F or higher daytime temperatures. Over a half dozen western communites saw temperatures reach 100 degrees F, where are long, hot, dry summer finally came to an end. Corn yields were not very good that year in western counties.

Outlook:

Near normal to above normal temperatures over the weekend, with increasing chances for showers later on Saturday and into Sunday. Thunderstorms may be strong on Sunday. Cooler on Labor Day but with continued chances for showers and thundersstorms. Drier weather by next Wednesday and Thursday, with warming toward next weekend.

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/

Minnesota WeatherTalk Newsletter for Friday, September 5, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, September 5, 2014

HEADLINES

-Severe weather and record rains
-High dewpoints and a heat burst
-Lack of 90 F temperatures
-Weekly Weather potpourri
-MPR listener question
-Almanac for September 5th
-Past weather
-Outlook

Topic: Severe weather and record rains

September 3-4 (Wed-Thu) brought severe weather to many parts of central Minnesota. There were at least 20 reports of large hail, ranging in size from 0.5 inch diameter to 2.75 inch diameter, with piles of hailstones reported near Waverly, MN. In addition there were many reports of damaging winds, ranging from 50 mph to over 84 mph. Around Todd and Wadena Counties many trees were blown down, and some building roofs damaged by winds.

Several observers reported over 1 inch of rainfall, with much of it coming in less than one hour. In addition there were some new daily record amounts reported at several climate stations. On September 3rd, St Cloud reported a new daily record with 2.94 inches. Cook in St Louis County reported a record 1.12 inches on that same day, as did Dawson with 1.13 inches. More new daily records of rainfall were reported on September 4th, including 4.26" at Onamia, 3.64" at Little Falls, 3.52" at Pelican Rapids, 3.35" at New York Mills, 2.35" at Mora, 2.22" at Aitkin, 2.12" at Rush City, 2.11" at Ottertail, 2.06" at Sandstone, 1.50" at Milaca, and 1.44" at Forest Lake. The rainfall of 4.26 inches at Onamia represents the largest single day rainfall in September since 9.48 inches was measured on September 23, 2010 at Amboy. Many other locations reported large amounts of rainfall but lacked historical records for comparison. For example, Askov (Pine County) reported 3.80 inches, a huge daily

quantity for the month of September, but they have no climate record for historical context.

As a result of the heavy rainfalls the National Weather Service had to issue a number of flash flood warnings, and many roads and highways were closed for a time, including portions of Hwy 210. Fortunately it looks like showers will not return to the area until next Monday or Tuesday, thus providing an opportunity to dry out.

Topic: High dewpoints and a heat burst

September 3-4 brought very high dewpoints to many parts of the state, with readings of 70 degrees F or higher. Montevideo reported a 73 degrees F dewpoint on the 3rd and 77 degrees F on the 4th, while the University of Minnesota-St Paul Campus reported a dewpont of 75 degrees F on the 3rd and 79 degrees F on the 4th of September. These are near record values for the date. On Thursday (Sept 4th) the high dewpoints pushed the Heat Index readings into the 90s F by afternoon for many southern Minnesota communities, making for a very uncomfortable day.

In addition early in the morning hours on September 4th, decaying thunderstorms over western portions of Minnesota produced an overnight "heat burst" for some areas. This is produced by compressional heating of sinking air from aloft. In Marshall, MN the air temperature at 5:00 am was 66 degrees, but rose to 72 degrees F by 6:30 am, while at Slayton, the air temperature was 66 degrees F at 4:00 am and rose to 72 degrees F by 4:30 am.

Topic: Lack of 90 F temperatures

Greg Spoden, Minnesota State Climatologist reported this week that MSP has reported only 2 days with temperatures of 90 degrees F or higher during 2014. This is rare in the historical record. Having 2 or less days with 90 F temperatures has only happened 8 other years back to 1873. Morris, Albert Lea, Duluth, and Rochester have not reported a single day with 90 degrees F this year, also quite rare in their historical records. Cooling Degree Days (CDD) used to measure the need for air conditioning during the summer were around 25 percent less than normal this summer in many places.

Weekly Weather potpourri:

A recent drought briefing from Brad Rippey of the USDA World Agricultural Outlook Board offers these major points:
-During the four-week period ending on September 2, 2014, contiguous U.S. drought coverage decreased slightly to 32.78% -- a 1.16 percentage point drop. Coverage

reached its year-to-date peak of 40.06% on May 6, but subsequent rainfall across the nation's mid-section and the Southwest has reduced drought's overall imprint. During August, statewide decreases in drought coverage of 10 to 20 percentage points were noted in Kansas (from 92 to 72% in drought), New Mexico (from 82 to 70%), and Kentucky (from 19 to 7%).
-Nevertheless, drought still covers a substantial portion of the central and southern Plains and the western U.S. On September 2, the highest level of droughtD4, or exceptional droughtwas noted in portions of California (58%), Nevada (12%), Texas (3%), and Oklahoma (2%). California also led the nation with 82% coverage of extreme to exceptional drought (D3 to D4).

Hurricane Norbert in the Eastern Pacific Ocean was bringing heavy rains and high surf to Baja California this week. Wind gusts were over 90 mph and sea wave heights exceeded 25 feet. By early next week clouds and rain from this storm may reach parts of the southwestern USA including southern California.

Environment Canada reported a snow storm in southern Alberta this week southwest of Calgary. The snow made for some difficult driving conditions and comes earlier than normal in September. The snow is not expected to last as temperatures will rebound into the 60s and 70s F over the coming weekend.

MPR listener question: I heard you report how extremely variable the August rainfall was around the state. Did anybody set a record for wettest or driest month of August in Minnesota?

Answer: Good question. The wettest places in the state from the NWS Cooperative Observer Network were Minnesota City (Winona County) with 8.59 inches (4th wettest August in their historical records), and Rushford (Fillmore County) with 7.95 inches (2nd wettest August in their historical records). Other observers without lengthy climate records had large amounts of rainfall in August as well, like Onamia with 8.20 inches and Cannon Falls with 8.05 inches. On the low end of the rainfall spectrum for August, Eveleth (St Louis County) reported their driest August in history with just 0.89 inches, and International Falls reported their 5th driest August in history with just 0.90 inches.

Twin Cities Almanac for September 5th:

The average MSP high temperature for this date is 77 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 5th:

MSP weather records for this date include: highest daily maximum temperature of 98 degrees F in 1922; lowest daily maximum temperature of 57 degrees F in 1873; lowest daily minimum temperature is 36 degrees F in 1962; highest daily minimum temperature of 77 F in 1912; record precipitation of 2.57 inches in 1946; and there has been no snow on this date.

Average dew point for September 5th is 55 degrees F, with a maximum of 78 degrees F in 1990 and a minimum of 31 degrees F in 1929.

All-time state records for September 5th:

The state record high temperature for this date is 103 degrees F at Tracy (Lyon 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 3.72 inches at Ely (St Louis County) in 1912 and at Austin (Mower County) in 1946; and no measurable snowfall has occurred on this date.

Past Weather Features:

September 5, 1885 brought a season-ending frost to northern parts of the state, especially the Red River Valley where temperatures fell into the mid to upper 20s F. Ground frost was reported in southern counties as well with a temperature reading of only 34 degrees F at Albert Lea.

One of the strongest and longest September Heat Waves in state history occurred over September 1-8, 1922. Day after day brought 90 F temperatures with little or no rainfall until the 8th. Sixteen communities saw the mercury reach the century mark, and it was 96 degrees F as far north as Babbitt. Following that warm start to the month some observers reported frost on the 11th which ended the growing season.

Strong thunderstorms brought heavy rains and street flooding to Rochester, Austin, and Grand Meadow over September 5-6, 1946. Austin reported a total of 6.74 inches of rain, while Grand Meadow reported 4.37 inches. The same storm system delivered a record amount to the Twin Cities of 2.57 inches.

A damaging frost occurred on September 5, 1962 before the corn and soybean crops had reached maturity. This unusual early frost affected areas around Luverne, Waseca, Farmington, Theilman, and Montevideo.

Severe thunderstorms with heavy rain visited the state over September 5-6, 2004. Over 20 climate observers reported 3 or more inches of rainfall, and areas of northern Minnesota around Fergus Falls, Detroit Lakes, and Moorhead received over 4 inches.

This brought relief to many dry areas of the state, restoring some watersheds which had been running low.

Outlook:

Mostly sunny weekend with cooler than normal temperatures. Increasing cloudiness on Monday with a chance for showers and thunderstorms into Tuesday and somewhat warmer temperatures. Another chance for showers by Thursday next week followed by even cooler temperatures heading into next weekend.

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Minnesota WeatherTalk Blog for Friday, September 12, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Blog for Friday, September 12, 2014

HEADLINES

-Wringing the atmosphere, September 9-10 rains
-Invasion of cold air
-Weekly Weather potpourri
-MPR listener question
-Almanac for September 12th
-Past weather
-Outlook

Topic: Announced Change in Minnesota WeatherTalk

Minnesota WeatherTalk is now an Extension Blog. It will continue to be released in newsletter form each Friday following the broadcast of Minnesota Public Radio's "Morning Edition" news program. But in addition, periodic WeatherTalk blogs highlighting current significant weather events and impacts, along with climate science research will appear at the Extension blog web site. The new web URL is:

http://blog-weathertalk.extension.umn.edu/

Topic: Wringing the atmosphere, September 9-10 rains

A strong low pressure system moved across Minnesota earlier this week over September 9-10, bringing strong winds, significant rains, and a dramatic drop in temperatures and dewpoints. Early in the week dewpoints ranged into the mid 60s F with temperatures in the 70s F. This cold front passage brought a drop of 20-30 degrees F in dewpoints and temperatures, along with 35-40 mph wind gusts.

Most observers reported less than an inch of rainfall from this storm, but some received record-setting amounts including 1.20" at Hibbing on the 9th. Those setting new records on September 10th included: 2.10" at Hutchinson, 1.59" at Preston, 1.55" at Litchfield, 1.37" at Bruno, 1.25" at Austin, and 1.19" at both Floodwood and Wolf Ridge Environmental Learning Center (north shore).

Topic: Invasion of cold air

Following the cold front passage on September 9-10, the coolest air mass of the season so far spread over Minnesota. Cool northwest winds, along with persist cloud cover kept daytime temperatures very low on Wednesday, September 10th. Some climate stations reported new record low daytime maximum temperatures including 44 degrees F at Embarrass, 46 degrees F at Ely, Eveleth, and Wright, 51 degrees F at Ottertail, 52 degrees F at Wheaton, and 54 degrees F at Kabetogama. On Thursday, September 11tth a few more record cold maximum temperatures were reported, including 46 degrees F at Grand Marais, 48 degrees F at Crane Lake, and 49 degrees F at Cook. In addition on Thursday morning Orr tied their daily record low temperature (2006) with a reading of 28 degrees F.

Weekly Weather potpourri:

The NOAA-National Weather Service Forecast Office in Rapid City, SD reported the earliest measurable September snowfall in history this week over the 10th and 11th. Rapid City reported about 2 inches, but nearby Custer, SD reported 8 inches of snowfall and Mount Rushmore saw 7 inches. You can read a more comprehensive report on this storm at their web site....

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=unr&storyid=104284&source=0

In addition Environment Canada reported this week that Calgary, Albert received over 11 inches of snowfall, causing some travel difficulties as well as some power outages.

A recent NOAA report assesses groundwater conditions in California in the context of the three year drought there. It clearly points to the fact that one of the driest three-year periods in the state has produced a significant decline in groundwater supplies as well. You can read this report at...

http://www.climate.gov/news-features/event-tracker/groundwater-california%E2%80%99s-big-unknown

Another news release this week from NOAA documents how new technologies deployed in the use of Doppler Radar systems are helping forecasters with detection and warnings for severe convective weather, including tornadoes. The technology applied is called SAILS which stands for Supplemental Adaptive Intra-Volume Low-Level Scans and it speeds up the radar scan rate at the lowest levels in the atmosphere. This technology has been deployed effectively in our region of the country since last May. You can read more about it at..

http://www.nws.noaa.gov/com/weatherreadynation/news/140908_feature_story.html#.VBHd82Pivnj

An inventory of global carbon dioxide emissions was described this week in a research paper from Arizona State University. The paper appears in the Journal of Geophysical Research and describes how researchers estimated hourly carbon dioxide emissions over the past 15 years. This is the most detailed source of emissions data yet derived for use in assessing human impact on climate change. You can read about this paper at...

http://www.sciencedaily.com/releases/2014/09/140911151853.htm

Tropical Storm Odile off the west coast of Mexico is expected to become a hurricane this weekend and bring heavy rains to coastal regions of Mexico. Odile is the 15th named storm of the Eastern Pacific Tropical Storm season. In the Western Pacific Tropical Storm Kalmaegi was expected to become a typhoon east of the Philippines and bring extreme weather to that country by early next week.

Earlier this week on September 8th the central portion of Arizona, particularly the Phoenix area received some torrential downpours causing widespread flash flooding. Some areas received 3-4 inches of rainfall in less than 12 hours. The Phoenix Sky Harbor Airport reported 3.29 inches in only 7 hours, the largest quantity of rainfall in one day ever recorded there. You can read more about this storm at the NWS web site.....

http://www.wrh.noaa.gov/psr/pns/2014/September/Sep8Flooding.php

MPR listener question: Back in the early summer you and Cathy spoke about how many climate observers in Minnesota were on pace to record their wettest year in history. Then Mother Nature slowed down the pace and quantity of rainfall over the summer. Are any places still expected to set annual precipitation records this year?

Answer: For the most part the frequency and quantity of precipitation has diminished during the second half of 2014 and few if any observers are expected to set any new annual precipitation records. Those who still have a shot at setting by year's end include: Mora with 36.03" (currently ranked 9th wettest year); Rushford with 36.26" (currently ranked 8th wettest year); Kabetogama with 28.70" (currently ranked 5th wettest year); Chaska with 39.63" (currently ranked 4th wettest year); and Little Falls with 34.16" (currently ranked 3rd wettest year). Normal or above normal monthly precipitation for the rest of this year would likely establish new annual records at these locations.

Twin Cities Almanac for September 12th:

The average MSP high temperature for this date is 72 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 53 degrees F (plus or minus 7 degrees F standard deviation).

MSP Local Records for September 12th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1908 and 1948; lowest daily maximum temperature of 55 degrees F in 1886, 1923, and 1974; lowest daily minimum temperature is 36 degrees F in 1878 and 1940; highest daily minimum temperature of 73 F in 1931; record precipitation of 4.96 inches in 1903; and there has been no snow on this date.

Average dew point for September 12th is 52 degrees F, with a maximum of 72 degrees F in 1909 and a minimum of 26 degrees F in 1923.

All-time state records for September 12th:

The state record high temperature for this date is 102 degrees F at Beardsley (Big Stone County) in 1931. The state record low temperature for this date is 17 degrees F at Kelliher (Beltrami County) in 2000. State record precipitation for this date is 4.96 inches at Komiska (an early Czech community in McLeod County) in 1869; and a trace of snow fell at Warroad and Roseau on this date in 1923.

Past Weather Features:

By far the coldest September 12th in history occurred in 1902 bringing an end to the agricultural season statewide. Half of the climate observers in the state reported lows in the 20s F, with virtually every corner of the state experiencing a frost. It was just 27 degrees F in St Peter.

One year later (1903) brought one of the wettest spells of September weather as strong thunderstorms crossed the state over the 12th and 13th bringing 2 to 3 inches of rainfall to many areas. Widespread flooding occurred in many areas including Shakopee, St Paul, Farmington, Minneapolis, and Red Wing where over 5 inches of rainfall was reported.

The warmest September 12th in state history was in 1931. Actually the entire week of September 6-12 that year was one of the warmest ever in September. Ever location in the state except for Grand Marais and Two Harbors surpassed the 90 degrees F mark, with 10 communities reporting afternoon readings of 100 degrees F or higher.

September of 1931 proved to be the warmest in state history as well.

Outlook:

The weekend will start with patchy frost around the state, depending on cloud cover early Saturday morning. Temperatures will continue cooler than normal, but moderate slowly towards normal later next week. There is a chance for showers Sunday night into Monday, but most of next week looks to be dry.

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Minnesota WeatherTalk Newsletter for Friday, September 19, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, September 19, 2014

HEADLINES

-Scattered Autumn Frosts
-New Seasonal Climate Outlook
-Weekly Weather potpourri
-MPR listener question
-Almanac for September 19th
-Past weather
-Outlook

Topic: Scattered Autumn frosts reported

Map from the DNR: Minnesota State Climatology Office
(http://www.climate.umn.edu/doc/irrigation/mintemp.htm)

Saturday, September 13th brought widespread frost to many areas, with record lows in a few places like International Falls (25 F), Crane Lake (28 F), Grand Meadow (30 F), Windom (32 F), and Waseca (31 F). Other dates this month brought a handful of frosts. Overall about 40 percent of the climate observers in the state have reported frost so far this month, with the vast majority in the northern half of the state. In the southern half of the state frosts have occurred in spots, but many areas remain frost-free. Hard freezes with lows in the 20s F have been confined to northern parts of the state. Some corn and soybean fields have been damaged by these frosts because they had not yet matured, but those fields untouched by frost will likely not see a frost threat for the rest of the month. There is a good discussion of the potential disparity in agricultural consequences from these frosts presented by Extension Faculty in the following newsletter.....

http://blog.lib.umn.edu/efans/cropnews/2014/09/mid-september-frost-on-corn-an.html

Topic: New Seasonal Climate Outlook

The NOAA Climate Prediction Center released new seasonal climate outlooks this week. The new outlooks favor a wetter than normal October for the Great Lakes Region, including Minnesota. The expected temperature pattern for the remainder of the autumn season and the winter season as well (october - February) is for above normal temperatures in our region of the country. The outlooks were based on the formation of a weak El Nino episode this fall, along with dynamical models that consider other climate trends and attributes.

Weekly Weather potpourri:

The People's Climate March will take place in New York City this Sunday (September 21). Starting from Central Park West at 11:30 am EDT organizers expect well over two hundred thousand to participate. A large group from Minnesota will be going. The March precedes next week's United Nations Climate Summit, scheduled for September 23rd with at least 125 nations in attendance. You can learn more at...

http://peoplesclimate.org/march/
http://www.un.org/climatechange/summit/faqs/

Yale Climate Connections if a daily public radio program produced by the Yale Center for Environmental Communication. It provides a diverse range of topics related to climate science, climate trends, climate change, climate interactions, and climate impacts. You can learn more at...

http://www.yaleclimateconnections.org/about-climate-connections/

Remnants of Tropical Storm Odile were dumping large amounts of rainfall across portions of AZ, NM, and west Texas this week as the moisture plume from this storm got caught up on the westerly wind flow across the southern USA. Meanwhile, Edouard became a major hurricane in the Atlantic Ocean, but remained far out to sea, and Hurricane Polo formed in the eastern Pacific Ocean off the coast of Mexico and was expected to bring heavy rain to portions of Baja California.

A recent paper by scientists at Montana State University published in Geophysical Research Letters shows that the tornado season is starting earlier in the southern plains states than it did 60 years ago. In certain areas the peak season for tornado activity has moved earlier on the calendar by as much as 14 days. You can read more at....

http://www.sciencedaily.com/releases/2014/09/140916132513.htm

The BBC reports that the first half of September has been the driest in more than 50 years for the United Kingdom with most observers reporting less than 0.04 inches of rainfall. Temperatures have been running several degrees F warmer than normal as well.

MPR listener question: For the past 15 years we have been going to the north shore of Lake Superior in September to catch the fall colors and walk the Superior Hiking Trail. In 2003 and 2012 we also encountered snow showers. We wondered how often do north shore observers report snow in the month of September?

Answer: Using the long term climate records for snowfall it appears that the Duluth and Two Harbors areas report at least a trace of snow in September about 30 percent of all years. It is about 20 percent of all years at Lutsen and Wolf Ridge Environmental Learning Center near Finland, but those climate records are of shorter duration. For north-central Minnesota communities, Baudette reports September snowfall in about 15 percent of all years while International Falls reports at least a trace of snowfall in September about 40 percent of the time.

Twin Cities Almanac for September 19th:

The average MSP high temperature for this date is 71 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 51 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for September 19th:

MSP weather records for this date include: highest daily maximum temperature of 94 degrees F in 1895; lowest daily maximum temperature of 48 degrees F in 1901 and 1918; lowest daily minimum temperature is 33 degrees F in 1873 and 1991; highest daily minimum temperature of 72 F in 1891 and 1940; record precipitation of 2.98 inches in 1907; and there was a trace of snow on this date in 1927.

Average dew point for September 19th is 51 degrees F, with a maximum of 72 degrees F in 1907 and a minimum of 25 degrees F in 1937.

All-time state records for September 19th:

The state record high temperature for this date is 104 degrees F at Beardsley (Big Stone County) in 1895. The state record low temperature for this date is 16 degrees F at Alborn (St Louis County) in 1929. State record precipitation for this date is 6.08 inches at Red Wing (Goodhue County) in 1907; and many places received a trace of snow on this date back in 1991.

Past Weather Features:

The year 1895 brought the hottest September 19th in state history. Actually a two-day Heat Wave prevailed over September 18-19, with over 35 climate observers reporting daytime high temperatures of 90 degrees F or higher. In western counties five communities reported temperatures of 100 degrees F or higher, all of which are still records today.

Widespread thunderstorms brought heavy rains to many parts of the state on September 19, 1907. Many observers reported over 2 inches of rain, while the east central counties like Washington, Dakota, and Goodhue reported over 4 inches. Red Wing and Lake City areas received over 5 inches with some flash flooding.

One of the coldest ever spells of mid-September weather occurred over the 17th to the 19th in 1929. Hard freezes occurred all the way from the Canadian border to the Iowa border, bringing an abrupt end to the growing season. Most northern communities recorded minimum temperatures in the teens F, while it was as cold as 25 degrees F as far south as Grand Meadow and New Ulm.

September 18-19, 1991 brought snow to many parts of Minnesota, along with slippery driving conditions. The Duluth area reported nearly 2.5 inches of snow.

Outlook:

Generally warmer than normal temperatures into the weekend with a chance for showers and thunderstorms in eastern sections of the state. Drier much of next week with near normal tempeatures, warming to above normal towards the end of the week.

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Minnesota WeatherTalk Newsletter for Friday, September 26, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, September 26, 2014

HEADLINES

-Variable moisture pattern continues
-Tornadoes in northwestern MN
-22nd Annual Kuehnast Lecture, October 7th
-Weekly Weather potpourri
-MPR listener question
-Almanac for September 26th
-Past weather
-Outlook

Topic: Variable moisture pattern continues

Just like the August rainfall pattern, September has been mostly drier than normal across the state, but intense thunderstorms have brought well above normal rainfall to some areas of the state. In the northern counties Hawley (3.08"), Lake Winnibigoshish (3.28"), Thorhult (3.42"), and Tofte (4.23") have all reported well above normal rainfall for the month.
In western counties a number of observers have reported over 4 inches for the month including Pelican Rapids, New York Mills, and Slayton. Lamberton has reported their 2nd wettest month of the year with 5.70 inches. In central Minnesota Sandstone has reportged 6.02 inches and Hutchinson has reported 6.55 inches of rainfall, the highest in the state. Stacy (Chisago County) has reported over 4 inches, giving them over 40 inches for the year, one of the wettest on record. And in southeastern Minnesota Grand Meadow (Mower County) reports 4.35 inches for the month

Among those experiencing a drier than normal month are Browns Valley with just 0.57 inches (8th driest in history) and Bemidji with 0.52 inches (9th driest month of September there). However recent weather outlooks favor a wet conclusion to the month, so these locations may end up with significantly higher monthly totals by the middle of next week.

Topic: Tornadoes in northwestern counties

Friday night (September 19th) brought severe weather to northwestern Minnesota counties. Both Kittson and Roseau Counties reported tornadoes. The first tornado was on the ground for 10 miles south of Northcote and Lancaster in Kittson County. It was estimated to be EF-2 (winds 111-135 mph) and destroyed some farm buildings. The second tornado, estimated to be EF-1 (winds 86-110 mph) was on the ground for 7 miles west of Greenbush in Roseau County and it too destroyed some farm buildings and grain bins. These storms represented the 26th and 27th tornadoes reported in the state this year. You can read more at...

http://www.crh.noaa.gov/news/display_cmsstory.php?wfo=fgf&storyid=104412&source=0

Topic: 22nd Annual Kuehnast Lecture on October 7th

The Annual Kuhenast Lecture in Atmospheric and Climate Science is scheduled for October 7th, 3 p.m. at the St. Paul Campus Student Center theater. The 22nd Annual Kuehnast Lecture will feature author, musician, and award-winning journalist Andrew Revkin of The New York Times and Pace University. Revkin is known widely as the founder of the Dot Earth blog. His lecture, "The New Communication Climate," will explore issues and opportunities arising as both the environment and the news media experience an era of unprecedented and unpredictable change. Music with Andrew, John Munson and friends, along with refreshments will follow the program.

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Everyone welcome - RSVP at:
http://z.umn.edu/kuehnastrsvp

Weekly Weather potpourri:

Over October 1-3 next week the Presidential Summit on Climate Leadership will take place in Boston, MA. Presidents from colleges and universities across the country have been invited to attend. You can read more about this at...

http://www.climate.gov/decision-support/professional-development/2014-presidential-summit-climate-leadership

Typhoon Kammuri was expected to brush the Japanese coastline with heavy rains and high surf this weekend, as it mostly stays out to sea on its journey to the Northern Pacific Ocean. It is the 17th named Tropical Storm of the 2014 western Pacific Ocean season. Meanwhile Tropical Storm Rachel was expected to high seas and perhaps heavy rains to parts of Baja California this weekend

The panhandle of Texas was clobbered by severe thunderstorms over September 24-25 this week. Many observers reported 2 to 5 inch rainfall amounts. Lubbock Airport reported 5.66 inches of rainfall, their 3rd highest daily total ever. Many roads were temporarily flooded there.

Now located in Exeter, the United Kingdom Meteorological Office College is celebrating its 75th Anniversary this month. Many BBC weather forecasters took their training there, and both Prince William and Prince Harry have been students there. I trained there briefly as well back in 1989.

A paper published this week by MIT scientists in the journal Nature Communications documents a new, greener way to manufacture concrete, one of the leading building materials used in construction industries. The proposed revised formula for concrete releases only half of the greenhouse gas emissions that come from the older formula process, and further it results in a stronger, more durable concrete. You can read more about this at...

http://www.sciencedaily.com/releases/2014/09/140925141236.htm

MPR listener question: I have heard you remark that 2014 has been a colder than normal year for Minnesota and that there were fewer than normal days with 90 degrees F or higher temperatures. Who reported the highest temperature this year and where was it?

Answer: Indeed for the year to date most weather observers are reporting a mean annual temperature that is 3 to 5 degrees F cooler than normal. The highest temperature reported this year in Minnesota was 97 degrees F at Detroit Lakes on July 11th. By the way, although September temperatures have been tracking cooler than normal across the state (5 months this year have been cooler than normal), it appears the month will end with several warmer than normal days, bringing the monthly mean values closer to normal.

Twin Cities Almanac for September 26th:

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 7 degrees F standard deviation).

MSP Local Records for September 26th:

MSP weather records for this date include: highest daily maximum temperature of 87 degrees F in 1923; lowest daily maximum temperature of 41 degrees F in 1942;

lowest daily minimum temperature is 27 degrees F in 1965; highest daily minimum temperature of 64 F in 1998; record precipitation of 1.81 inches in 1930; and record snowfall is 1.7 inches in 1942.

Average dew point for September 26th is 46 degrees F, with a maximum of 70 degrees F in 1986 and a minimum of 20 degrees F in 1965.

All-time state records for September 26th:

The state record high temperature for this date is 93 degrees F at Madison (Lac Qui County) and at Redwood Falls (Redwood County) in 1974. The state record low temperature for this date is 11 degrees F at Crookston (Polk County) in 1893. State record precipitation for this date is 3.45 inches at Albert Lea (Freeborn County) in 1973; and the state record snowfall for this date is 7.5 inches at Long Prairie (Todd County) in 1942.

Past Weather Features:

Perhaps the coldest ever last week of September occurred in 1893. During that period nine Minnesota locations reported low temperatures in the teens F, while most other observers reported lows in the 20sF. It was just 25 degrees F in Fairmont and 26 degrees F at Rochester.

September 26, 1942 is a climatic benchmark of sorts in that it marks the earliest fall occurrence of a significant snowfall in Minnesota. Though MSP officially recorded 1.7 inches many of the city parks reported 2 or more inches. The heavy wet snow damaged trees and shrubs which had not lost their leaves. Elsewhere the snow was heavier yet and required some
shoveling. At New Ulm 5.5 inches fell, while at Willmar and Detroit Lakes 6 inches of snowfall was reported.

Perhaps the wettest last week of September occurred in 1973 when numerous thunderstorms crossed the state bringing heavy showers. Many areas reported over 3 inches of rain and corn harvest was delayed. A tornado occurred near Eyota (Omsted County), damaging some farm buildings on September 26th.

By far the warmest September 26th in state history was in 1974. Except for the Lake Superior region most observers in the state reported afternoon temperatures in the 80s F. Over 25 western and southern Minnesota communities saw the thermometer reach 90 degrees F or greater that day.

Outlook:

Mostly sunny and warmer than normal over the weekend. Increasing cloudiness on Monday with a chance for showers, especially in northern sections. Somewhat lower temperatures next week, but still warmer than normal with chances for scattered showers and thunderstorms by Wednesday and Thursday.

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

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

For access to other information resources go to

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Minnesota WeatherTalk Newsletter for Friday, October 3, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, October 3, 2014

HEADLINES

-Old Wisdom
-Warm, But No 90s F
-Wet start to October
-22nd Annual Kuehnast Lecture, October 7th
-Weekly Weather potpourri
-MPR listener question
-Almanac for Octoboer 3rd
-Earth's oldest voices
-Past weather
-Outlook

Topic: Old Wisdom

".....climate change..for the first time in history....is being both qualitatively and quantitatively measured.....[with] the great amount of evidence gathered the reality of this change can no longer be denied.....the recent warming of the climate has so far been most noticeable in the more northerly latitudes of the northern hemisphere....." These are the words of Dr. Donald Baker, climatologist and founder of the Land and Atmospheric Science Program at the University of Minnesota, also the man who hired me back in the 1970s. When did Dr. Baker write this? These words appear in a publication he wrote for the Minnesota Farm Bureau back in April of 1960! Thanks to DNR climatologists Pete Boulay and Greg Spoden who brought this to my attention. Dr. Baker was a beloved faculty member, a great mentor to me and a dear friend.

Topic: September finishes warm, but no 90s F

With a flourish of warm days at the end of the month, September finished warmer than normal on a statewide basis, about 1 to 1.5 degrees F warmer than average for most observers in the state. Though some observers saw daytime highs reach the upper 80s F there were no reports of 90 degrees F or greater during the month of

September. Of further note the 2014 growing season, designated May through September, brought no 90 degrees F temperatures to many locations in the state that customarily see a number of 90 F days during the period. For example, Rochester recorded the first year without a 90 F temperature since 2008, and Albert Lea reported the first year without a 90 F temperature since 1993. In western Minnesota which normally sees a warmer growing season, Pipestone and Morris reported the first year without a 90 degrees F temperature since 1915!

Topic: Wet start to October

The month of October started out wet for most areas of the state, except for northwestern counties. East-central and southeastern areas of the state reported measurable rainfall on each of the first three days of the month, with close to 1 inch a common total. Faribault reported 1.16 inches while Lakeville received 1.30 inches. Winona reported 1.36 inches and Caledonia 1.81 inches, while in the Twin Cities Metro Area MSP airport reported 1.47 inches and the University of Minnesota St Paul Campus 1.20 inches. Well over half of the state's corn crop has reached physiological maturity now and a majority of the soybeans have dropped their leaves. As the corn and soybean harvesting season gets underway in earnest this month Minnesota farmers will be hoping for a series of dry days to get some harvesting done. It appears that patience will be required waiting for a warm and dry interval of weather.

Topic: 22nd Annual Kuehnast Lecture on October 7th

The Annual Kuhenast Lecture in Atmospheric and Climate Science is scheduled for October 7th, 3 p.m. at the St. Paul Campus Student Center theater. The 22nd Annual Kuehnast Lecture will feature author, musician, and award-winning journalist Andrew Revkin of The New York Times and Pace University. Revkin is known widely as the founder of the Dot Earth blog. His lecture, "The New Communication Climate," will explore issues and opportunities arising as both the environment and the news media experience an era of unprecedented and unpredictable change. Revkin will conclude the program with some music compositions of his own, accompanied by John Munson (MPR's "Wits" program) and friends. Refreshments will follow the program.

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Everyone welcome - RSVP at:
http://z.umn.edu/kuehnastrsvp

Weekly Weather potpourri:

Highlights from a recent drought briefing by Brad Rippey of the USDA include:
-During the four-week period ending on September 30, 2014, contiguous U.S. drought coverage decreased to 30.57% -- a 2.21 percentage point drop. Coverage reached its year-to-date peak of 40.06% on May 6, but subsequent rainfall in various regions has reduced drought's overall imprint. Statewide decreases in drought coverage of at least 10 percentage points were noted in states such as Kansas (from 72 to 46% in drought), Texas (from 61 to 49%), and Georgia (from 25 to 15%).
- Drought still covers a substantial portion of the southern Plains and the western U.S. On September 30, the highest level of droughtD4, or exceptional droughtwas noted in portions of California (58%), Nevada (12%), Oklahoma (5%), and Texas (3%).
- In recent weeks, unfavorably dry weather has returned to portions of the southern Great Plains. This resurgent dryness could have implications for fall grazing of recently planted wheat on the southern Plains, as well as possible issues with establishment of the winter wheat crop. On September, 35% of the nation's winter wheat production area was located within a drought-affected region.

Dr. Stephen Schneider, climatologist and founder of the journal Climate Change was inducted into the California Hall of Fame this week. Among few scientists to be so recognized, Dr. Schneider won numerous science awards and served as a climate advisor to every U.S. President since Nixon. During his professional career he worked at both NCAR and Stanford University. He passed away in 2010. More about him can be found at...

http://www.californiamuseum.org/inductee/stephen-schneider

A report issued this week in the Bulletin of the American Meteorological Society is titled "Explaining Extrme Events of 2013 from a Climate Perspective." This is an interesting read because it is basically a fingerprinting study to see how many of the 2013 extreme weather and climate events were tied to global climate change. Certainly not all of the events were attributable to climate change and the authors take great pains to explain why. You can read more about it at...

http://www.noaanews.noaa.gov/stories2014/20140929_extremeevents.html

The United Kingdom Meteorological Office reported this week that Northern Ireland recorded its driest September in history last month. In addition England, Wales, and Scotland recorded their 2nd driest September of all time. Monthly precipitation amounts typically ranged from only 0.30 inches to 0.90 inches across these countries.

In the western Pacific Ocean, Typhoon Phanfone was growing in strength this week, packing winds of 130 mph and creating sea waves of 40-45 feet. It was expected to bring high seas, strong winds, and heavy rains to parts of Japan by the weekend.

MPR listener question: I recently moved to St Cloud, MN from Columbia SC, so I am still getting used to the wildly fluctuating weather here. Now I hear that there is a chance for snow on Saturday, October 4th! Yikes! How often does it snow in the first half of October here?

Answer: Well, let's start with the month of October. For the St Cloud area two-thirds of all Octobers (back to 1893) bring snowfall. So that's pretty common if you ask me. Now what about the first half (15 days) of the month? Approximately 20 percent of the time snowfall is reported from St Cloud during the first 15 days of the month, however the vast majority (64 percent) of those years the snow is only a trace amount. The largest single day quantity of snowfall measured at St Cloud during the first half of October was 3.6 inches on October 12, 1969. In all cases of early October snowfalls, the snow was short-lived as it warmed up and melted very readily. So don't panic. BTW, further north it has snowed as much as 19 inches at Virginia (St Louis County), MN during the month of October (1951).

Twin Cities Almanac for October 3rd:

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 46 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 3rd:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1997; lowest daily maximum temperature of 41 degrees F in 1935; lowest daily minimum temperature is 26 degrees F in 1996; highest daily minimum temperature of 72 F in 2005; record precipitation of 2.62 inches in 1903; and record snowfall is a trace in 1935.

Average dew point for October 3rd is 42 degrees F, with a maximum of 64 degrees F in 1926 and a minimum of 18 degrees F in 1989.

All-time state records for October 3rd:

The state record high temperature for this date is 95 degrees F at Ada (Norman County) in 1922, and at Milan (Chippewa County) in 1938. The state record low temperature for this date is 9 degrees F at Embarrass (St Louis County) in 1999. State record precipitation for this date is 4.50 inches at Pine River (Crow Wing County) in 1903; and the state record snowfall for this date is 0.3 inches at Virginia (St Louis County) in 1935.

Word of the Week: Earth's oldest voices

This isn't really a meteorological expression, but perhaps it is arguably a climate expression, though derived from Native American culture and others. What are the oldest sounds on Earth? They are the sounds of wind, waves, and running water....all elements of the Earth's climate. Before any life forms existed, millions of years ago, there was the voice of the Earth's atmosphere, wind generated by air pressure gradients (high and low pressure cells) and the differential heating of land and water surfaces. There was also the voice of the Earth's water, waves generated by wind and tidal forces, and running water responding to the forces of gravity. Pretty basic stuff here, but obviously, these are the oldest sounds on our planet. These are the types of sounds that many of us find comforting and peaceful. In fact some doctors prescribe these sounds to relax patients or help them sleep better at night.

Past Weather Features:

Strong thunderstorms crossed the state over October 2-3, 1903, bringing a complete halt to the harvest season. Many observers reported 2-3 inches of rainfall, with hail and winds to 40 mph. Western Minnesota counties were especially hard hit and harvest was delayed for over one week.

October 3, 1922 was the warmest in state history as 16 communities reported a high temperature of 90 degrees F or greater. It was a short-live spell of autumn warmth as a cold front drop temperatures by 30 to 40 degrees F on the 5th of the month.

October 3, 1935 brought snow to many parts of the state. Measurable snowfalls, generally less than one inch, occurred at Orr, Tower, and Virginia, while there were widespread reports of trace amounts even as far south as Spring Grove (Houston County).

October 3-4, 1989 brought a hard freeze to just about every county in the state. Overnight temperatures fell into the teens and twenties F, with lows as cold as 15 degrees F at Theilman and Milan.

Outlook:

Cooler over the weekend with a chance for light snow and rain mix early on Saturday. Some frosts likely Saturday night, then a chance of showers again on Monday and early Tuesday. Warming up by the middle of next week to near normal temperatures.

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Minnesota WeatherTalk Newsletter for Friday, October 10, 2014

To: MPR's Morning Edition
From: Mark Seeley, University of Minnesota, Dept of Soil, Water, and Climate
Subject: Minnesota WeatherTalk Newsletter for Friday, October 10, 2014

HEADLINES

-Roller coaster climate pattern
-Changing day length effects on temperature
-Weekly Weather potpourri
-MPR listener question
-Almanac for October 10th
-Past weather
-Outlook

Topic: Roller Coaster Climate Pattern

The climate patterns this month have been classic for Minnesota....that is to say highly variable. We started on the 1st with many reports of daytime temperatures in the 70s F. In fact over 20 western Minnesota communities reported daytime highs of 70 F or above. Then on the 4th of the month 35 Minnesota communities reported record-setting cold daytime maximum temperatures with their thermometers remaining in the 30s and 40s F all day. Windom only rose to 43 degrees F, while Cass Lake barely reached 38 degrees F for a daytime high. The next morning (October 5th) Zumbrota (Goodhue County) reported a record-tying minimum temperature of just 23 degrees F (tied 1952). The remainder of the week was cold with frequent frosty mornings. By October 9th about two-thirds of the state's weather observers have reported at least one frost this autumn.

Also over October 4-5 over 30 communities reported a trace of snowfall, while the Brainerd area reported 0.6 inches, one of the earliest measurable snowfalls observed there. More recently this week temperatures have moderated and will rise to near seasonally normal levels by early next week. Further temperatures are supposed to be warmer than normal for much of the mid-month period. It is possible many areas of the state will see 70 degrees F again with an extended Indian Summer.

Topic: Changing day length effects on daily temperature

As we continue to lose daylight hours this month, you may notice an increase in the daily temperature range. Though the sun will heat the dry landscape substantially during the day (as we have seen this week), the longer nights allow for more cooling to occur, dropping the overnight lows to a greater degree than just a month ago. This produces a larger daily temperature range in the absence of significant cloud cover (note many observers reported a 30-35 degrees F temperature rise on Monday, October 6th).

Another temperature effect of day length is change in the time of day that the maximum temperature occurs. Again, in the absence of persistent cloud cover, or drastic change in air mass because of a strong frontal passage, the time of the maximum temperature is typically 5:00 to 6:00 pm in July, 4:00 to 5:00 pm this time of year (October), and during the very short days of December, the maximum temperature occurs between 3:00 and 4:00 pm.

Weekly Weather potpourri:

Super Typhoon VongFong was generating wind gusts over 150 mph this week and sea wave heights of 40-45 feet. It was on a track to bring heavy rains, high seas, and damaging winds to parts of South Korea and Japan over the weekend. Also, Cyclone HudHud in the Bay of Bengal was expected to bring heavy rains and strong winds to east-central India over the weekend as well.

NOAA announced this week that it will host a press conference next Thursday, October 16th to discuss and delineate the winter season outlook for the USA. Several scientists from the Climate Prediction Center will be present to lead the discussion and answer questions.

The NOAA Climate.Gov newsletter also announced this week a webinar on October 16th to discuss "Climate Change and National Security." This will take place at Ohio State University and offer perspectives on how climate change may impact humanitarian relief efforts and armed conflicts. You can read more about it at...

http://climate.gov/decision-support/professional-development/climate-change-national-security

A recent study by the University of British Columbia finds that a changing climate will have significant effects on the redistribution of fish stocks causing many species to migrate from the tropical latitudes toward the polar latitudes. This will be detrimental to the subtropical countries and cultures that rely on certain fish stocks for their basic dietary needs. There will be new opportunities for fisheries development in more Arctic regions of the ocean basins. You can read more about this study at...

http://www.sciencedaily.com/releases/2014/10/141010083847.htm

MPR listener question: What are the all-time October temperature extremes for Minnesota and what is the last date that a 90 degrees F temperature has ever been recorded this month?

Answer: The all-time extremes for October in Minnesota are 98 degrees F at Beardsley (Big Stone County) on October 5, 1963 and -16 degrees F at Roseau (Roseau County) on October 26, 1936. The latest date for a 90 degrees F reading in the Twin Cities is 90 F on October 10, 1928, while the latest date for the state is a reading of 90 degrees F at Canby (Yellow Medicine County) on October 30, 1950.

Twin Cities Almanac for October 10th:

The average MSP high temperature for this date is 62 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for October 10th:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1928; lowest daily maximum temperature of 38 degrees F in 1906; lowest daily minimum temperature is 25 degrees F in 1964 and 1987; highest daily minimum temperature of 63 F in 1930; record precipitation of 1.89 inches in 1898; and record snowfall 2.5 inches of snow fell on this date in 1977.

Average dew point for October 10th is 41 degrees F, with a maximum of 67 degrees F in 1949 and a minimum of 15 degrees F in 2009.

All-time state records for October 10th:

The state record high temperature for this date is 93 degrees F at Tracy (Lyon County) in 1928. The state record low temperature for this date is 6 degrees F at Big Falls (Koochiching County) in 1932. State record precipitation for this date is 6.13 inches at Vesta (Redwood County) in 1973; and the state record snowfall for this date is 10.0 inches at Oklee (Red Lake County) in 1970.

Past Weather Features:

October 10, 1928 was the warmest in state history with over 20 communities reporting daytime highs of 90 degrees F or greater. With winds from the east, north shore areas of Minnesota along the Lake Superior shoreline remained in the 50s F all day.

October 9-12, 1932 was cold and snowy. Many communities reported overnight lows in the 20s and 30s F, while daytime highs did not reach higher 50 degrees F at many places. Snowfall was widespread ranging from trace amounts in most places and from 1 to 2 inches at a number of southern locations.

October 9-10, 1970 brought even more widespread snowfall to the state. Many counties reported 3-5 inches, while Fosston reported 9 inches and Slayton reported 7.5 inches. The snow was short-lived and melted over a few days.

Outlook:

Mostly dry weekend with near normal temperatures and bright, sunny skies. Chance for showers later on Sunday and into Monday and warming up next Tuesday through Friday with above normal temperatures and generally dry weather.

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Friday, December 19, 2014

Roller Coaster Temperatures in December

This will be the last Minnesota WeatherTalk Blog until after the New Year. Please look for a new one on Friday, January 9, 2015

Roller coaster temperatures in December:

After starting the month with many sub-zero F temperature readings around the state during the first week, including a national low of -12 F at Embarrass on the 6th, many Minnesota observers reported 11-12 consecutive days with above normal temperatures and several new daily record warm minimum values and record daily warm maximum values were set over the 13th to the 15th. In addition MSP set a new all-time record high dewpoint for so late in the month with a reading of 49 F on the 15th, that corresponds to the average dewpoint for early June or mid-September. A full report on this mild spell of weather around the state is available at the MN-State Climatology Office web site.

With the warm spell much of the state lost a great deal of snow cover recently. Much of the state has seen little snow this month anyway, with only portions of northeastern Minnesota reporting 10 or more inches. But the other shoe will drop, as it usually does. Starting this weekend there will be chances for snowfall before Christmas Day, then much cooler temperatures for the balance of the month with more chances for snowfall between Christmas and New Year's Day. So snow lovers may yet have a smile on their face by the end of the month. It is still likely that overall December will end up warmer than normal for most areas of the state.

Santa Forecast:

The North American Aerospace Defense Command (NORAD) will again be tracking Santa as he travels the globe on Christmas Eve. He has a lot of ground to cover. You can follow his progress by going to the NORAD Santa web site.

For those of us who live in Minnesota it looks like Santa may have to navigate through some snow on Christmas Eve as there will be some snow showers across the state. At least temperatures will be normal and not terribly frigid. I am sure Santa and his reindeer will still appreciate a hot beverage and some cookies left out for his home

visits.

Weekly Weather Potpourri:

The NOAA-National Climatic Data Center has kept records of climate extreme values for each state. They are available at their web site and may be of interest to many citizens. It is evident that a number of all-time record values in each state have occurred over recent decades. You can find this information at the NOAA-NCDC Extremes Records Section of their web site.

For those who have been light-starved this month, take heart. The winter solstice (shortest day of the year) arrives at 5:03pm on December 21st. After that we can begin to expect an increase in day length, albeit very slow at first, only about 9 minutes gain by the end of the month. However we'll pick up another 55 minutes of gain in day length during January, and even more in February and March. If you want to check out the relative gains and losses in day length for the Twin Cities area you can go to the NOAA-National Weather Service web site....

Brad Rippey of the USDA offered a California drought update this week:
-Since Thanksgiving, periods of significant precipitation have fallen across California. In valley locations, rain has boosted topsoil moisture, benefited winter grains, and helped to revive rangeland and pastures. According to USDA/NASS, 30% of Californias rangeland and pastures

were rated in good to excellent condition on December 14, compared to just 15% on October 26.
-The latest U.S. Drought Monitor (Dec 18) indicates that there was a substantial reduction in D4 (exceptional drought) coverage in northern and central California. Statewide, D4 coverage fell from 55 to 32% -- the smallest area in exceptional drought since early-June 2014. However, overall drought (D1 to D4) coverage declined only slightly, from 99.7 to 98.4%. In other words, nearly all of the state remains in drought, although the drought intensity has decreased by one category in parts of northern and central California.

This week the United Kingdom Meteorological Office provided an update on global temperature anomalies for 2014. It is obvious that 2014 will be among the warmest years measured since 1880 no matter what happens weatherwise for the remainder of the year.

NASA/Goddard Space Flight Center released an analysis this week showing that holiday brightened cities emit increased light intensity that is detectable on the NASA/NOAA Suomi NPP satellite system. Using the Visible Infrared Imaging Radiometer Suite sensor NASA has routinely mapped the images of "Earth at Night." These images clearly show brighter, more intense light coming from various cities during the Christmas and New Years holidays in the USA and during Ramadan in the Middle East.

MPR listener question:

The persistent warmth earlier this week over the 13th to the 15th was remarkable. I don't remember anything like it in December. Were any new statewide daily temperature records set?

Answer:

Indeed, at least 12 climate stations reported new daily warmest maximum temperature readings over December 13-15, including readings of 56 F at Redwood Falls, 52 F at Worthington, and 51 F at MSP. But none of the maximum temperature values were statewide records. More significantly, December 13-15, brought new record warm minimum temperatures to 121 climate stations in Minnesota, with scores of readings in the 40s F. Two days brought new statewide daily warm minimum temperature readings: on December 14th Marshall reported a low temperature of 46 F breaking the old statewide record of 40 F set at Red Wing in 1891; and on December 15th Owatonna reported a low temperature of 45 F surpassing the former statewide warm minimum temperature record for the date of 40 F at Winona in 1928.

Twin Cities Almanac for December 19th:

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 14 degrees F standard deviation).

MSP Local Records for December 19th:

MSP weather records for this date include: highest daily maximum temperature of 52 degrees F

in 1923; lowest daily maximum temperature of -11 degrees F in 1983; lowest daily minimum temperature is -29 degrees F in 1983; highest daily minimum temperature of 38 F in 1923; record precipitation of 0.51 inches 1968; and record snowfall is 6.4 inches in 1951.

Average dew point for December 19th is 10 degrees F, with a maximum of 39 degrees F in 1918 and a minimum of -31 degrees F in 1955.

All-time state records for December 19th:

The state record high temperature for this date is 60 degrees F at Madison (Lac Qui Parle County) in 2011. The state record low temperature for this date is -52 degrees F at Mora (Kanabec County) and Tower (St Louis County) in 1983. State record precipitation for this date is 1.35 inches at Luverne (Rock County) in 1902; and the state record snowfall for this date is 11.5 inches at Two Harbors (Lake County) in 2008.

Past Weather Features:

A major winter storm crossed the state over December 19-21, 1902 bringing a mixture of precipitation and high winds. In southern counties much of the precipitation came in the form of rain, while in central and northern counties it was snow. At least 15 climate stations reported over 1 inch of precipitation and some reported 5 to 8 inches of snow.

December 19, 1923 was the warmest in state history with 35 cities reporting highs of 50 F or greater. Duluth and Two Harbors reported 51F that day, while Winona reported a high of 55F and a mild low of 37F.

By far the coldest December 19th in state history occurred in 1983. In fact the entire week before Christmas was one of the coldest in state history. Overnight lows of -30F were common and 35 communities reported lows of -40F or colder, including -40F at Zumbrota and -41F at Jordan. The high temperature at Ada was -20F. Windchill values were dangerously low all day.

December 18-20, 2008 brought heavy snow to many parts of the state. In southeastern Minnesota Harmony reported 8.5 inches, but in the northeast even heavier amounts were reported with 14 inches at Duluth and nearly 20 inches near Two Harbors. It was a very snowy December in 2008 with widespread reports of 30 to 50 inches for the month.

Outlook:

Warmer than normal on Saturday with increasing cloudiness and a chance for precipitation by evening. Continued warmer than normal on Sunday and Monday with chances for mixed precipitation, mostly snow in the north. Good chance for snow statewide on Christmas Eve, carrying over into Christmas Day. Then cooler and drier for much of next week.

Posted by Mark Seeley at 11:09 AM 1 comment:

Friday, December 12, 2014

Looking back at 2014 weatherwise

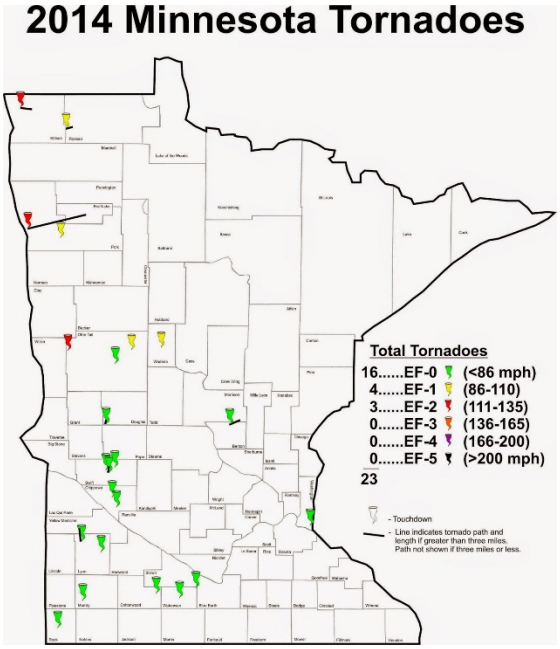
2014 Weather and Climate Highlights:

I was asked to speak about this last week on TPT's Almanac program and I didn't get to cover all the weather and climate headlines from the year. So here is my list:

-March 31st brought a statistical singularity, a tornado warning and a blizzard warning at the same time to Yellow Medicine County. St Leo was hit by the tornado.
-Coldest year in Minnesota since 1996. This is especially noteworthy since it has been the warmest year globally in well over 100 years.
-March 6th brought the highest amount of Great Lakes Ice cover since 1979.
-A delayed spring produced some of the latest ever ice-out dates for Minnesota lakes, including Lake of the Woods (May 21st)
-June brought the wettest month in Minnesota state history, with a statewide mean value of over 8 inches of rainfall, many observers had over a foot of rain.
-Glorious weather during the State Fair helped to bring about record-setting attendance
-A terrific month of October allowed most farmers to harvest late maturing crops
-Lastly, a cold and snowy November was like a "slap in the face."

2014 Tornado Summary:

This week Todd Krause of the NOAA-National Weather Service in Chanhassen, MN provided a summary of tornado reports across the state this year. Only 23 tornadoes were reported in the state during 2014, the second consecutive year with a smaller than average number (only 15 reports in 2013). You can view historical data on tornadoes at the State Climatology Office web site to compare other years. Among the noteworthy characteristics of 2014: the majority of tornadoes (16) were rated EF-0 (winds<86 mph) and caused relatively little damage; an EF-2 tornado (winds 111-135 mph) was on the ground for nearly 38 miles across portions of Polk and Red Lake Counties on July 21st but shrouded in low clouds and heavy rain it was hard to detect; and two tornadoes occurred in Otter Tail County on September 4th between 4:48 am and 5:45 am, very unusual times for such storms to develop.



Moderation and Warmth:

Since last Friday (December 5th) temperatures have slowly been moderating and warming across the state. Nearly every observer has reported daytime highs above freezing and a few places have seen 40F or greater. The NOAA-CPC keeps emphasizing a warming trend across the country in their mid-range outlook products all the way out to December 24th, Christmas Eve. In fact there is hardly a place on the USA landscape expected to see cooler than normal temperatures over that interval. Therefore it is likely that a number of spots across Minnesota will lose their snow cover before Christmas. For those who dread a Brown Christmas there is hope that an Albert Clipper storm system out of the northwest is expected to deliver some precipitation over Christmas Eve and Christmas Day. Don't know yet how much.

December of 1822:

In the past during the Christmas season we have talked about historical climate extremes for December. In my lifetime it was 1983, the coldest December of the 20th Century with 16 nights of sub-zero F temperatures and a mean monthly temperature for the Twin Cities of just 3.7 F in the Twin Cities. The next closest value in the Twin Cities historical record was a mean monthly temperature of 6.0 F in 1872, when there were also 16 nights of sub-zero temperatures. These are shivering statistics for December, but they are tame when compared to the temperatures endured by the soldiers at Ft Snelling in December of 1822. They reported 24 sub-zero F nights, with a mean monthly temperature of just 1.6 F. On Christmas Day that year the temperature only varied between -13 F and -2 F. Brrrrrr.....

Weather Potpourri:

A recent paper in the *Journal of Geography and Geology* by Yuan and Mitchell documents a comprehensive study of climate trends in Minnesota. Some conclusions from this study: precipitation has increased significantly, especially in the months of May and June since 1985; minimum temperatures have increased significantly; and the length of the growing season has expanded, particularly with an earlier onset in the spring.

A recent paper in *Geophysical Research Letters* by Indiana University researchers documents an increase in extreme temperatures at the "tails" of the spatial distribution on Earth. These increases are found to be larger than those associated with the central or mean Earth temperature values. In the past 30 years warm anomalies are increasing at a faster rate than cold anomalies.

A new study by the United Kingdom Meteorological Office shows that the probability of having extremely hot summers in Western Europe has increased significantly. Extremely hot summers that once had a historical frequency of twice per century, are now expected to occur about twice per decade.

MPR Listener Question:

What's has been the longest lasting snow storm in the Twin Cities area? It seems that most snowfall lasts for just a few hours up to a day in length.

Answer:

The longest duration of continuous falling snow was from shortly after midnight on December 6th to shortly after 5 pm on December 9th, 1969, a period of 88 hours! This was very light snow, amounting to a total of only 14.0 inches, but the December total snowfall that year was 33.2 inches, an all-time record for the Twin Cities until 33.6 inches fell in December of 2010.

Heavier and more memorable snow storms were not as long-lasting. For example, the Halloween Blizzard of 1991 (over 28 inches of snowfall) occurred over a period of 67 hours, while the Armistice Day Blizzard of 1940 (nearly 17 inches of snowfall) lasted about 55 hours.

Twin Cities Almanac for December 12th:

The average MSP high temperature for this date is 28 degrees F (plus or minus 12 degrees F standard deviation), while the average low is 12 degrees F (plus or minus 13 degrees F standard deviation).

MSP Local Records for December 12th:

MSP weather records for this date include: highest daily maximum temperature of 53 degrees F in 1883 and 1968; lowest daily maximum temperature of -1 degrees F in 2000; lowest daily minimum temperature is -15 degrees F in 1879; highest daily minimum temperature of 37 F in 1928; record precipitation of 0.61 inches 1886; and record snowfall is 4.6 inches in 1941.

Average dew point for December 12th is 9 degrees F, with a maximum of 49 degrees F in 1968 and a minimum of -19 degrees F in 1962.

All-time state records for December 12th:

The state record high temperature for this date is 64 degrees F at Tracy (Lyon County) in 1913. The state record low temperature for this date is -39 degrees F at International Falls (Koochiching County) in 1995. State record precipitation for this date is 3.66 inches at Caledonia (Houston County) in 1899; and the state record snowfall for this date is 18.0 inches at Altura (Winona County) in 2010.

Past weather features:

December 12, 1913 was the warmest in state history, with nearly all parts of the state seeing afternoon temperatures that reached 50 F or greater. Some western and southern communities reported record values in the 60s F.

December 12, 1995 was the coldest statewide in history, with every spot in the state reporting sub-zero F temperature readings. Several northern cities reported -30 F or colder, and the temperature never rose above -15 F at Itasca State Park. Abundant snow cover blanketed the state.

December 11-12, 2010 brought heavy snow and a blizzard to many parts of the state. The Twin Cities received over 17 inches, and the Metrodome roof collapsed under the weight of the snow. The Holidazzle parade on Nicollet Mall was cancelled and the MSP Airport was closed for a time. Blizzard warnings prevailed across southern Minnesota, where Winona reported 23 inches, Lake City 21 inches, Red Wing 20 inches, and Owatonna 14 inches.

Outlook:

Mild temperatures over the weekend with increasing cloudiness and a chance for rain or drizzle on Sunday. Chance for rain or snow later on Monday and into Tuesday with temperatures returning to near normal levels. Warmer again toward the end of next week.

Friday, December 5, 2014

November Wrap-Up, Revised December Outlook

Final comments on November:

On a statewide basis November of 2014 was the coldest since 1995 with over two-thirds of the days showing temperature values that were colder than normal. Since 1895 it ranked as 9th coldest November statewide. For the Twin Cities the 11 consecutive days with below freezing temperatures (Nov 10-20), tied as the third longest November stretch below freezing in history back to 1871. Minnesota reported the coldest temperature in the nation five times during the month. Temperature extremes for the month were 60 degrees F at several locations on the 2nd, and a frigid -24F at Embarrass on the 28th.

Incidentally, Embarrass reported the coldest temperature in the nation again this week on December 4th with a reading of -13 degrees F, and so far this month nearly every climate observer in the state has reported at least one sub-zero F temperature.

Snowfall for the month of November ranged from just a few inches to well over a foot. Some of the snowiest places in the state this month included: Duluth, Benson, Collegeville, and Kimball with over 16 inches; Dawson, Madison, Winnebago, and Little Falls with over 17 inches; Rush City and Cambridge with over 18 inches; and Mora and Milan reported over 19 inches.

December Climate Outlook Revised:

On November 30th the NOAA-Climate Prediction Center revised the temperature outlook for the month of December based on a recent indication of a stronger El Nino forming in the equatorial Pacific Ocean (warmer than normal surface water temperatures). The revised outlook called for a higher probability of warmer than normal temperature conditions across most of the nation, including Minnesota. Certainly warmer and drier conditions are seen in the outlook for Minnesota through the next two weeks of December as well.

How sound carries well in dense air:

A scientist and former meteorologist was studying the language of elephants in the wild, and especially their mating calls. He found that the females emit an extremely low tone (long sound wave) mating call at certain times of the year, but they wait to do so typically until sunset or shortly after. These sounds can be heard by male elephants from as far as 10 miles. He inferred that elephants were using their meteorological knowledge in two respects: (1) sound travels much farther over a landscape when there is a temperature inversion (colder, denser air near the surface) and this is often the case shortly after sunset; (2) surface winds often subside and calm after sunset and therefore permit sound to be detected at greater distances (not having to compete against the aeolian sounds of the wind). In addition, sounds of longer wavelength tend to travel farther in the atmosphere than high pitched (short wavelength) sounds. On the other hand, perhaps elephants are simply in a more romantic mood after the sun goes down.

Weekly Weather potpourri:

Earlier this week Pete Boulay of the MN State Climatology Office provided an interesting resource on Great Lakes annual ice coverage over the period from 1973 to 2014. These data

compiled by the NOAA Great Lakes Environmental Research Laboratory in Ann Arbor, MI show that last winter maximum ice coverage on the Great Lakes (March 6, 2014) was 92.2 percent the 2nd highest value in the data record (surpassed only by 94.7 percent in 1979). You can read more about this analysis at the NOAA web site.

There is a nice feature this week provided in the NOAA Climate.gov newsletter about how an Alabama Farmer uses the NOAA seasonal climate outlooks to plan his crop rotations. He especially pays attention to La Nina and El Nino related outlooks. Take a look at the video.

The Climate.gov newsletter also features an interesting article about pine bark beetle outbreaks related to climate based on some work done by the American Museum of Natural History. Worth a read.

Some excerpts from USDA's Brad Rippey's weekly drought briefing:
-During the five-week period ending on December 2, 2014, contiguous U.S. drought coverage decreased to 29.13% -- a 0.48 percentage point drop. Several weeks ago, in mid-October, U.S. drought coverage fell below 30% for the first time since December 2011.
-During November, most of the significant changes involved reduction in the intensity and/or coverage of dryness and drought, primarily across the southern and eastern U.S.
-Drought still covers a substantial portion of the southern Plains and the western U.S. On December 2, the highest level of droughtD4, or exceptional drought was noted in portions of California (55%), Nevada (12%), Oklahoma (5%), and Texas (3%).
- On December 2, more than one-third (37%) of the nations winter wheat production area mainly across the southern Plains and the interior Northwest was located within a drought-affected region.
- Heading into the winter of 2014-15, the Midwest remains nearly drought-free. On December 2, drought covered just 5% of the U.S. corn production area and 3% of the soybean area.

Super Typhoon Hagupit was churning in the Western Pacific Ocean east of the Philippines this week generating winds up to 160 mph and sea waves of 45-50 feet. It was expect to make landfall southeast of Manila on Saturday and Sunday and may be quite destructive, thought winds are expected to diminish somewhat before landfall.

The United Kingdom Meteorological Office earlier this week summarized the global temperature records for 2014 so far and offered some assessment on attribution for the warm year it has been worldwide. Clearly this year may go into the record books as the warmest in the modern record.

An article released in *Science* magazine this week takes a hard look at the "Social Cost of Carbon." An assessment by economists and lawyers on the costs of carbon emissions is intended to provide a framework for policymakers to better judge costs and benefits of climate policies.

MPR listener question:

Over Thanksgiving I heard something I have never heard before: "White Thanksgiving = Brown Christmas." Does wintry weather at Thanksgiving correlate with less snowy weather at Christmas or even a brown Christmas?

Answer:

NO! is the emphatic answer to this question and here's why. Thanks to the MN State Climatology Office I can look at the data for the Twin Cities since 1900. Over that time period there has been at least one inch of snow cover on Thanksgiving Day 38 times, so that provides the number of cases to examine for Christmas Day. Of those 38 years, Christmas Day brought at least one inch of snow cover 28 times (74 percent), while just a trace of snow was observed on Christmas Day 7 times (18 percent). There were only 3 years (1997, 1957, and 1911) when a brown Christmas was observed, a frequency of only 8 percent. Clearly white Thanksgiving Days are correlated to White Christmas Days.

Twin Cities Almanac for December 5th:

The average MSP high temperature for this date is 30 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 16 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for December 5th:

MSP weather records for this date include: highest daily maximum temperature of 63 degrees F in 2001; lowest daily maximum temperature of 2 degrees F in 1873; lowest daily minimum temperature is -14 degrees F in 1873; highest daily minimum temperature of 40 F in 1875; record precipitation of 0.81 inches 1909; and record snowfall is 7.0 inches in 1909.

Average dew point for December 5th is 17 degrees F, with a maximum of 57 degrees F in 2001 and a minimum of -19 degrees F in 1977.

All-time state records for December 5th:

The state record high temperature for this date is 65 degrees F at Winona (Winona County) in 1998 and 2001. The state record low temperature for this date is -38 degrees F at Ft Ripley (Crow Wing County) in 1873. State record precipitation for this date is 2.23 inches at Milaca (Mille Lacs County) in 1985; and the state record snowfall for this date is 12.0 inches at Little Falls (Morrison County) in 1909.

Outlook:

Mostly sunny on Saturday with below normal temperatures. Increasing cloudiness on Sunday and warmer, but with a chance for mixed precipitation later in the day and into Monday. Drier after Tuesday with a significant warming trend and a run of above normal temperatures with mostly a dry pattern.

Wednesday, November 26, 2014

Snow Accumulates As We Near Month's End

With holiday programming scheduled for this Friday, there will not be a WeatherTalk segment on Minnesota Public Radio's "Morning Edition" news program. So I am sending along an abbreviated version of Minnesota WeatherTalk early this week.....MS

Snow Accumulates:

This past week both Monday and Wednesday brought snow to parts of the state. A rapidly moving Alberta Clipper deposited 1-3 inches of snowfall in many places on Monday, and then a more moisture-laden system dropped snow across southern Minnesota and northern Iowa on Wednesday, with some amounts over 4 inches. This made travel on Wednesday difficult for

many going away for the Thanksgiving holiday.

Some observers reported record-setting snowfall amounts on November 26th. Among these were: 6 inches at St Peter and Amboy, 7 inches at Mapleton, 8 inches at Winnebago, 8.5 inches at Fairmont, and 11 inches at Faribault. As the month of November comes to an end this weekend, a number of observers have received over 15 inches of snowfall for the month and most of the state's landscape rests under a blanket of snow. With all of the snow, temperatures have averaged colder than normal for the month, ranging from 6 to 9 degrees below average. November will be the 6th month of 2014 to record significantly colder than normal temperatures.

Thanksgiving Day, Fasting Day, and Climatology:

Historically, Christian people have held Thanksgivings to celebrate and recognize the gifts and mercies of God. This has often taken the form of a harvest festival or a banquet in the fall. Conversely, Fasting Days were often scheduled as a recognition of God's harsh judgements, a way for reconciliation or atonement. These quite often occurred in the spring. But long ago neither of these events were typically observed on
fixed calendar dates. Some would say that they were more related to climate.

When harvests were made bountiful by a blessed rain or abundant sunshine or when fish and game were caught in great numbers by hunters and fishermen, a community might declare a Thanksgiving Day to celebrate these gifts. Alternatively, if the winter was harsh, game was scarce, there was spring flooding, or drought related forest fires, then a community might declare a Fasting Day in an attempt to reconcile with God. Often times this was coincident with the depletion of winter stored food anyway, so there was little to eat. Thus many of these occasions were at least partially dictated by climate and weather variations as they affected agriculture, fish and game, or the hospitality of the local environment.

In early American history, Thanksgiving could be declared independently by a local community, church or colonial government. These were often celebrated on a weekday that was called "Lecture Day", typically a Wednesday or Thursday when a topical sermon was given each week. An annual autumn Thanksgiving was pretty well established in many American colonies by the middle of the 17th century and a feast or banquet built around harvested crops and game became customary. The Continental Congress and early Presidents like Washington and John Adams declared periodic Thanksgivings, often in the month of December. In 1815, President James Madison declared two national Thanksgivings. In 1863, President Lincoln declared a Thanksgiving for the last Thursday of November which became a national holiday of sorts until President Franklin Roosevelt signed a bill in 1941 official making Thanksgiving Day the fourth Thursday of each November. This date which varies from November 22nd to November 28th adheres to the tradition of following the agricultural harvest and hunting seasons, however it also coincides with a highly volatile
climate transition from fall to winter. Thus this holiday in particular is perhaps loaded with more weather-related memories than any other American holiday.

I certainly hope that your Thanksgiving in 2014 is a safe and enjoyable one.

Twin Cities Almanac for November 26th:

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 20 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for November 26th:
MSP weather records for this date include: highest daily maximum temperature of 62 degrees F in 1914; lowest daily maximum temperature of 10 degrees F in 1898; lowest daily minimum temperature of -16 degrees F in 1977; highest daily minimum temperature of 39 degrees F in 1909; record rainfall of 1.76 inches in 1896; and record snowfall of 5.9 inches in 2001. The greatest snow depth on this date was 9 inches in 1983 and 1996. Worst wind chill conditions occurred in 1930 with a value of -30 F.

Average dew point for November 26th is 20 degrees F, with a maximum of 52 degrees F in 1909 and a minimum of -22 degrees F in 1977.

All-time state records for November 26th:

Scanning the state climatic data base: the all-time high for this date is 68 degrees F at Fairmont (Martin County) in 1914; the all-time low is -37 degrees F at Pokegama Dam (Itasca County) in 1903. The greatest amount of precipitation on this date is 4.80 inches at Worthington (Nobles County) in 1896; and the heaviest snowfall statewide on this date is 19.5 inches at Granite Falls (Yellow Medicine County) in 2001.

Words of the week: Snawwreath and Snawbroo:

These are terms Scottish meteorologists use in the winter season. Naw is Scottish for snow. A snawwreath is the term for snowdrift, a feature we have begun to see around the Minnesota landscape this month. Broo is a Scottish term used to refer to water for cooking. Thus, snawbroo is melting snow, sometimes harvested in the old days for cooking, especially when the pump handle was frozen.

Outlook:

Chance of mixed precipitation on Friday, then warmer on Saturday with temperatures somewhat above normal. Cooler Sunday through Tuesday, then a moderation in temperature next week.

Posted by Mark Seeley at 3:57 PM No comments:

Friday, November 21, 2014

Coldest November since 1996

Coldest November since 1996:

Following the winter storm of November 10th, cold air has dominated the state. Through November 20th average monthly temperatures are running from 6 to 9 degrees F colder than normal, marking the coldest November since 1996. A streak of 12 consecutive days with no temperature reading of 32 degrees F or higher at MSP is the 2nd longest for the month of November, topped only by 15 consecutive days back in 1880. Pete Boulay of the Minnesota State Climatology Office has a nice feature on this.

In addition a number of observers have reported new daily record cold maximum daytime temperatures this week. In fact at least 120 climate stations set such records this week, including the following:
On November 14th: 18 degrees F at Browns Valley and Ottertail; 19 degrees F at Melrose; and 21 degrees F at Owatonna
On November 15th: 19 degrees F at Austin; 17 degrees F at Litchfield; 16 degrees F at Madison; and 21 degrees F at St Cloud
On November 16th: 21 degrees F at Grand Meadow; 16 degrees F at Moose Lake and Thorhult; 12 degrees F at Pokegama Dam; and 24 degrees F at Preston
On November 17th: 12 degrees F at Mora; 15 degrees F at Albert Lea; 13 degrees F at Waseca; 16 degrees F at Windom; and 14 degrees F at Zumbrota
On November 18th: 12 degrees F at Caledonia, Albert Lea, and Winnebago; 16 degrees F at Milaca; 11 degrees F at Pipestone and Windom; and 14 degrees F at Duluth and Wheaton
On November 19th: 9 degrees F at Cotton: 18 degrees F at Grand Marais; 17 degrees F at Brainerd; and 20 degrees F at Rosemount
On November 20th: 24 degrees F at Winona Dam (tied record; 22 degrees F at La Crescent; 18 degrees F at Redwood Falls; and 11 degrees F at Brimson

In addition over 60 new daily minimum temperature records were set this week, including the autumn season's first sub-zero F readings. Here is a sampling of new record low temperatures set or tied:
On November 14th: -5 degrees F at Benson and Browns Valley; -4 degrees F at Lake Wilson; and 0 degrees F at Georgetown
On November 15th: -8 degrees F at Browns Valley and Hibbing; -7 degrees F at Madison and Benson; -5 degrees F at Montevideo; and -3 degrees F at Aitkin
On November 16th: -6 degrees F at Lamberton; -10 degrees F at Windom; -8 degrees F at Pipestone; and -5 degrees F at Worthington
On November 17th: -2 degrees F at Melrose; -1 degrees F at Lake Wilson, and 0 degrees F at St James
On November 18th: 4 degrees F at Madison; and 0 degrees F at Ottertail
On November 19th: 2 degrees F at Forest Lake; and 7 degrees F at Lakefield
On November 20th: 0 degrees F at Rochester; 1 degrees F at Wells; -1 degrees F at Lakefield; and -8 degrees F at Moose Lake and Brimson
On November 21st: -7 degrees F at Grand Meadow and St Cloud; -11 degrees F at Wright; -7 degrees F at Willmar; -18 degrees F at Embarrass; and -20 degrees F at Cotton

Fosston (Polk County) reported the coldest temperature in the nation on November 20 with a

reading of -11 degrees F, and Cotton reported the nation's coldest temperature on the 21st with a reading of -20 degrees F. On five dates so far this month Minnesota has reported the coldest temperature in the nation.

New Seasonal Climate Outlook:

The NOAA Climate Prediction Center released a new seasonal climate outlook on Thursday of this week (Nov 20). For the Western Great Lakes Region they see equal chances for above or below normal temperatures and above or below normal precipitation during the December through February period. The western states are expected to see above normal temperatures prevail and the southern states below normal temperatures. Less than normal precipitation is forecast for the states east of Minnesota, including Wisconsin and Michigan.

A good discussion of the new seasonal outlook is presented by NOAA Meteorologist Mike Halpert.

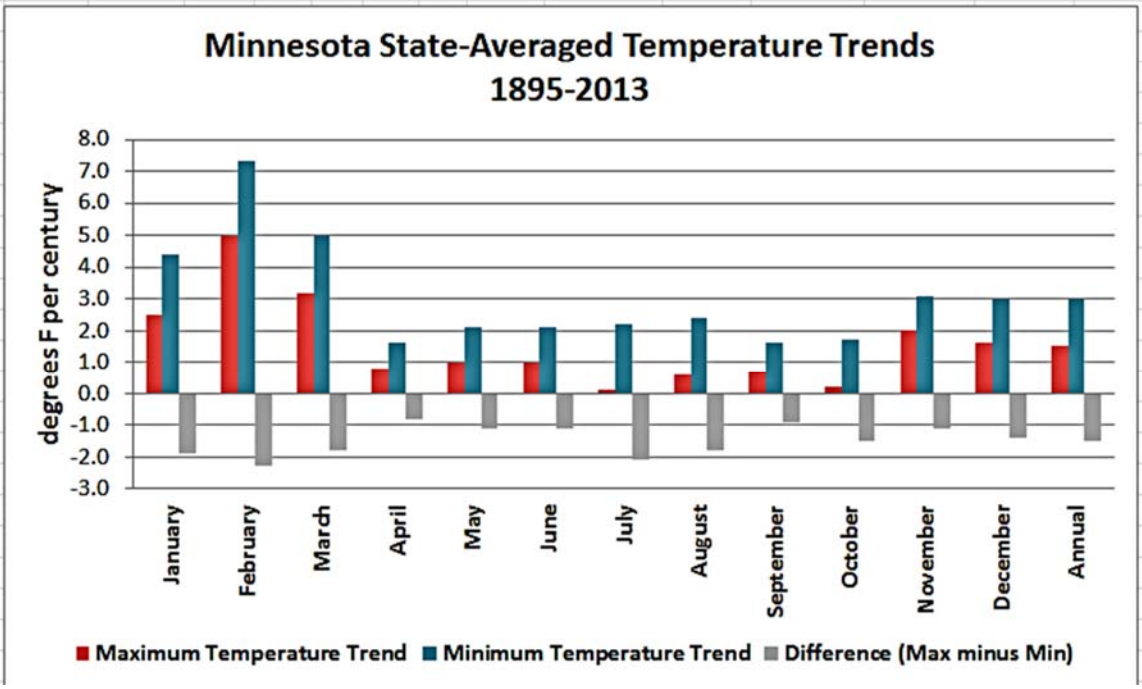
In addition drought persistence is forecasted for the far western counties of Minnesota, notably portions of Wilkin and Traverse Counties. Currently much of the state landscape is under a 2 to 4 inch snow cover (a result of the winter storm over November 10-11), and soils and lakes are beginning to freeze up for the winter. Currently frost depths in the soil range from 2 to 6 inches depending on snow cover.

Minnesota Temperature Changes:

The NOAA-National Climate Data Center climate at a glance feature shows the details of Minnesota state temperature trends and how very much they are weighted to increasing minimum temperatures rather increasing maximum temperatures. The pace of increase in minimum temperatures since 1895 is roughly twice that of maximum temperatures on an annual basis. This is real data and should not be dismissed.

http://www.ncdc.noaa.gov/cag/time-series

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
max	2.5	5.0	3.2	0.8	1.0	1.0	0.1	0.6	0.7	0.2	2.0	1.6	1.5
min	4.4	7.3	5.0	1.6	2.1	2.1	2.2	2.4	1.6	1.7	3.1	3.0	3.0
difference	-1.9	-2.3	-1.8	-0.8	-1.1	-1.1	-2.1	-1.8	-0.9	-1.5	-1.1	-1.4	-1.5



Weekly Weather potpourri:

Speaking of cold, NOAA has recently analyzed when the coldest day of the year occurs across the USA. Naturally there is a great deal of variation. Across Minnesota it is typically during the 3rd or 4th week of January, but in the mountainous western states it is often in December. You can find the NOAA report, along with a map on line.
A NOAA Climate Resilience Tool Kit is now available on line to examine ways to evaluate risk from weather and climate extremes, and then to assess the options to take action to mitigate these risks.

Earlier this week on Tuesday, November 18th NOAA described a rare event, freezing temperatures were being reported in all 50 states. Nationwide it was the coldest November morning since 1976, with temperatures in the 20s F reported from the Florida panhandle. In addition NOAA reported a national snow cover of 50.4 percent over the USA landscape. This is the largest mid-November percentage snow cover reported in the USA in several decades.

The St Paul District of the Army Corps of Engineers locked the last tow of the season for the St Paul, MN area on Thursday (November 20) this week as the ice conditions on the Mississippi River are getting difficult for vessels to navigate. Thus ends the navigation season of 2014 on the upper reaches of the Mississippi River, a season that opened last April 16th, a later than

normal date because of prolonged ice thickness on Lake Pepin last spring. The official Army Corps press release describes more detail.

The American Geophysical Union offered a news release this week based on a recent study headed up by Dr. David Ridley of MIT which shows that a series of recent volcanic eruptions may have played a role in slowing done the pace of warming detected in the global temperature record. This study will appear later in the *Geophysical Research Letters.*

MPR listener question:

Do you think we'll have snow for Thanksgiving this year?

Answer:

Analysis from Pete Boulay of the State Climatology Office shows that for the Twin Cities snow falls on Thanksgiving day about one year out of five. The way the forecast models are trending for next week, it does appear there will be a chance for snow Wednesday night and into Thanksgiving morning. Temperatures are expected to be cooler than normal as well. In addition I would add that for the Thanksgiving 4-day weekend snowfall occurs about 60 percent of the time in the Twin Cities area and close to 75 percent of the time in northern Minnesota communities. The MN SCO data for Thanksgiving Day may be of interest to you.

Twin Cities Almanac for November 21st:

The average MSP high temperature for this date is 37 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 24 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for November 21st:

MSP weather records for this date include: highest daily maximum temperature of 67 degrees F in 1990; lowest daily maximum temperature of 5 degrees F in 1880; lowest daily minimum temperature is -11 degrees F in 1880; highest daily minimum temperature of 42 F in 1963; record precipitation of 0.54 inches in 1994; and record snowfall is 4.8 inches in 1989.

Average dew point for November 21st is 20 degrees F, with a maximum of 58 degrees F in 2001 and a minimum of -2 degrees F in 1959.

All-time state records for November 21st:

The state record high temperature for this date is 72 degrees F at Tracy (Lyon County) in 1962. The state record low temperature for this date is -25 degrees F at Tower (St Louis County) in 1978. State record precipitation for this date is 3.04 inches at Lake City (Wabasha County) in 1996; and the state record snowfall for this date is 16.0 inches at Montevideo (Chippewa County) in 1975.

Word of the Week: ZEUS

ZEUS is a new airborne measurement system developed by the United Kingdom Meteorological Office and the Natural Environmental Research Council to assess the presence of volcanic ash in the upper atmosphere, more specifically across long distance air traffic routes. It is a device capable of detecting amounts of volcanic ash in the air by measuring small changes in electrostatic charge. A British Airways 747 has been fitted with the ZEUS device and made a successful measurement run between London and Johannesburg, South Africa. Hopefully such measurements will assist forecasters in making better route forecasts for the airlines industry.

Past Weather Features:

Two of the coldest November 21st days occurred in the 19th Century. In 1880 Arctic air resided over the state producing morning lows of -13 degrees F at Duluth and -11 degrees F at St Paul. The daytime high temperature reached only 2 degrees F at Duluth, while St Paul only made it to 5 degrees F. November 21, 1896 also brought Arctic cold to the state with morning low temperatures of -14 degrees F at Milan, -16 degrees F at New London, and -21 degrees F at Detroit Lakes. The daytime high only reached -2 degrees F at Crookston that day.

November 20-21, 1973 brought a major winter storm to Minnesota, but instead of snow it developed enormous amounts of rainfall as air temperatures remained in the 40s and 50s F. At least 30 Minnesota communities reported over 2 inches of rainfall, while St James reported a record 3.03 inches.

A major winter snow storm disrupted traffic and caused school closings over November 19-21, 1975. The heaviest snow fell across central portions of the state. Reports included 24 inches at Canby, 17 inches at Willmar, 16 inches at Montevideo, Tracy, and Minnesota, and 15 inches at Marshall.

November 20-21, 1990 was a true Indian Summer period with very mild temperatures and sunny skies dominating the state. Most northern observers reported daytime highs in the 50s, while over 80 communities across central and southern Minnesota saw the thermometer reach or surpass 60 degrees F. Stillwater, Winona, and Austin reached the 70 F mark, setting new records there.

Outlook:

Milder over the weekend with some thawing temperatures, perhaps even low to mid-40s F in places. Increasing cloudiness on Sunday with a chance for light rain, turning to snow by evening. Chance for occasional snow and patchy blowing snow on Monday into Tuesday, then cooler temperatures for Tuesday through the end of next week. Chance for snow again on Wednesday night and later into Thanksgiving weekend.

Posted by Mark Seeley at 1:45 PM No comments:

Friday, November 14, 2014

First Significant Winter Storm and First Sub-Zero Temperatures

First Winter Storm:

The first significant winter storm of the autumn season crossed the state over Monday and Tuesday (November 10-11) this week depositing several inches of snowfall in many places. The heaviest band of snow ran through Madison, Willmar, St Cloud, and Mora, over to Rice Lake, Wisconsin with most observers reporting 10 to 14 inches over the two days. The largest total snowfall reported from the storm was 16.5 inches at St Augusta (Stearns County) and Cambridge (Isanti County). The storm made both commuting and longer distance travel difficult across central Minnesota counties, and was the cause of many traffic accidents. A synopsis of this storm is provided by the State Climatology Office.

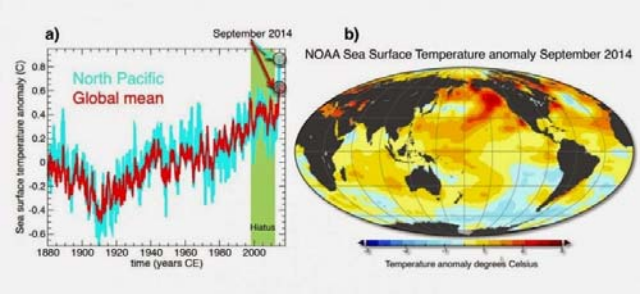
Some observers reported new daily record snowfall amounts for November 10th, including Benson (6.7"), Moose Lake (8.0"), Dawson (10.0"), Princeton (11.0"), Collegeville (12.0"), Milan (13.0"), St Cloud (13.2"), and Isanti (14.0"). Additional observers reported new record daily amounts of snowfall for November 11th, including Browns Valley (4.3"), Floodwood and Ortonville (5.0"), Montevideo (8.0"), Long Prairie (8.7"), Milaca and Forest Lake (9.0"), Mora (10.0"), and Kimball (11.8").

Much of the snow was expected to linger on the landscape as temperatures are forecast to remain below freezing for a number of days and deep into next week. In the end the streak of below freezing temperatures (less than 32 F) may linger for 11 or more days.

First sub-zero F temperatures of autumn:

Friday morning, November 14th brought the first sub-zero F temperature readings of the autumn season to many parts of the state, notably western and northern counties. No record low temperatures were reported, but many observers reported their coldest readings since last March. Some low temperature values included: -10 degrees F at Brimson; -8 degrees F at Fosston, Benson, and Rice; -6 degrees F at Embarrass and Cotton; -5 degrees F at Bemidji and Browns Valley; -4 degrees F at Hallock and Park Rapids; -3 degrees F at Kabetogama, Long Prairie, and Morris; -2 degrees F at Fergus Falls, Orr, Silver Bay, and Crane Lake; and -1 degree F at International Falls, Ely, and Lakefield. Yet more sub-zero F overnight low temperatures are forecast for many areas of Minnesota over the weekend and early next week before temperatures begin to moderate. Thus soils and lakes will begin to freeze-up over the coming days.

Weekly Weather potpourri:



There is a nice article this week by Dr. Robert Henson in the NCAR/UCAR news about what causes cold temperatures to prevail in North America as they did last winter. He breaks down the trends and the large scale weather features of the Northern Hemisphere which are related to dominant cold temperatures. Part of the explanation stems from a study by Dr. Axel Timmermann of the University of Hawaii who found that the northern Pacific Ocean has warmed significantly this year, beyond any year in the measurement record. This has helped to create a persistent ridge in the atmosphere over western states which has allowed polar air to flow south from Canada into the central and eastern USA. You can read some of the narratives from these scientists by clicking on their names.

A new lake-level viewer is available at the NOAA Office of Coastal Management web site. You can view the current lake level of any of the Great Lakes in the context of its historical variation.

Also, this week's NOAA.Gov newsletter features an article about expected precipitation changes across the USA. It not only highlights regional differences but it also explains changes in seasonality. The western Great Lakes region is expected to get wetter.

A paper in the current issue of *Science* documents that continued climate change will lead to much more lightning strikes compared to what is common today. This will be caused by an increased in atmospheric water vapor and deeper convection. Researchers from UC-Berkeley used 11 different climate models to test this hypothesis and came up with this conclusion.

The NOAA-Storm Prediction Center has no reports of tornadoes so far this month (November 1-14), marking the fewest reports since last January. Severe convective weather systems have given way to winter storm systems this month.

MPR listener question:

My wife and I have lived in the Twin Cities since 1999 and we are shocked that the temperature has remained below 32 degrees F since Monday (November) and is expected to stay that way throughout most of next week. When was the last time we recorded such a long period below freezing during the month of November?

Answer:

Indeed the forecast calls for below freezing temperatures through at least next Thursday (Nov 20) a period of 11 days. Such a streak was last observed in the Twin Cities in 1996, and also happened in 1985 and 1911. The longest ever streak of days below freezing during November in the Twin Cities was 15 days in 1880. I might also mention that Novembers with streaks of cold temperatures below freezing were precursors to colder than normal Decembers as well.

Twin Cities Almanac for November 14th:

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 26 degrees F (plus or minus 10 degrees F standard deviation).

MSP Local Records for November 14th:

MSP weather records for this date include: highest daily maximum temperature of 71 degrees F in 1990; lowest daily maximum temperature of 12 degrees F in 1940; lowest daily minimum temperature is 0 degrees F in 1919; highest daily minimum temperature of 52 F in 2001; record precipitation of 0.80 inches in 1926; and record snowfall is 2.5 inches in 1951.

Average dew point for November 14th is 26 degrees F, with a maximum of 58 degrees F in 2001 and a minimum of -2 degrees F in 1959.

All-time state records for November 14th:

The state record high temperature for this date is 81 degrees F at St James (Watonwan County) in 1999. The state record low temperature for this date is -23 degrees F at Warroad (Roseau County) in 1911. State record precipitation for this date is 2.05 inches at Mankato (Blue Earth County) in 1951; and the state record snowfall for this date is 14.0 inches at Moorhead (Clay County) in 1909.

Past Weather Features:

November 14, 1940 was arguably the coldest in state history. An Arctic air mass just three days after the famous Armistice Day Blizzard, brought extreme cold to Minnesota. Nearly all areas of the state saw temperatures fall to sub-zero F readings. In the north, Itasca State Park fell to -20 degrees F, while in the south Windom and Albert Lea fell to lows of -3 degrees F.

Over November 14-16, 1951 a winter storm delivered a great deal of snow to many parts of the state. Clearwater and Hubbard Counties reported the most snowfall, ranging from 10 to 26 inches. In the south Le Center received 14 inches, but many other communities measured 3-6 inches.

November 13-14, 1999 brought true Indian Summer conditions to many parts of the state. Over 60 Minnesota communities reported a daytime high temperature of 70 degrees F or higher. In southern counties Amboy, Mankato, Windom, Lakefield, St James, and Winnebago all reached 80 degrees F under bright, cloudless skies. That November was the 3rd warmest in state history.

November 13-14, 2010 brought a winter storm to Minnesota with a mixture of freezing rain and snow. Across central Minnesota counties many observers reported 6 to 10 inches of snow, while in the south some freezing rain was reported.

Outlook:

Remaining colder than normal with a chance of snow on Saturday, especially in the southern half of the state. In fact Saturday will be a true test for Gopher and Buckeye fans at the football game with occasional snow and windchill values in the teens F. Some snow flurries continue on Sunday, especially north. Cold and dry for most of next week, with some temperature moderation towards next weekend.

Posted by Mark Seeley at 11:12 AM No comments:

Friday, November 7, 2014

Second Annual Climate Adaptation Conference

Some snow this week:

Some snowfall accumulated across central portions of the state on Thursday, November 6th, the first widespread accumulation of the season so far. Many areas of Crow Wing, Cass, Aitkin, and Pine Counties reported 1 to 2 inches of snow. The largest reported amount was near Malmo in Aitkin County where 2.4 inches of snow fell. This snowfall is a precursor to another more significant snowfall that is expected statewide over this coming Sunday through Tuesday.

Report on Second Annual Climate Adaptation Conference:

Highlights include:
-Climate trends are clearly showing greater variability in some severe weather elements, including heavier rains, cluster outbreaks of tornadoes, more large hail, and seasonal changes in peak risk periods for hail, strong winds, and tornadoes. Peak season for heavy rainfall has shifted to August in our region.
-More research with reanalysis of upper air data and high resolution climate model outputs will be useful in further delineating the future risk of specific severe weather elements over finer scale geography.
-Climate trends are effecting recreation and tourism in terms of number of visitors and seasonal use and activity, e.g. northern MN more stable environment for winter recreation (skiing, snowmobiling, ice fishing); Mississippi River accessibility for educational programs has recently

been restricted due to many high flow periods.
-The American Society of Adaptation Professional (ASAP) is an organization designed to foster a community of climate change adaptation practitioners.
-Through this organization and others it is evident that community organizations and local units of government will lead us into the future with successful examples of climate adaptation strategies that may be more effective than legislated federal incentives…at least in the short term, though nearly all units of our federal government have been instructed to develop climate adaptation plans at the highest level.
-The Climate Adaptation Partnership gave the first-ever awards for outstanding leadership in Minnesota climate adaptation education and practice to the following:
Minnesota Interfaith Power and Light which has mobilized the faith community on reducing greenhouse gas emissions and promoted practical methods to improve environmental stewardship.
Northern Institute of Applied Climate Science which helped landowners adapt better practices to cope with a changing climate, especially MN forested landscapes.
Stearns County Soil and Water Conservation District which has promoted climate adaptation practices related to tillage, cover crops, and soil health, helping to mitigate erosion and nutrient runoff episodes.
Paul Douglas, founder of Media Logic Group who has done outstanding work with all media to promote climate change awareness and approaches to adaptation, better stewardship, and mitigation.

Weekly Weather potpourri:

NOAA- National Climatic Data Center (NCDC) now offers an online tool to examine the geographic distribution of major snow storms. This can be done to look at the entire country or specific regions, and you can zoom in or zoom out for specific locations.

NOAA released a report on Antarctica sea ice this week utilizing not only the modern era satellite measurement records but also going all the way back to the Nimbus satellite imagery of the mid 1960s. The report shows the waxing and waning of the sea ice extent and that 2014 only just surpassed the level of sea ice detected there back in 1964.

A Community on Ecosystems Services (ACES) will host a conference titled "Linking Science, Practice, and Decision Making" in Washington, D.C. over December 8-11, 2014. Many speakers will address topics related to valuing and integrating ecosystem services into public and private policy decisions.

The Meteo France reported this week that heavy rains have caused flooding across parts of France and devastated many vineyards in southern parts of the country. In some areas the grape harvest will be reduced by 20 to 30 percent. Nice, France reported rain on November 4th of over 6 inches, their 2nd highest daily amount in history. Many rivers overflowed, some landslides reported, and up to 10,000 residents were left without electricity.

Remnants of Super Typhoon Nuri in the Northern Pacific Ocean will merge with another low pressure system as it approaches the Bering Sea later this week and begins to affect the Gulf of

Alaska area with strong winds, high seas, and intense rainfall. Who knows where this storm will go next week as it approaches North America but it may bring some significant weather, including snow and/or a polar air mass to our region.

The IPCC 5th Assessment Synthesis Report for Policymakers was released earlier this month and is available to download (40 pages).

MPR listener question:

You have often mentioned that November is the month with the most cloud cover in Minnesota. Does that also lead to a smaller difference between daytime and nighttime temperatures?

Answer:

Good question. Indeed this is the case. There are more days with cloud cover during November than any other month of the year. This condition tends to reduce heating of the air near the ground during the day and also prevents too much heat loss at night. The daily range of temperature, called diurnal fluctuation by climatologists, is from 20 to 30 F degrees much of the year in Minnesota. But in November it is typically only 14 to 16 degrees F. This is due primarily to increased cloud cover, but it is also due to the combined effects of shorter day length, declining sun angle, increased atmospheric humidity, and generally greater wind speeds (keeping the air mixed). November is the second windiest month of the year, trailing only April for most Minnesota counties.

Twin Cities Almanac for November 7th:

The average MSP high temperature for this date is 46 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 30 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for November 7th:

MSP weather records for this date include: highest daily maximum temperature of 72 degrees F in 1874; lowest daily maximum temperature of 15 degrees F in 1991; lowest daily minimum temperature is -6 degrees F in 1991; highest daily minimum temperature of 51 F in 1874; record precipitation of 1.67 inches in 1915; and record snowfall is 4.2 inches in 1947.

Average dew point for November 7th is 30 degrees F, with a maximum of 62 degrees F in 1915 and a minimum of -10 degrees F in 1991.

All-time state records for November 7th:

The state record high temperature for this date is 78 degrees F at Montevideo (Chippewa County) in 1931. The state record low temperature for this date is -23 degrees F at Wild River State Park (Chisago County) in 1991. State record precipitation for this date is 2.30 inches at

Garrison (Crow Wing County) in 1991; and the state record snowfall for this date is 14.0 inches at Marshall (Lyon County) in 1943 and at Virginia (St Louis County) in 1947.

Words of the Week: Sierra, Tango, and Zulu:

These are the code words used in AIRMETs (acronym for "AIRman's METeorological information, including statements and advisories) routinely issued by the Aviation Weather Center and the Alaska Aviation Weather Unit and Volcanic Ash Advisory Center.

Sierra refers to a message about IFR (instrument flight rules) weather or mountain obscuration. Tango refers to a message about turbulence, strong surface winds, and windshear. Zulu refers to a message about icing and freezing levels in the atmosphere. All of these messages are of critical importance to pilots and updated every six hours, or more frequently if needed.

Past Weather Features:

A short-live return to summer-like conditions over November 7-8, 1931 produced dozens of daily maximum temperature records around the state. Over 30 communities reported daytime highs of 70 degrees F or greater, under bright, sunny skies. Temperatures fell off into the 30s and 40s F by mid-month.

A large winter storm brought mixed precipitation and a good deal of snow to the state over November 6-9, 1943. Rain, sleet, glaze, and snow were reported around the state, bringing down power lines in northern Minnesota. Many parts of central and northern Minnesota reported 10 to 25 inches of snowfall, with drifts up to 15 feet in depth blocking roads in western counties. Hundreds of autos were abandoned on roads and trains were delayed for up to 48 hours. The locomotive of a train stranded near Windom was completed encased in a snow drift. High waves on Lake Superior caused some erosion damage, but most ships were safely anchored in Duluth Harbor. Farmers reported some loss of livestock and turkeys.

Perhaps the coldest November 7th in state history occurred in 1991. Nearly every observer in the state reported a morning low temperature that was below 0 degrees F, with some ranging from -10 to -20 F. This was the week following the famous Halloween Blizzard so there was ample snow on the ground as well.

November 5-7, 2000 saw a slow moving low pressure system cross the state and bring a great deal of rainfall to many counties. Most observers reported 1-2 inches of rain. Twenty-seven communities reported over 2 inches of rainfall, with St Francis reporting 3.37 inches a record amount for November.

Outlook:

Cooler than normal temperature trend will be dominant for the weekend, with a good deal of wind on Saturday. Chance of snow late Sunday and into Monday and Tuesday, then continued cold and dry much of next week. Some possible single digit lows in northern counties.

Posted by Mark Seeley at 10:49 AM No comments:

Friday, October 31, 2014

Climate Summary for October

Preliminary climate summary for October 2014:

October saw a cooler than normal start to the month, a generally warmer than normal middle of the month, and a cooler than normal finish to the month. In the end most observers reported mean monthly temperature values that were near normal. Extreme temperatures for the month ranged from 81 degrees F at Madison (Lac qui Parle County) on the 24th to just 11 degrees F at Crookston on the 31st. Much of the middle part of the month was dominated by bright, sunny days.

Most observers reported a drier than normal October, some with less than half of the average precipitation historically. Western areas of the state were the driest with many reports of total precipitation less than one inch, while southeastern counties were the wettest. Many southeastern Minnesota cities reported over 2 inches of precipitation and Caledonia (Houston County) reported 4.69 inches. Several observers reported traces of snowfall, but measurable amounts only occurred in north-central and northeastern counties on the last two days of the month, topped by 2 inches at Isabella.

October brought enough good field working days that most Minnesota farmers were able to harvest corn and soybean crops. Yields were highly variable this year due to a late planting season, highly variable rainfall, and some early frosts. But October generally favored good field drying conditions, saving farmers on drying costs prior to storing the crop.

Asthma and Allergy Foundation Rankings:

The Asthma and Allergy Foundation of America (AAFA) ranks the Top 50 Cities for each allergy season (spring and fall) based on measured pollen levels, allergy medications administered per capita, and number of allergists per capita for each major city. They use a weighted scoring system of 1 to 100, with a mean city score of 62.5. The top three allergy cities in America this autumn season are Louisville, KY (score 100), Wichita, KS (score 95.76), and Oklahoma City, OK (score 92.00). Minneapolis ranks 35th this autumn with a score of just 66.96. Last year Minneapolis ranked 37th highest. Among upper Midwestern cities this autumn, both Des Moines, IA and Madison, WI have higher scores than Minneapolis. So I guess we should feel good about that.

November 6th Climate Adaptation Conference:

The Second Annual Conference on Climate Adaptation, "Building Minnesota's Capacity for Climate Adaptation" will be held November 6, 2014 at the Hyatt in Minneapolis. Keynote speakers include Dr. Harold Brooks from the NOAA Severe Storms Laboratory in Oklahoma and Steve Adams from the Institute for Sustainable Communities. In addition there will be many fine speakers at the break-out sessions on watershed management, ecosystems, agriculture, public health, community planning, recreation, and tourism. To register you can call 612-624-7452 or use the embedded link to the conference.

Weekly Weather potpourri::

Georgetown University Climate Center released an update this week on statewide climate adaptation plans and activities among the 50 states. So far 15 states have filed a state-led climate change adaptation strategy plan which addresses changes needed in state infrastructure.

The United Kingdom Meteorological Office announced this week plans to unveil a new supercomputer that will be 13 times more powerful than their present computer. The new system will produce weather and climate forecasts faster and with high spatial resolution than before. BTW the United Kingdom reported its warmest Halloween in history with temperatures ranging from 65-70 degrees F as far north as York and Carlisle. Light costumes, and even shorts were being worn by trick-or-treaters.

The government in Sri Lanka reported widespread flooding and some deaths associated with mudslides this week following a week of monsoon rains that delivered several inches of moisture to what had previously been a dry landscape. Thousands of people were displaced by the floods.

Remnants of Tropical Cyclone Nilofar were bringing high seas, moderate rains, and brisk winds to coastal regions between Karachi, Pakistan and Jamnagar, India this week. It is expected to dissipate rapidly. Elsewhere Tropical Storm Nuri was expected to strengthen northeast of the Philippines in the Western Pacific Ocean producing winds over 100 mph by Sunday, but largely remaining out to sea. Tropical Storm Vance in the Eastern Pacific Ocean was expected to gain strength and bring heavy rains to coastal regions around Mazatlan, Mexico early next week.

Highlights from the weekly briefing on drought by Brad Rippey of the USDA include:
-During the four-week period ending on October 28, 2014, contiguous U.S. drought coverage decreased to 29.61% -- a 0.96 percentage point drop.
-Drought still covers a substantial portion of the southern Plains and the western U.S. On October 28, the highest level of droughtD4, or exceptional drought was noted in portions of California (58%), Nevada (12%), Oklahoma (7%), and Texas (4%).
-At the end of 2014 growing season, the Midwest remains nearly drought-free. By October 26, nearly three-quarters of the U.S. corn (74%) was rated in good to excellent condition the highest end-of-season rating since 2004.

MPR listener question:

What kind of weather do you see for Election Day next Tuesday?

Answer:

Not much impact from the weather for next Tuesday's Election. Skies should be partly to mostly sunny with daytime highs from the mid 40s F in the north to mid 50s F in the south. It looks like a dry day as well across most of the state. Perhaps we'll lead the nation again in voter turnout.

Twin Cities Almanac for October 31st:

The average MSP high temperature for this date is 53 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 35 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 31st:

MSP weather records for this date include: highest daily maximum temperature of 83 degrees F in 1950; lowest daily maximum temperature of 26 degrees F in 1873; lowest daily minimum temperature is 15 degrees F in 1878; highest daily minimum temperature of 57 F in 1933; record precipitation of 0.85 inches in 1991; and record snowfall is 8.2 inches in 1991.

Average dew point for October 31st is 34 degrees F, with a maximum of 60 degrees F in 1974 and a minimum of 4 degrees F in 1996.

All-time state records for October 31st:

The state record high temperature for this date is 86 degrees F at Worthington (Nobles County) in 1950. The state record low temperature for this date is -4 degrees F at Hallock (Kittson County) in 1913. State record precipitation for this date is 4.12 inches at Luverne (Rock County) in 1979; and the state record snowfall for this date is 8.5 inches at New Hope (Hennepin County) in 1991.

Past Weather Features:

October 30 to November 1, 1950 brought a spell of summer-like weather to Minnesota with daytime highs in the 70s and 80s F and nighttime lows in the 50s F, marking the warmest Halloween in state history. Over 30 cities in the state reported daytime highs in the 80s F. A cold front dropped temperatures by 30-35 degrees F on November 2nd.

October 30 to November 3, 1951 brought a winter storm and Cold Wave to Minnesota. The precipitation included a mixture of rain, freezing rain, sleet, and snow, all of which brought a halt to the harvest season. Record-setting snowfall amounts were reported from many central and northern locations including over 10 inches at Itasca State Park, Walker, Pokegama Dam, Virginia, Hinckley, Cloquet, Aitkin, Wadena, and Mora. Both Leech Lake and Pine River

received over 14 inches. Temperatures behind the storm front plummeted to below zero F readings in many communities. Many roads and highways were closed, as were many schools. Up until the 1991 Halloween Blizzard this was the worst winter storm to strike the state over October 31st.

An early winter storm brought a mixture of precipitation to the state over October 30 to November 1 of 1979. The Red River Valley saw 3 to 6 inches of snowfall, mixed with rain and sleet, while southwestern counties received mostly heavy rains which brought an end to the late harvest season. Alexandria, Luverne, Marshall, Tracy, and Tyler observers reported over 4 inches of rainfall, while Lake Wilson reported nearly 6 inches.

The most memorable event in Minnesota history for this time of year is the famous Halloween Blizzard of 1991. This storm affected mostly the eastern portions of the state with record-setting snowfall over October 31 to November 3. Over 30 communities reported 20 or more inches of snowfall, with 28.4 inches in the Twin Cities. Elsewhere Brimson, Bruno, Duluth, Eveleth, Two Harbors, and Gunflint Lake reported over 30 inches of snow. Winds up to 60 mph produced huge drifts and a 180 mile-long stretch of I90 was closed for a time.

Outlook:

Cooler than normal to start out the weekend, then warming to near normal temperatures (40s and 50s F) for Sunday. Continued near normal temperatures and perhaps a few days warmer than normal next week with little chance for precipitation.

Posted by Mark Seeley at 11:19 AM No comments:

Friday, October 24, 2014

Warm and Dry Pattern Prevails

Warm October 23-24:

Temperatures soared into the 70s F in more than 20 Minnesota communities on Thursday and Friday this week (Oct 23-24), the highest temperatures on these dates since 1998 for many. The highest values occurred in western communities. Moorhead reached 72 degrees F which was just one degree shy of the all-time record for October 23rd. Browns Valley and Milan reached 74 degrees F, with afternoon humidity values only ranging from 20 to 30 percent, indicating very dry air. The recent run of warm weather, especially in western counties has offset the colder than normal start to the month so that average October temperature values now are running 1 to 2 degrees F warmer than normal.

Dryness expands:

The Minnesota State Climatology Office reported this week that the absence of precipitation this month has caused a wider area of the state to be designated as "abnormally dry" by the US Drought Monitor. Most of the expansion of dryness has occurred in northwestern and north-central counties, and now over 17 percent of the state landscape is designated as abnormally dry. September was drier than normal in many areas of the state, and since October 4th little precipitation has occurred as well. This has been great for leaf-peeping, and for farmers harvesting their crops, but many of the state's soils are in need of moisture recharge before freezing up for the winter.

Last day for early registration fees to the November 6th Climate Adaptation Conference:

Early registration rates (just $95/person and $65/student) end on Friday (October 24th) for the Second Annual Conference on Climate Adaptation, "Building Minnesota's Capacity for Climate Adaptation" to be held November 6, 2014 at the Hyatt in Minneapolis. After October 24th registration rates will go up by $25. Keynote speakers include Dr. Harold Brooks from the NOAA Severe Storms Laboratory in Oklahoma and Steve Adams from the Institute for Sustainable Communities. In addition there will be many fine speakers at the break-out sessions on watershed management, ecosystems, agriculture, public health, community planning, recreation, and tourism. To register call 612-624-7452 or go hypertext link underlined above

Statewide Daily Climate Records Set in 2014 (so far):

In general this year across Minnesota has been cooler than normal, with mixed precipitation (most areas above normal, but with some drier than normal spots). For a statewide look, temperature-wise five months have been abnormally cool and four months near normal. Moisture-wise three months have been drier than normal, three months near normal, and three months above normal, with a record-setting wettest June in history. In June over 30 climate stations set new monthly rainfall records, with several reports over 12 inches.

Amidst the data for 2014 so far, there are nine statewide daily climate records which have been

set:

All-time precipitation records:
1.40 inches at Thorhult (Beltrami County) on January 26, 2014
2.02 inches at Two Harbors (Lake County) on February 21, 2014
4.85 inches at Santiago (Sherburne County) on May 8, 2014
All-time snowfall records:
15.0 inches at Wild River State Park (Chisago County) on April 17, 2014
All-time minimum temperature records:
-44 degrees F at Embarrass (St Louis County) on March 3, 2014
All-time coldest maximum temperature records:
-14 degrees F at Warroad (Roseau County) on March 2, 2014
-12 degrees F at Embarrass (St Louis County) on March 3, 2014
47 degrees F at Wolf Ridge Environmental Learning Center (Lake County) on June 15, 2014
41 degrees F at Isabella (Lake County) on September 11, 2014

Approaching the Dark Days or SAD days:

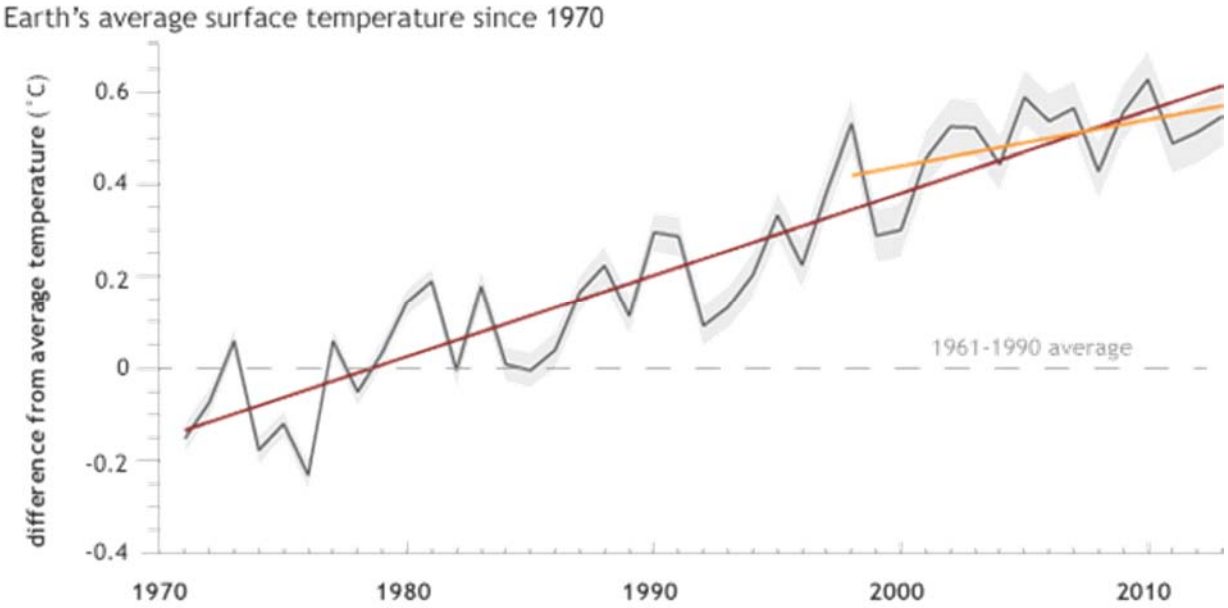
As the shorter days become more evident (we are losing over 20 minutes per week in day length now), some people begin to suffer from the deprivation of light, a malady called seasonal affected disorder (SAD). This can be both physical and mental, and in some cases lead to severe depression. The somewhat rapid loss in day length which occurs this time of year is magnified by two other factors, a lowering sun angle (declination) and increased cloudiness. The lowered sun angle creates very long and long lasting shadows, especially on northerly slopes, such that some parts of the landscape are in shade for much of the day. In addition, the degree of cloudiness begins to increase, peaking during the month of November in Minnesota when two thirds of the days are mostly cloudy (8/10 sky cover or greater) and most of the remaining days are partly cloudy (4/10 to 7/10 sky cover). This produces a condition of highly diffuse light rather than direct sunlight. The average percent possible sunshine is less than 40 percent during November and perfectly clear days are almost unheard of. In this regard then, we not only lose day length (or quantity of light), but we also lose out on direct sunlight (or the quality of light).

Weather potpourri:

Andy Revkin wrote this week about a new play in New York City called "Extreme Whether" which explores the theme of climate change as a source of strife within a family. It is written by playwright Karen Malpede. I don't know how long it will be playing, but you can read more about it at the underlined link.

Remnants of Hurricane Gonzalo slammed into western European countries this week. It brought strong winds, high seas, and heavy rains to parts of Germany and Belgium where flooding and downed power lines and trees were reported. It was expected to bring disturbed weather to central Europe early in the weekend.

NOAA Climate.gov newsletter reported this week on a study by Richard Allan of the University of Reading which documents that El Nino, or rather the absence of El Nino has contributed to a recent slowing down in the global surface temperature increase.



Observed changes in global annual average surface temperature relative to 1961-1990 from the HadCRUTv4 dataset which is updated to account for gaps in data coverage (version 2.0 Long Reconstruction). The temperature difference is compared with 1961-1990 average using data from Cowtan & Way (2014). The rate of warming from 1970-2013 (red trend line) is larger than the rate of warming between 1998-2013 (orange line).

MPR listener question:

We recently moved to the Twin Cities from Vermont and we thoroughly enjoy cross country skiing. I am told by our new neighbors that occasionally November delivers a good amount of snow and the skiing season can begin before Thanksgiving. How often does this occur and what are the snowfall amounts we might expect.

Answer:

Locally here in the Twin Cities area normal November snowfall amounts range from 8-10 inches. There have been years when the Twin Cities have recorded 20 or more inches of snowfall in November, and the record is 46.9 inches back in 1991. For cross country skiing many residents go to northern Minnesota locations where November snowfalls are greater and longer lasting. Up north places like Two Harbors, Duluth, Pigeon River Sandy Lake, and Bruno have had over 50 inches of snowfall in November.

Twin Cities Almanac for October 24th:

The average MSP high temperature for this date is 55 degrees F (plus or minus 10 degrees F standard deviation), while the average low is 36 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 24th:

MSP weather records for this date include: highest daily maximum temperature of 80 degrees F in 1989; lowest daily maximum temperature of 33 degrees F in 1887; lowest daily minimum temperature is 15 degrees F in 1887; highest daily minimum temperature of 59 F in 2000; record precipitation of 1.00 inches in 1899; and record snowfall is 1.0 inches in 2001.

Average dew point for October 24th is 35 degrees F, with a maximum of 62 degrees F in 2000 and a minimum of 11 degrees F in 1960.

All-time state records for October 24th:

The state record high temperature for this date is 88 degrees F at Fairmont (Martin County) in 1891. The state record low temperature for this date is -5 degrees F at Isabella (Lake County) in 1976. State record precipitation for this date is 2.65 inches at Faribault (Rice County) in 1899; and the state record snowfall for this date is 12.0 inches at Itasca State Park (Clearwater County) in 1919.

Past Weather Features:

An early winter storm brought 6 to 12 inches of snowfall to portions of northern Minnesota over October 24-25, 1919. Following the snowfall temperatures fell below zero F in over 20 northern communities, setting record low values in many cases, including -14 F at Angus and Itasca State Park.

October 24, 1927 brought a record-setting warm day to many western and southern Minnesota counties. Temperatures soared into the 70s and 80s F in 27 different counties. It was 72 degrees F as far north as Park Rapids and 85 degrees F at Chatfield.

October 24, 1976 was the coldest of the modern era. Many observers reported morning lows in the single digits F. In the northeast it was 0 degrees F at Tower and -5 degrees F at Isabella. The daytime temperature rose no higher than 29 degrees F at Baudette and Gunflint Lake.

October 24-25, 2001 brought widespread snow to many parts of the state, especially northern communities. Many observers reported over 6 inches from this early winter type storm, while Thief River Falls measured 11 inches and Argyle measured 14 inches. The snow brought a halt to harvest and field work.

Outlook:

Mostly warm and pleasant over the weekend, with increasing clouds on Sunday night and a chance for showers. Continued chance for showers on Monday, then much cooler on Tuesday. A bit warmer towards Halloween and next weekend.

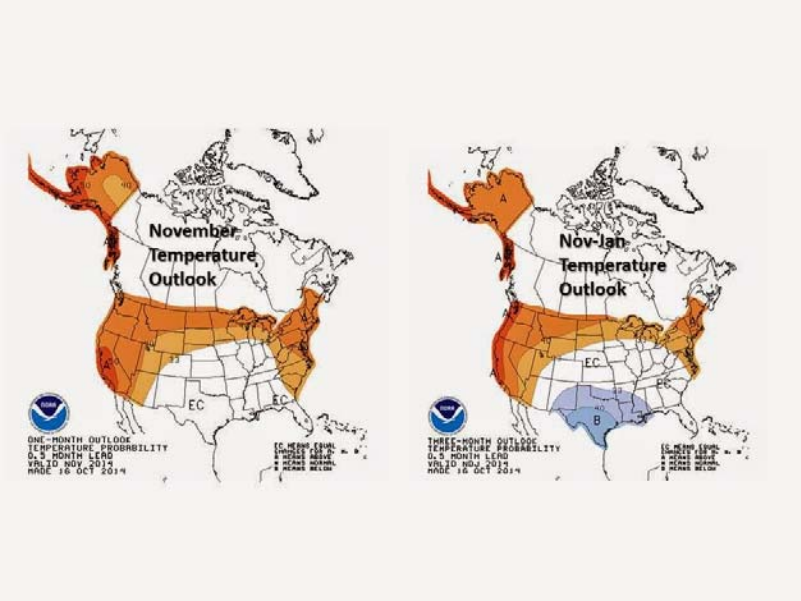
Posted by Mark Seeley at 11:39 AM No comments:

Friday, October 17, 2014

New Seasonal Climate Outlook

New Seasonal Climate Outlook:

The NOAA Climate Prediction Center released new seasonal climate outlooks on Thursday (Oct 16) of this week. The outlooks for November through January and for December through February favor warmer than normal temperature conditions for the western states, the northern plains states, northern Great Lakes (including most of Minnesota), and northeastern states. This outlook is in direct conflict with what the Farmer's Almanac issued earlier the autumn, which called for another long, frigid, and snowy winter for Minnesota. Detailed in the narrative of the new seasonal outlook is the notion that the first half of winter has a higher probability for warmth than the second half of winter in our area. This is partially exemplified in the outlook for the month of November alone, which shows a stronger signature for being warmer than normal.



The outlook for precipitation from November through February across the Great Lakes generally favors drier than normal, except for large portions of Minnesota which are designated to have equal chances for wetter or drier than normal conditions to prevail.

As a footnote the medium range models certainly depict that the rest of October will be warmer than normal and drier than normal over most of the state. This week brought warmth and very dry air as well with afternoon relative humidity readings on Wednesday (Oct 15) of just 32 percent at MSP, 24 percent at Pipestone, 22 percent at Fergus Falls, and 21 percent at Fairmont.

A Few Notes on Lake Superior's Climate:

We have spoken a number of times about the effects that Lake Superior has on the north shore climate of Minnesota. It clearly affects the temperature, wind, precipitation (rain and snow), and cloudiness of north shore communities like Two Harbors, Grand Marais, Grand Portage, Knife River, and Beaver Bay. But how about the climate over the lake itself? Thanks to the NOAA National Data Buoy Center (the deployment of instrumented buoys on Lake Superior has occurred during our lifetime), and the work of the University of Minnesota Large Lakes Observatory (notably Dr. Jay Austin and colleagues), we are learning more about the climate patterns over the lake itself.

Some examples.....Because water absorbs and surrenders heat energy quite slowly compared to land, the range and variation in monthly temperatures is quite out of phase with the land-based climate stations along the north shore. Average water temperatures in October are warmer than those of June as a result of the time lag effect of summer warming. Maximum water temperatures, ranging from 55 to 65 F typically occur in August, sometimes even early September. The land stations show maximum air temperature values in July. The coldest air temperatures on land occur in January and are often well below zero F, while the coldest the lake ever gets is about 332-34 degrees F, a temperature it may hold steady for most of the late winter and even into the month of May.

The windiest month on the lake is November (remember the gales of November) with winds of 20 mph or more common in that month, and gusts well over 40 mph. Expectedly, the maximum wave heights also occur in November, with occasional extreme values over 15 ft.

The maximum difference between air temperature and water temperature occurs in the months of November and December, when the air temperature may be as much as 20-25 degrees F colder than the water, and in June when the air temperature may be as much as 15 to 20 degrees F warmer.

Paper on Tornadoes in *Science* this week:

Dr. Harold Brooks and colleagues from the NOAA National Severe Storms Laboratory in Oklahoma published a paper this week in *Science* which documents increased variability in the number of annual tornadoes in the USA, along with increased variability in the start date of the tornado season. Overall, there has been a decrease in the number of tornado days, but total number of tornadoes has changed little.

Dr. Brooks will be a keynote speaker at the upcoming Second Conference on Climate Adaptation ("Building Minnesota's Capacity for Climate Adaptation") to be held on November 6, 2014 at the

Hyatt in downtown Minneapolis. There is a great lineup of other speakers for this conference. Topics will include natural resources, agriculture, urban planning, public health, recreation and tourism, and many other areas impacted by climate change.

New Climate Tool from U2U:

The regional climate project known as Useful to Usable (U2U) has developed a visualization tool to examine the geographic distributions of monthly climatic patterns associated with El Nino, La Nina, and Arctic Oscillation features of the climate. It is handy to examine which months are most affected by these climate features and how the patterns are distributed geographically. I encourage you to give it a try.

Weekly Weather potpourri:

Resilient Chicago, Climate Planning for the Future was a statewide meeting held in Chicago earlier this autumn to hear about climate trends and climate adaptation practices. Many other states and cities are hosting such meetings.

Record warmth in northern Alaska was reported for the month of September and for much of the 2014 summer in a report released by NOAA this week.

George Mason University will host an international conference next week on Weather and Climate Extremes, Food Security and Biodiversity. The conference will take place in Washington, D.C. over October 20-24.

Hurricane Gonzalo was gaining strength in the North Atlantic Ocean this week and heading towards Bermuda. Sustained winds over 145 mph and a very wide band of showers and thunderstorms were associated with this storm on Thursday (Oct 16) as it moved north in the Atlantic. Though weakened it will still be a powerful hurricane when it moves toward Bermuda Friday night.

The weather in the Pacific Ocean was relatively quiet except for Tropical Storm Ana which was moving towards Hawaii. This storm is likely to bring some rain and high surf to the islands over the coming weekend.

MPR listener question:

I have only lived in Minnesota a few years, but my neighbor tells me that the thunderstorm season all but ends in November. In Arkansas we would still get some heavy duty thunderstorms in November bringing 3 to 4 inch rains. Have you ever had such storms here in November?

Answer:

By far the greatest November thunderstorm in Minnesota history occurred over Thanksgiving (Nov 26) in 1896. This storm brought high winds, hail, and heavy rainfall to many areas. Worthington received almost 5 inches of rain while several other locations reported 3 to 4 inches, including Farmington, Le Sueur, New Ulm, Shakopee, and St Paul. The storms were followed by cool weather, with snow.

Twin Cities Almanac for October 17th:

The average MSP high temperature for this date is 60 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 41 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for October 17th:

MSP weather records for this date include: highest daily maximum temperature of 84 degrees F in 1910; lowest daily maximum temperature of 33 degrees F in 1880 and 1930; lowest daily minimum temperature is 22 degrees F in 1948 and 1952; highest daily minimum temperature of 62 F in 1910 and 1953; record precipitation of 1.24 inches in 1879; and record snowfall is a trace in 1925 and 1990.

Average dew point for October 17th is 38 degrees F, with a maximum of 66 degrees F in 1994 and a minimum of 8 degrees F in 1948.

All-time state records for October 17th:

The state record high temperature for this date is 90 degrees F at Moorhead (Clay County), Long Prairie (Todd County), Campbell (Wilkin County), and Beardsley (Big Stone County) in 1910. The state record low temperature for this date is 2 degrees F at Bemidji (Beltrami County) and Cass Lake (Cass County) in 1952. State record precipitation for this date is 4.02 inches at Georgetown (Clay County) in 1971; and the state record snowfall for this date is 7.0 inches at Cook (St Louis County) and Gunflint Lake (Cook County) in 1990.

Past Weather Features:

October 16-18, 1880 brought one of the heaviest early season snowfalls in Minnesota history to southwestern counties. The observer in Canby reported snow drifts up to 20 feet high, while the New Ulm observer measured 15 inches of snowfall. At Breckenridge the snow reduced visibility to near zero for a time. The snow storm shut down the railroads in southwestern counties for a period of days and was later documented in Laura Ingalls Wilder's story of *The Long Winter.*

Warmest October 17th in state history occurred in 1910. Many locations reached a daytime high of 90 degrees F, while even the Iron Range communities like Virginia made it into the 80s F under bright sunny skies. A sharp cold front two days later dropped temperatures by 40 to 50 degrees F.

1952 brought the coldest October 17th in state history with morning lows in the single digits up north and just teens in the south. It was only 12 degrees F at Rosemount and 13 degrees F at Austin. Many observers also reported daytime highs no greater than 39 degrees F. The prolonged mid-month cold spell was alleviated on the 23rd when temperatures climbed into the 60s and 70s F.

Strong thunderstorms brought heavy rains to the western and northern portions of the state over October 16-17, 1971. The heavy rains brought a halt to the fall harvest season, as many observers reported over 2 inches. Ada, Fosston, Benson, and Georgetown reported over 3 inches of rain and resumption of harvest activity was delayed over a week.

A storm brought a mixture of rain, freezing rain, and snow to Minnesota on October 17, 1990. Some areas received significant snowfalls including 4" at Ada, 3.6" as Hibbing, 3.5" at Big Falls, and 3.0" at Cotton. Gunflint Lake and Cook reported a record 7 inches.

Outlook:

Cooler than normal temperatures to start the weekend, then warming up on Sunday to near normal temperatures. Small chance of showers in the north over the weekend, but dry elsewhere. Continued near normal to warmer than normal temperatures with dry weather through much of next week.

Posted by Mark Seeley at 10:49 AM No comments:

Friday, October 10, 2014

Roller coaster climate pattern this month

Roller Coaster Climate Pattern

The climate patterns this month have been classic for Minnesota....that is to say highly variable. We started on the 1st with many reports of daytime temperatures in the 70s F. In fact over 20 western Minnesota communities reported daytime highs of 70 F or above. Then on the 4th of the month 35 Minnesota communities reported record-setting cold daytime maximum temperatures with their thermometers remaining in the 30s and 40s F all day. Windom only rose to 43 degrees F, while Cass Lake barely reached 38 degrees F for a daytime high. The next morning (October 5th) Zumbrota (Goodhue County) reported a record-tying minimum temperature of just 23 degrees F (tied 1952). The remainder of the week was cold with frequent

frosty mornings. By October 9th about two-thirds of the state's weather observers have reported at least one frost this autumn.

Also over October 4-5 over 30 communities reported a trace of snowfall, while the Brainerd area reported 0.6 inches, one of the earliest measurable snowfalls observed there. More recently this week temperatures have moderated and will rise to near seasonally normal levels by early next week. Further temperatures are supposed to be warmer than normal for much of the mid-month period. It is possible many areas of the state will see 70 degrees F again with an extended Indian Summer.

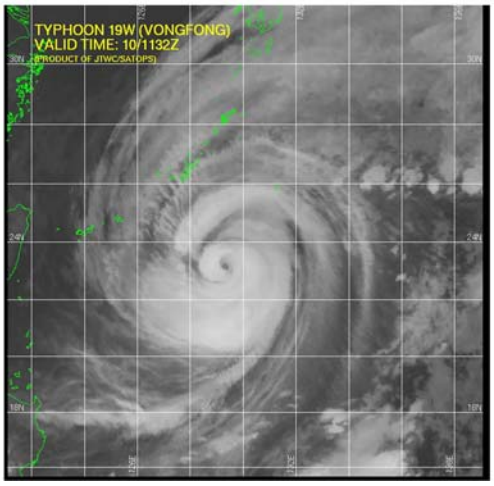
Changing day length effects on temperature

As we continue to lose daylight hours this month, you may notice an increase in the daily temperature range. Though the sun will heat the dry landscape substantially during the day (as we have seen this week), the longer nights allow for more cooling to occur, dropping the overnight lows to a greater degree than just a month ago. This produces a larger daily temperature range in the absence of significant cloud cover (note many observers reported a 30-35 degrees F temperature rise on Monday, October 6th).

Another temperature effect of day length is change in the time of day that the maximum temperature occurs. Again, in the absence of persistent cloud cover, or drastic change in air mass because of a strong frontal passage, the time of the maximum temperature is typically 5:00 to 6:00 pm in July, 4:00 to 5:00 pm this time of year (October), and during the very short days of December, the maximum temperature occurs between 3:00 and 4:00 pm.

Weekly Weather potpourri:

Super Typhoon VongFong was generating wind gusts over 150 mph this week and sea wave heights of 40-45 feet. It was on a track to bring heavy rains, high seas, and damaging winds to parts of South Korea and Japan over the weekend.



Also, Cyclone Hudhud in the Bay of Bengal was expected to bring heavy rains and strong winds

to east-central India over the weekend as well.

NOAA announced this week that it will host a press conference next Thursday, October 16th to discuss and delineate the winter season outlook for the USA. Several scientists from the Climate Prediction Center will be present to lead the discussion and answer questions.

The NOAA Climate.Gov newsletter also announced this week a webinar on October 16th to discuss "Climate Change and National Security." This will take place at Ohio State University and offer perspectives on how climate change may impact humanitarian relief efforts and armed conflicts.

A recent study by the University of British Columbia finds that a changing climate will have significant effects on the redistribution of fish stocks causing many species to migrate from the tropical latitudes toward the polar latitudes. This will be detrimental to the subtropical countries and cultures that rely on certain fish stocks for their basic dietary needs. There will be new opportunities for fisheries development in more Arctic regions of the ocean basins.

MPR listener question:

What are the all-time October temperature extremes for Minnesota and what is the last date that a 90 degrees F temperature has ever been recorded this month?

Answer:

The all-time extremes for October in Minnesota are 98 degrees F at Beardsley (Big Stone County) on October 5, 1963 and -16 degrees F at Roseau (Roseau County) on October 26, 1936. The latest date for a 90 degrees F reading in the Twin Cities is 90 F on October 10, 1928, while the latest date for the state is a reading of 90 degrees F at Canby (Yellow Medicine County) on October 30, 1950.

Twin Cities Almanac for October 10th:

The average MSP high temperature for this date is 62 degrees F (plus or minus 11 degrees F standard deviation), while the average low is 42 degrees F (plus or minus 9 degrees F standard deviation).

MSP Local Records for October 10th:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1928; lowest daily maximum temperature of 38 degrees F in 1906; lowest daily minimum temperature is 25 degrees F in 1964 and 1987; highest daily minimum temperature of 63 F in 1930; record precipitation of 1.89 inches in 1898; and record snowfall 2.5 inches of snow fell on this date in 1977.

Average dew point for October 10th is 41 degrees F, with a maximum of 67 degrees F in 1949 and a minimum of 15 degrees F in 2009.

All-time state records for October 10th:

The state record high temperature for this date is 93 degrees F at Tracy (Lyon County) in 1928. The state record low temperature for this date is 6 degrees F at Big Falls (Koochiching County) in 1932. State record precipitation for this date is 6.13 inches at Vesta (Redwood County) in 1973; and the state record snowfall for this date is 10.0 inches at Oklee (Red Lake County) in 1970.

Past Weather Features:

October 10, 1928 was the warmest in state history with over 20 communities reporting daytime highs of 90 degrees F or greater. With winds from the east, north shore areas of Minnesota along the Lake Superior shoreline remained in the 50s F all day.

October 9-12, 1932 was cold and snowy. Many communities reported overnight lows in the 20s and 30s F, while daytime highs did not reach higher 50 degrees F at many places. Snowfall was widespread ranging from trace amounts in most places and from 1 to 2 inches at a number of southern locations.

October 9-10, 1970 brought even more widespread snowfall to the state. Many counties reported 3-5 inches, while Fosston reported 9 inches and Slayton reported 7.5 inches. The snow was short-lived and melted over a few days.

Outlook:

Mostly dry weekend with near normal temperatures and bright, sunny skies. Chance for showers later on Sunday and into Monday and warming up next Tuesday through Friday with above normal temperatures and generally dry weather.

Posted by Mark Seeley at 10:36 AM No comments:

Friday, October 3, 2014

No 90 F Days for Some

September finishes warm, but no 90s F

With a flourish of warm days at the end of the month, September finished warmer than normal on a statewide basis, about 1 to 1.5 degrees F warmer than average for most observers in the state. Though some observers saw daytime highs reach the upper 80s F there were no reports of 90 degrees F or greater during the month of September. Of further note the 2014 growing season, designated May through September, brought no 90 degrees F temperatures to many locations in the state that customarily see a number of 90 F days during the period. For example, Rochester recorded the first year without a 90 F temperature since 2008, and Albert Lea reported the first year without a 90 F temperature since 1993. In western Minnesota which normally sees a warmer growing season, Pipestone and Morris reported the first year without a 90 degrees F temperature since 1915!

Wet start to October

The month of October started out wet for most areas of the state, except for northwestern counties. East-central and southeastern areas of the state reported measurable rainfall on each of the first three days of the month, with close to 1 inch a common total. Faribault reported 1.16 inches while Lakeville received 1.30 inches. Winona reported 1.36 inches and Caledonia 1.81 inches, while in the Twin Cities Metro Area MSP airport reported 1.47 inches and the University of Minnesota St Paul Campus 1.20 inches. Well over half of the state's corn crop has reached physiological maturity now and a majority of the soybeans have dropped their leaves. As the corn and soybean harvesting season gets underway in earnest this month Minnesota farmers will be hoping for a series of dry days to get some harvesting done. It appears that patience will be required waiting for a warm and dry interval of weather.

22nd Annual Kuehnast Lecture on October 7th

The Annual Kuehnast Lecture in Atmospheric and Climate Science is scheduled for October 7th, 3 p.m. at the St. Paul Campus Student Center theater. The 22nd Annual Kuehnast Lecture will feature author, musician, and award-winning journalist Andrew Revkin of The New York Times and Pace University. Revkin is known widely as the founder of the Dot Earth blog. His lecture, "The New Communication Climate," will explore issues and opportunities arising as both the environment and the news media experience an era of unprecedented and unpredictable change. Revkin will conclude the program with some music compositions of his own, accompanied by John Munson (MPR's "Wits" program) and friends. Refreshments will follow the program.

Old Wisdom

".....climate change..for the first time in history....is being both qualitatively and quantitatively measured.....[with] the great amount of evidence gathered the reality of this change can no longer be denied.....the recent warming of the climate has so far been most noticeable in the more northerly latitudes of the northern hemisphere....." These are the words of Dr. Donald Baker, climatologist and founder of the Land and Atmospheric Science Program at the

University of Minnesota, also the man who hired me back in the 1970s. When did Dr. Baker write this? These words appear in a publication he wrote for the Minnesota Farm Bureau back in April of 1960! Thanks to DNR climatologists Pete Boulay and Greg Spoden who brought this to my attention. Dr. Baker was a beloved faculty member, a great mentor to me and a dear friend.

Weekly Weather potpourri:

Dr. Stephen Schneider, climatologist and founder of the journal *Climate Change* was inducted into the California Hall of Fame this week. Among few scientists to be so recognized, Dr. Schneider won numerous science awards and served as a climate advisor to every U.S. President since Nixon. During his professional career he worked at both NCAR and Stanford University. He passed away in 2010.

A report issued this week in the *Bulletin of the American Meteorological Society* is titled "Explaining Extreme Events of 2013 from a Climate Perspective." This is an interesting read because it is basically a fingerprinting study to see how many of the 2013 extreme weather and climate events were tied to global climate change. Certainly not all of the events were attributable to climate change and the authors take great pains to explain why.

In the western Pacific Ocean, Typhoon Phanfone was growing in strength this week, packing winds of 130 mph and creating sea waves of 40-45 feet. It was expected to bring high seas, strong winds, and heavy rains to parts of Japan by the weekend.

The United Kingdom Meteorological Office reported this week that Northern Ireland recorded its driest September in history last month. In addition England, Wales, and Scotland recorded their 2nd driest September of all time. Monthly precipitation amounts typically ranged from only 0.30 inches to 0.90 inches across these countries.

MPR listener question:

I recently moved to St Cloud, MN from Columbia SC, so I am still getting used to the wildly fluctuating weather here. Now I hear that there is a chance for snow on Saturday, October 4th! Yikes! How often does it snow in the first half of October here?

Answer:

Well, let's start with the month of October. For the St Cloud area two-thirds of all Octobers (back to 1893) bring snowfall. So that's pretty common if you ask me. Now what about the first half (15 days) of the month? Approximately 20 percent of the time snowfall is reported from St Cloud during the first 15 days of the month, however the vast majority (64 percent) of those years the snow is only a trace amount. The largest single day quantity of snowfall measured at St Cloud during the first half of October was 3.6 inches on October 12, 1969. In all cases of early October snowfalls, the snow was short-lived as it warmed up and melted very readily. So

don't panic. BTW, further north it has snowed as much as 19 inches at Virginia (St Louis County), MN during the month of October (1951).

Twin Cities Almanac for October 3rd:

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 46 degrees F (plus or minus 8 degrees F standard deviation).

MSP Local Records for October 3rd:

MSP weather records for this date include: highest daily maximum temperature of 90 degrees F in 1997; lowest daily maximum temperature of 41 degrees F in 1935; lowest daily minimum temperature is 26 degrees F in 1996; highest daily minimum temperature of 72 F in 2005; record precipitation of 2.62 inches in 1903; and record snowfall is a trace in 1935.

Average dew point for October 3rd is 42 degrees F, with a maximum of 64 degrees F in 1926 and a minimum of 18 degrees F in 1989.

All-time state records for October 3rd:

The state record high temperature for this date is 95 degrees F at Ada (Norman County) in 1922, and at Milan (Chippewa County) in 1938. The state record low temperature for this date is 9 degrees F at Embarrass (St Louis County) in 1999. State record precipitation for this date is 4.50 inches at Pine River (Crow Wing County) in 1903; and the state record snowfall for this date is 0.3 inches at Virginia (St Louis County) in 1935.

Earth's oldest voices

This isn't really a meteorological expression, but perhaps it is arguably a climate expression, though derived from Native American culture and others. What are the oldest sounds on Earth? They are the sounds of wind, waves, and running water....all elements of the Earth's climate. Before any life forms existed, millions of years ago, there was the voice of the Earth's atmosphere, wind generated by air pressure gradients (high and low pressure cells) and the differential heating of land and water surfaces. There was also the voice of the Earth's water, waves generated by wind and tidal forces, and running water responding to the forces of gravity. Pretty basic stuff here, but obviously, these are the oldest sounds on our planet. These are the types of sounds that many of us find comforting and peaceful. In fact some doctors prescribe these sounds to relax patients or help them sleep better at night.

Past Weather Features:

Strong thunderstorms crossed the state over October 2-3, 1903, bringing a complete halt to the harvest season. Many observers reported 2-3 inches of rainfall, with hail and winds to 40 mph. Western Minnesota counties were especially hard hit and harvest was delayed for over one

week.

October 3, 1922 was the warmest in state history as 16 communities reported a high temperature of 90 degrees F or greater. It was a short-live spell of autumn warmth as a cold front drop temperatures by 30 to 40 degrees F on the 5th of the month.

October 3, 1935 brought snow to many parts of the state. Measurable snowfalls, generally less than one inch, occurred at Orr, Tower, and Virginia, while there were widespread reports of trace amounts even as far south as Spring Grove (Houston County).

October 3-4, 1989 brought a hard freeze to just about every county in the state. Overnight temperatures fell into the teens and twenties F, with lows as cold as 15 degrees F at Theilman and Milan.

Outlook:

Cooler over the weekend with a chance for light snow and rain mix early on Saturday. Some frosts likely Saturday night, then a chance of showers again on Monday and early Tuesday. Warming up by the middle of next week to near normal temperatures.