Severe Winter Weather in 2009-2010

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ABSTRACT

The winter of 2009-2010 was cold and stormy with excessive snowfall. The average winter temperature for Illinois was 3.6 degrees F below normal, and winter snow amounts varied from 8 inches at Cairo to more than 52 inches at Chicago. Snowfall totals in all parts of Illinois ranged from 27 to 86 percent above normal. Six severe snowstorms occurred in the December-February period and this was 2 more than normal. The northern half of Illinois had snow covering the ground from Christmas until February 28. These various severe conditions created costly impacts. Property losses totaled \$159 million, the ninth highest winter loss on record. Damages to transportation systems were also severe, power costs were high, and the total losses and costs for the winter 2009-2010 were \$530 million.

INTRODUCTION

The winter of 2009-2010 had weather conditions that created numerous costly impacts. The winter had six severe snowstorms. The total winter snowfall (Fig. 1) ranged from 8 inches at Cairo to over 52 inches in Chicago, and all parts of Illinois had snowfall totals well above normal. Amounts in northern Illinois ranked as eighth largest in the past 125 years. This was the fourth severe winter in a row in Illinois, and the third consecutive winter when more than 50 inches of snow fell in northeastern Illinois (Changnon and Kunkel, 2007; Changnon, et al., 2008; Changnon and Kristovich, 2009).

Continuous below freezing temperatures during January and February led to a snow cover in central and northern Illinois that persisted from late December unto the end of February. The number of days with snowfall exceeded normal values across Illinois. Monthly temperatures were below normal in all three months.

This report presents descriptions of conditions including temperatures, snowfall, snow cover, and storms during December 2009-February 2010. Values are presented for each month, and the values are compared to historic data to assess their climatological relevance. The second major section of the report assesses the numerous impacts created by the winter conditions. A national study of snowstorms found that damaging events occurred when snowstorms caused 6 or more inches of snow in 1 or 2 days (Changnon et al., 2008).

WEATHER CONDITIONS

The statewide snowfall averages were 11.7 inches in December, 6.3 inches in January, and 10.8 inches in February. The state's winter average total was 28.8 inches which is 9.8 inches above normal (Fig. 1). Monthly temperatures across Illinois averaged 1.1 degree below normal in December, 3.8 degrees below in January (18th coldest since 1895 when records began), and 5.3 degrees below in February.

December

December 2009 was cold and snowy with statewide snowfall totals averaging 3 to 6 inches above normal. Figures 2-3 present the patterns of snowfall for the three major December snowstorms. One snowstorm in December is the normal number. The first storm on December 7-9 resulted from a blizzard that had begun in the High Plains and moved east across northern Illinois. High winds with gusts of 50 to 60 mph occurred in the area where 2 to 10 inches of snow fell (Fig. 2). Several highways and rural roads were blocked in northwestern Illinois. The second December storm occurred in extreme northern Illinois on December 21-22 (Fig. 2). A Christmas snowstorm then occurred on December 25-26, with amounts over 10 inches in northeastern Illinois (Fig. 3). High winds occurred in the area with 4 inches or more snow, creating blizzard conditions. December 2009 rated as the 14th coldest and 11th wettest across the United States (Weatherwise, 2010).

January

January 2010 had continuously below normal temperatures which kept the snow cover produced by the December storms from melting. Most areas north of a line from Quincy to Champaign had a snow cover all month. Only one snowstorm occurred in January, one less than normal. This storm, which occurred on January 6-8, was widespread (Fig. 4). Snowfalls were greater than 4 inches over the northern two-thirds of the state with high values of 7 to 8 inches in northwestern Illinois.

February

February 2010 was a very cold and snowy month. Cold temperatures persisted through February, and the month had two major snowstorms, one more than normal. The storm on February 7-9 produced more than 12 inches of snow in Chicago, and the northern half of the state had 4 or more inches (Fig. 5). Eleven days later a deep low pressure center moved from Oklahoma across central Illinois, and it produced a second February storm on the 20th-21st (Fig. 5). This was the winter's final storm. It affected the northern half of the state with a peak of 8 inches in the Galesburg region. The February total snowfall at Chicago was 22.4 inches, the third largest on record. The highest daily temperature reached in Chicago during February was only 41 degrees, becoming one of only six years since 1890 when values did not reach 42 or higher.

Winter

The temperature and snowfall departures from normal during the winter are shown in table 1, illustrating the severity of conditions. The winter with temperatures well below normal, experienced a large number of days with snow cover on the ground. Chicago had 70 consecutive days with >1 inch snow on the ground, and this was the fourth largest number on record following behind 1978-79 (90 days), 1909-10 (81 days), and 1977-78

(72 days). Urbana, representative of central Illinois conditions, had 54 days with snow cover of 1 inch or more including the days during December 27-January 22; January 26-31, and February 6-26 periods.

	Mean Temperature	Snowfall	Number of Storms
December	-1.0	+5.7	+2
January	-3.8	-0.7	-1
February	5.1	+5.2	+1
Winter	-3.3	+9.8	+2

 Table 1. Departures from normal monthly and seasonal conditions during the winter of 2009-2010. Temperatures are degrees Fahrenheit and snowfall is in inches.

The lack of mild daily temperatures during the winter is reflected in the fact that only 6 days had temperature above 40 degrees F at Chicago (23 is average), and Rockford had only 4 days with temperatures above 40, as compared to an average of 18 days. The average winter 2009-2010 snowfall across Illinois, which was 28.8 inches, ranked as the eighth largest in the past 125 years. The six major snowstorms was two more than average.

IMPACTS

The heavy snows, numerous storms, low temperatures statewide, and long-lasting snow cover in central and northern Illinois produced a myriad of physical, societal, and economic impacts in Illinois, some of a serious nature. These impacts included various damages to property, transportation problems, power outages, and costly efforts to deal with the weather problems. Anther problem included flooding that resulted from the melted snowfall. Residents of Illinois should find the information presented herein useful for future planning.

Property

The conditions led to many damages to property which included houses, farms, businesses, and vehicles. The three December storms caused \$58 million in losses, The January snowstorm caused losses totaling \$35 million, and the two February storms led to losses of \$66 million. The winter total property losses in Illinois were \$159 million, the ninth highest winter loss in Illinois since records began in 1949.

Environmental

Environmental impacts included extensive tree damage (heavy snow and high winds in northwestern Illinois) and flooding (precipitation much above normal). Flooding was a major physical impact in Illinois during and after the winter ended. River levels across Illinois during December were all well above normal stages, with flood stages occurring all along the Illinois River, on the Mississippi River from Grafton south to Chester, and on the Ohio River at Cairo. These high levels continued through January. Other rivers at or above flood stages in January included the Kaskaskia, Kankakee, Rock, Green, and Mackinaw. In February flooding receded slightly on many streams. However, the Illinois River from Havana to Grafton remained above flood stage as did the Mississippi at Thebes, and the Ohio at Cairo.

Transportation

The snowstorms and frequent fogs limited visibilities, often leading to vehicle accidents. More than 6,500 accidents were reported in the winter as being weather related. Railroads in Illinois had many problems caused by the heavy snows and cold temperatures. Many trains were delayed , and two major derailments were caused by icing and blowing snow cover in northern Illinois in February (Railroads Illustrated, April 2010).

The storms, fogs, and high winds also curtailed commercial airline flights, and Chicago's O' Hare Airport had a large number of flight cancellations. O'Hare reported that 3 percent of all flights in December and 5 percent February were late due to bad weather. These late arrivals often clogged the airport and slowed outgoing flights.

Government

The wide temperature swings, coupled with moisture from the melting snow, created major pothole problems in streets and highways in many parts of the state. Damages to vehicles from hitting potholes were widespread. The pothole repairs in the five counties in northeastern Illinois involved 50 state crews and cost \$2.3 million (Chicago Tribune, March 29). In Chicago they had to fill 230,000 potholes during the winter. The price of materials used in filling potholes had escalated rapidly since 2008, adding to the high costs. The statewide cost of pothole repairs was \$48 million.

Snow removal (i.e., salt, fuel, overtime for workers) budgets for several Illinois communities were exceeded by mid February. Thousands of residents also had to pay private sector firms to remove snowfall from their clogged driveways. The huge pothole repairs and snow removal efforts, created major budget issues and problems for local governments and state agencies.

Retail Business

The numerous storms and heavy snow cover during late December through February curtailed retail shopping. Sales in February were only 65 percent of expected sales in Illinois during an already depressed nationwide economy (Chicago Tribune, April 4, 2010).

Agriculture

The numerous storms and heavy snows had a considerable effect on Illinois farmers. The 2009 growing season had been cool and wet and fall crop harvesting was greatly delayed. A third of the Illinois corn crop had to be harvested when possible in December 2009 and January 2010. The wet snowy conditions in the winter also limited normal efforts to perform tillage of farm fields. Furthermore, the flooding of streams and river eroded soils.

Human Health and Welfare

The prolonged cold conditions with continuous snow cover across the northern threefourths of Illinois was frustrating and dangerous to many who needed to travel to work. Damages to homes and vehicles brought worries and fear to many. Deaths attributed to the winter weather conditions, mostly auto accidents, totaled 8.

SUMMARY

The three snowstorms in December 2009 were 2 more than normal; January had only one storm, one less than normal; but February had two snowstorms, one more than normal. The statewide snowfall totals for the winter were all well above normal. The statewide average was 28.8 inches which is 9.8 inches above normal. Snow totals ranged from a low of 8 inches at Cairo to over 50 inches in Chicago.

All three winter months had below normal temperatures, and the statewide average for the winter was 3.6 degrees F below normal. The heavy snowstorms in December, coupled with continuous below average temperatures, resulted in a snow cover that persisted from late December until the end of February. All aspects of the winter weather were far from normal.

Table 2. Losses and costs in millions of dollars, in Illinois associated with the winter 2009-2010 conditions.

Property damages	\$159
Power losses and costs	118
Government costs	96
Transportation losses and costs	07
Retail losses	35
Environment	15
Total	\$530

The numerous impacts resulting from the severe 2009-2010 winter conditions led to high losses and costs in several sectors. The winter's financial losses and costs are summarized in table 2. The greatest losses came to property. Losses and costs in the power use and production sector and in transportation were also large. The winter total in Illinois was \$530 million.

LITERATURE CITED

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Figure 1. The pattern of total snowfall (inches) during December 2009-February 2010.



Figure 2. Patterns of snowfall (inches) for storms on December 7-9, 2009, and December 21-22, 2009.



Figure 3. Pattern of snowfall (inches) from storm on December 25-26, 2009.



Figure 4. Pattern of snowfall (inches) forma storm on January 6-8, 2010.



Figure 5. Patterns of snowfall (inches) for storms on February 7-9, 2010, and February 20-21, 2010.