Prairie State Precip

## What's With All of This White Stuff?

Winter got off to a very quick start this year, with most of the northeastern half of the state covered in snow from the storm of December 3-4. While this isn't terribly unusual for northern Illinois, areas to the south aren't used to seeing this much snow so early. Typically the first measurable snow (greater than 0.1 inch) occurs sometime the last week of November as far south as central Illinois. Many locations in central Illinois received more snow on December 3-4 than they normally do during the whole month of December. December snowfall, based on the 30-year average, ranges from around 2 inches from Carbondale to 8 inches or more from Interstate 80 northward.

Annually, snowfall ranges from about 40 to 45 inches in the Chicago area to 24 inches in central Illinois, and then to a foot or less in far southern Illinois.
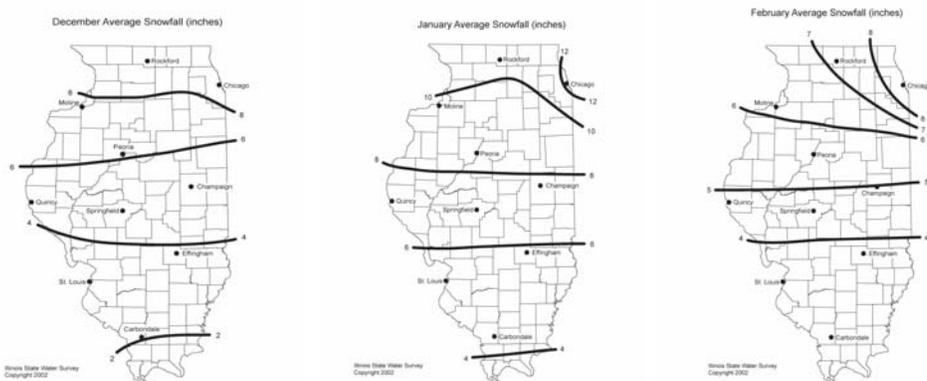
January is the peak month for snow, and we see the average snowfall jump to about 4 inches in southern Illinois to 10 or more inches north of Interstate 80. It's during January that the lake effect is evident in the pattern, with 12 inches along the lake shore. February snowfall drops to 4 inches or less south of Interstate 70, and to 6 to 8 inches in northern Illinois. The February pattern is skewed toward northeastern Illinois, where Lake Michigan can enhance snowfalls from storms passing through the region. Average snowfall in March ranges from about 5 inches in northern Illinois to 2 inches or less in the southern quarter of the state.

Annually, snowfall ranges from about 40 to 45 inches in the Chicago area to 24 inches in central Illinois, and then to a foot or less in far southern Illinois.

You can see more maps about the climate of Illinois and find more information about winter storms in Illinois on the Illinois State Climatologist Office web site, http://www.isws.illinois.edu/atmos/statecli/index.htm
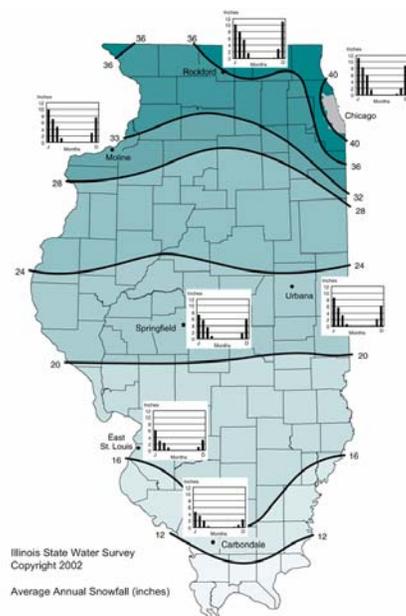
The Authority on Snow

Believe it or not, until the mid 1990's there was not much in the way of standardization for snow measurements. The first comprehensive guide to snow measurement was written by CoCoRaHS founder Nolan Doesken and co-author Arthur Judson in 1996 and was the basis for snow measurement procedures we now use in CoCoRaHS and for those used by U.S. Cooperative Observers. *The Snow Booklet – A Guide to the Science, Climatology, and Measurement of Snow in the United States* is a must for anyone who enjoys snow, even if you just enjoy it from the comfort of a warm room. The booklet, while very descriptive and detailed, is easy to read and not highly technical. On page 3 of the booklet is one of my favorite Calvin and Hobbes comic strips where Calvin declares "Getting an inch of snow is like winning 10 cents in the lottery." Snow was a recurring theme in the Calvin and Hobbes strip, and this particular strip reflects the mind-set for those that enjoy snow.

There is a lot of information packed into 84 pages. The chapter "The Science of Snow" describes what snow is, how it forms, types of snow crystals, and the characteristics of fresh snow, snow on the ground, and melting snow; and a short section on avalanches. Among the topics covered in the chapter on snow climatology are a description of the distribution of snow in the U.S., typical storm tracks, and a list of the snowiest U.S. weather stations, and record snow storms. The last five chapters of the booklet deal with measuring snow, from the types of instrumentation used to correct procedures to how to deal with adverse or unusual situations.
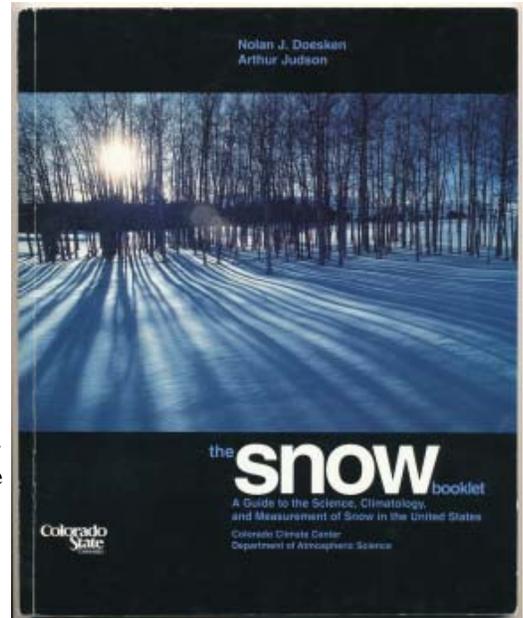
Copies of *The Snow Booklet* are still available from the Colorado Climate Center, and there is a discounted price for CoCoRaHS observers - $10 plus $2.50 for shipping. You can order one via the web at http://ccc.atmos.colostate.edu/orderform.php - make sure to note you are a CoCoRaHS observer. You may also call the Colorado Climate Center at (970) 491-8545 to order *The Snow Booklet.*

> *The Snow Booklet – A Guide to the Science, Climatology, and Measurement of Snow in the United States is a must for anyone who enjoys snow*

Illinois CoCoRaHS Performance - Some Stats

- Highest daily average
  392 in June 2010

- Greatest number of observers reporting in one month
  508 in June 2010

- Highest number of daily reports
  448 on 5/11/2010
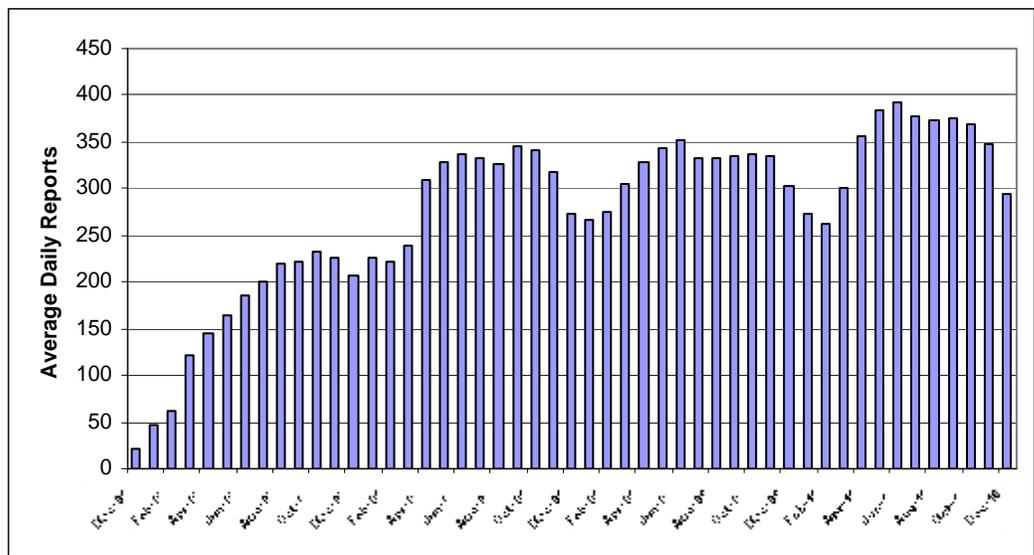
CoCoRaHS Observations Important to Accurate Depiction of Snow Across the U.S.

by Anne Sawyer, Snow Hydrologist, National Operational Hydrologic Remote Sensing Center, Chanhassen, MN

The unique aspect of SNODAS is its capability to incorporate snow observations from sources such as satellite imagery, airborne remote sensing and most importantly, ground-based observations like those from the CoCoRaHS network.

Living in Illinois, you are certainly aware of how seasonal snow impacts our lives and communities. Spring runoff from melting snow provides water for drinking, farming and industrial uses. Billions of dollars are gained from snow-related recreation and tourism, while billions of dollars are spent to remove snow from roads and runways. Some degree of snowmelt-related flooding occurs every year in the United States, with the severity of flooding dependent upon many factors such as snow accumulation, fall soil moisture and the rate and timing of spring snow melt. Therefore, continued and improved snowpack observation and analysis is essential to protecting life and property in the United States. The National Weather Service (NWS), which issues river and flood forecasts and provides hydrometeorological data and products to water resource managers, established the National Operational Hydrologic Remote Sensing Center (NOHRSC) in Chanhassen, MN, as its center of expertise in, among other things, snow-related data products and services.

SNODAS - A Powerful Tool

The NOHRSC operates the Snow Data Assimilation System (SNODAS), a sophisticated snow model that produces hourly estimates of snowpack distribution and characteristics on a 1-kilometer grid for the continental United States and southern Canada. The model integrates all electronically-available snow-related data into the most accurate, consistent, and complete analysis of the snowpack available. SNODAS generates near real-time estimates of snow depth, snow water equivalent and other variables such as blowing snow, snow sublimation and snowmelt, all of which are available on our web site at: http://www.nohrsc.noaa.gov.

SNODAS is run using weather data from a numerical weather prediction model, the Rapid Update Cycle (RUC), and also incorporates satellite-derived solar radiation data and ground-based temperature observations. The unique aspect of SNODAS is its capability to incorporate snow observations from sources such as satellite imagery, airborne remote sensing and most importantly, ground-based observations like those from the CoCoRaHS network. SNODAS, like most other models, produces an approximation of actual conditions and incorporating observations into the model allows us to correct for its biases and inconsistencies.

Every day, SNODAS ingests tens of thousands of snow depth and snow water equivalent observations from all over the country. Analysts compare the observations to the model, and when the differences between the two are significant over a sufficiently large area and can be explained, the model is adjusted. An example of a scenario creating discrepancies between the model and observations may be a rain/snow mix where temperatures hover near freezing, and the model cannot accurately determine whether the precipitation was rain, freezing rain, snow or a mix of all three! Perhaps the model put down snow but the observations suggest that mostly rain fell. In such a scenario, the model would be adjusted to more closely match the observations. We call this process of adjusting the model by using the observations "assimilation". The assimilation process (Figure 1) will "nudge" the model closer to the observations, but it doesn't focus too much on any one observation. It incorporates observations within a given radius and makes spatial adjustments to the model, taking into account distance between stations, station elevation, and the snow depth and/or snow water equivalent reports from all stations.

Accurate Ground Observations are Critical

The assimilation process depends upon having adequate and accurate ground-based observations of snow depth and snow water equivalent. The CoCoRaHS network provides a significant source of these data nationwide. Of the more than 16,000 unique stations that reported snow depth last snow season (data from October 2009 – October 2010), 39% were CoCoRaHS observers. In Illinois, the ratio of CoCoRaHS snow depth observers to non-CoCoRaHS

CoCoRaHS Observations Important (continued)

You can see your reported observations along with the modeled snowpack information at your station on the NOHRSC web site.

observers is even greater, with 51% of our snow depth observations coming from CoCoRaHS (Figure 2a). The snow water equivalent reporting stations for snow season 2009 had an even higher proportion of CoCoRaHS observers. Nationwide, 48% of nearly 7,500 snow water equivalent reporting stations were CoCoRaHS stations. In Illinois that number was very high, with 64% of more than 600 snow water equivalent reporters being CoCoRaHS observers (Figure 2b).

See Your Data on the NOHRSC Web Site

As observers, you may want to know how your data are being used. You can see your reported observations along with the modeled snowpack information at your station on the NOHRSC web site. However, we do not use the same station IDs as the Co-CoRaHS network due to the volume of station data incorporated by the NWS. NOHRSC has just added a feature to its web site where you can cross-reference your CoCoRaHS station ID with

the station ID that the NWS has assigned to your station to see your data on our web page. To do this, go to http:// www.nohrsc.noaa.gov/ shef_archive/ cocorahs_lookup.html and select your state from the drop-down menu. The MADIS ID (Meteorological Assimilation Data Ingest System, http:// madis.noaa.gov) is the ID assigned to your station by the NWS. MADIS is the data feed we use to receive observations from all CoCoRaHS stations. You can sort the
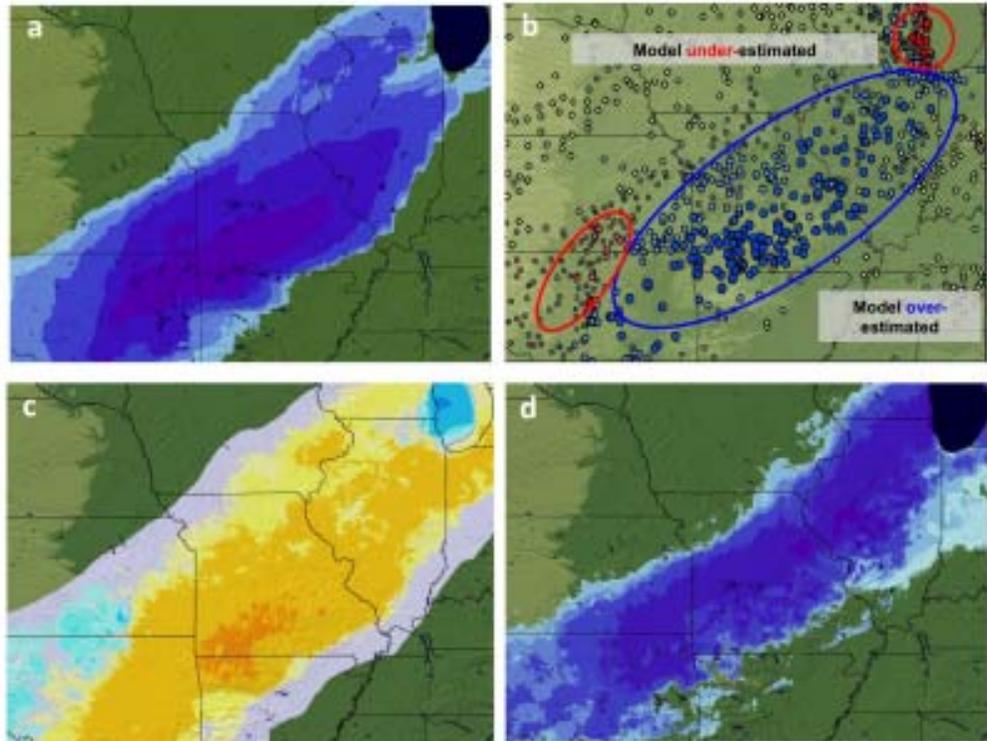

Figure 1. *The NOHRSC assimilation process.* ***1a.*** *Modeled snow water equivalent following a November 30, 2006 storm. Darker colors indicate more modeled snow on the ground.* ***1b.*** *Observations shown as differences between the observed snow water equivalent / snow depth and modeled. The larger the dot, the bigger the difference. Blue dots indicate that the model over-estimated snowfall. In this case, it was a band of rain/snow mix that was modeled entirely as snow. Red dots indicate that the model under-estimated snowfall. The lake effect snowfall near Chicago was underestimated, and rainfall, not snowfall, was modeled in central Kansas and Nebraska.* ***1c.*** *The "nudge" created by the assimilation process. Warm colors indicate areas where snow will be removed from the model, and cool colors indicate where snow will be added to the model.* ***1d.*** *Modeled snow water equivalent after the "nudge" is applied to the model.*

CoCoRaHS Observations Important (continued)

columns alphabetically by clicking on the column heading. Once you find your station, click on the MADIS ID, which will take you to your station's web page. There you will see your observations and you can see what SNODAS is modeling for snow and weather conditions at your location (Figure 3). If you have comments or questions about our web page, you can send us an email using the form on our contact page: http://www.nohrsc.noaa.gov/contact.html.

As you can see, the more accurate your observations are, the more accurate our estimates of snow water equivalent in Illinois can be. While we certainly use all of your snow observations, we especially appreciate observations of snow water equivalent. You probably know from shoveling your driveways that 10 inches of light, fluffy snow has much less water than 10 inches of wet, soppy snow even though the depth of each snowpack may be the same. If the amount of water in the snow is known, it becomes easier for us to estimate the water on the ground and water managers, in turn, are better able to prepare for snowmelt. But, no matter whether you measure snow water equivalent, snow depth or both, the NOHRSC couldn't do what we do if CoCoRaHS observers didn't do what they do! We appreciate your efforts! Keep up the good work!

"...the NOHRSC couldn't do what we do if CoCoRaHS observers didn't do what they do! We appreciate your efforts! Keep up the good work!."
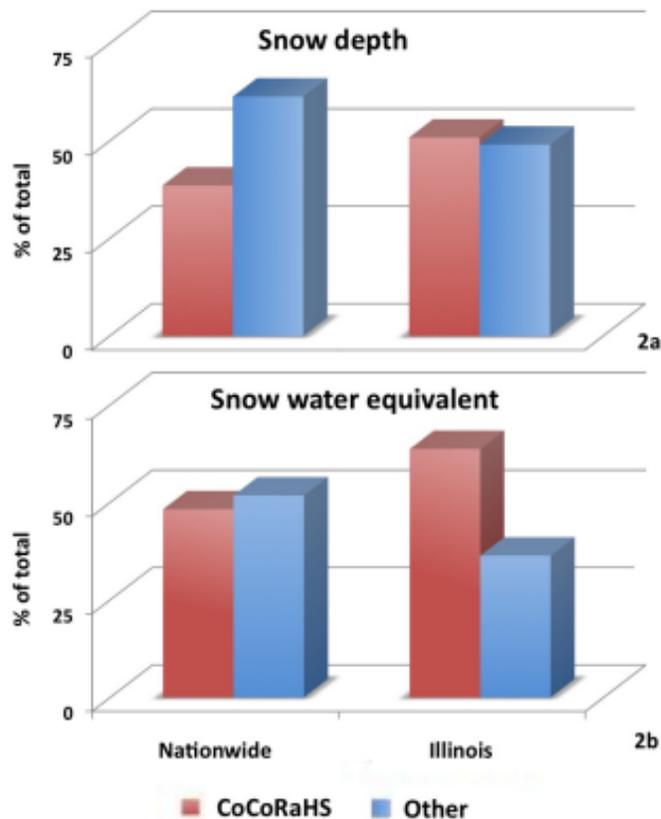

Figure 2. *Percentage of total observing stations, both nationwide and in Illinois, reporting snow depth (**2a**) and snow water equivalent (**2b**).*
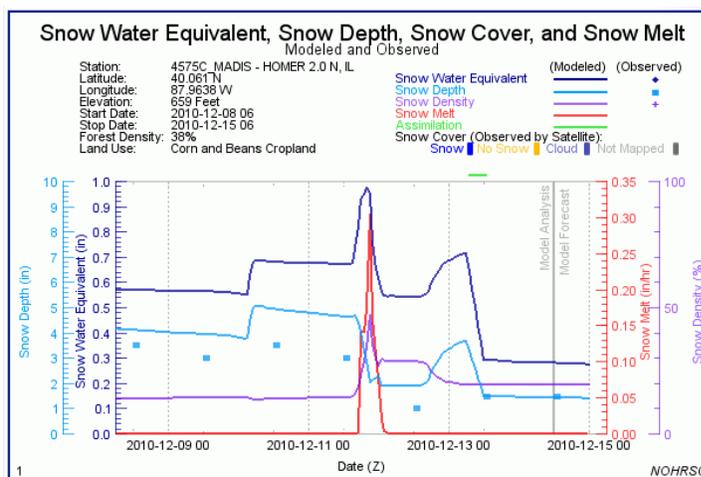

Figure 3. This the first of nine charts displayed on the NOHRSC web site when selecting a CoCoRaHS station, in this case IL-CP-1, Homer 2.0 N. Other charts include Precipitation, Snow Water Equivalent and Snow Depth; Time Window Cumulative Precipitation; Snow Pack Temperature and Density by Layer; Snow Surface, Mean Snow Pack, and Air Temperature; Snow Melt, Sublimation, and Weather Forcing; Snow Surface Energy Exchanges; and Snow Surface Radiation Fluxes.

Jon Snurka, Kane County Coordinator

Jon Snurka is the local coordinator for Kane County in northeastern Illinois. Jon was among the first group of volunteers to sign up in Illinois.

How did you find out about CoCoRaHS and when did you get started?

I found out about CoCoRaHS in Colorado after reading a newspaper article. I've always been interested in the weather and I thought CoCoRaHS would be a neat opportunity to learn more about weather and to contribute in some way. The first training session I attended was conducted by Chris Spears who runs the CoCoRaHS blog. The training was held at the Denver Water office in the spring of 2003.

I continued to be an observer up until we moved to Illinois the summer of 2004. During the time observing in Colorado, I recorded 7 hail events as well as a single storm snowfall event of 36 inches.

After moving to Illinois, I was disappointed that CoCoRaHS had yet to expand here. I emailed Nolan a couple of times asking when they would be represented here and to please let me know so I could sign up. I received the notification in 2006 and signed up that November.

Some of the obvious differences between Colorado and Illinois are the amount of precipitation and snowfall totals. In Colorado it was rare to have a rain total more than .50 inches unless we really received a down-pour. But the snow totals greatly exceeded Illinois. Storms of 6" to 10" were rather common. Here in Illinois it seems to be more around 2" – 5" for a common snowfall, at least in Kane County.

What about the program do you enjoy the most?

I enjoy seeing the total precipitation amounts over time. It is neat to track the daily totals and then go back and see for a month or even a year how much we received. I also really like contributing with the Significant Weather Reports. It is a good feeling knowing that I can provide valuable data to the NWS that they can act on if needed. I am actually bummed when a large rain happens and I'm not home to submit a report.

Why did you decide to volunteer as coordinator?

I was approached by Tim *[Tim Halbach, then Illinois Co-Coordinator]* to be a coordinator in 2007. I actually put him off for a time because I had a lot going on at work that year. Finally that fall I said I would be glad to be a coordinator. I enjoy trying to recruit more observers and sending the occasional email notes. I just wish I had more time to promote CoCoRaHS thoroughly.

Tell us a little more about yourself.

I was born in Michigan and lived there up to 1983. After a brief stint in California, my family ended up in Colorado in 1984 and I loved it. I enjoy the outdoors, hiking, camping and skiing and Colorado provided all of that. Met my bride, Kala, and we married in 1992. We just celebrated our 18th year together. We have two middle school kids who have both attended the CoCoRaHS training and have sent in reports when I travel for work.

My career has included spending time in the US Navy Reserves. I've worked at Barnes and Nobles and also managed a rare book store (Abracadabra Antiquarian Bookshop). I've worked at a restaurant and Walgreens and also have sprayed trees and did golf course maintenance as summer jobs.

My previous employer promoted me to a regional IT manager in 2004 which prompted our move to Illinois. I currently manage an IT team at a health care insurance company. Travel thankfully is not often but it's good to know my family can still report when I'm gone.

Interests include collecting Robin Hood books, reading, shooting trap with my son and used to be running until I hurt my knee in 2008. We still camp a couple of times a year and enjoy exploring Illinois and southern Wisconsin.

I'm looking forward to another year with CoCoRaHS and am trying to figure out how to get better coverage with observers in all corners of Kane County.

"I also really like contributing with the Significant Weather Reports... I am actually bummed when a large rain happens and I'm not home to submit a report."

![CoCoRaHS logo]

Community Collaborative Rain, Hail, and Snow Network

www.cocorahs.org

Illinois web page
http://www.cocorahs.org/state.aspx?state=il

*"Because Every Drop Counts!"*

Illinois State Coordinator

Steve Hilberg
hberg@illinois.edu

We're on
Facebook!

Join the group
Illinois CoCoRaHS

Illinois CoCoRaHS Regions
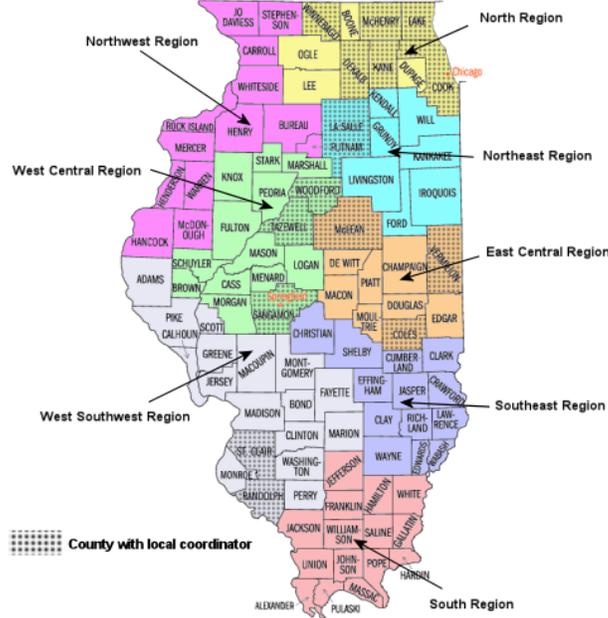
Region	Coordinator
Northwest	Andy Ervin Andy.Ervin@noaa.gov
North	Bill Nelson William.Nelson@noaa.gov
Northeast	Bill Morris William.Morris@noaa.gov
West Central	Bill Ousley Billy.Ousley@noaa.gov
East Central	Steve Hilberg hberg@illinois.edu
West Southwest	Jim Angel Jimangel@illinois.edu
Southeast	Darrin Hansing Darrin.Hansing@noaa.gov
South	Deanna Lindstrom Deanna.Lindstrom@noaa.gov

Local County Coordinators

County	Coordinator	County	Coordinator
Brown	Tim Gross Tim.Gross@noaa.gov	McLean	Jerry Swartz jjj.swartz@verizon.net
Champaign	Steve Hilberg hberg@illinois.edu	McDonough	Tim Gross Tim.Gross@noaa.gov
Cook	Jim Morrill jmorrill2@comcast.net	McHenry	Mary Moltmann moltmannm@aol.com
Coles	Cameron Craig cdcraig@eiu.edu	Randolph	Scott Rubach scottrubach2@msn.com
DeKalb	Walker Ashley washley@niu.edu	Sangamon	Casey Mayfield caseymayfield@comcast.net
Douglas	Mike Timlin mtimlin@illiois.edu	Schuyler	Tim Gross Tim.Gross@noaa.gov
DuPage	Nick Boss DuPageCoCoRaHS@gmail.com	St. Clair	Curtis Williams faxplus@swbell.net
Kane	Jon Snurka jon@robynhode.com	Tazewell	Amanda Wertz amandawertz86@gmail.com
Knox	Tim Gross Tim.Gross@noaa.gov	Warren	Tim Gross Tim.Gross@noaa.gov
Lake	Richard Mathis rlmath@yahoo.com	Winnebago	Mike Lager lucky13lager@yahoo.com
LaSalle	Patricia Rod pmend12@verizon.net	Woodford	Jim Copes jcopes@mtco.com