



GETTING TO KNOW US

NEBRASKA STATE CLIMATE OFFICE

The Nebraska State Climate Office is nearing its first birthday.

Over the course of the last year, we've answered more than 560 data requests, given more than 45 climate-related presentations and launched our sister websites, nsco.unl.edu and mesonet.unl.edu.

We're just getting started, and we're excited about what the future holds for our organization.

We are an American Association of State Climatologists Recognized State Climate Office, dedicated to delivering

science-based climate services at the local and state level. Our focus is on weather and climate monitoring, climate services and stakeholder engagement. We also operate the Nebraska Mesonet, a statewide weather observation network with nearly 70 stations across the state. The ARSCO designation recognizes our commitment to gathering and disseminating weather and climate information to users; demonstrating its value to decision-makers; performing climate impact assessments and weather event evaluations; and conducting climate research,

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Photo of Arapahoe weather station by Glen Roebke.

WHO WE ARE, FROM 1

diagnosis and projections.

Seven people work in our office: full-time employees Martha Shulski, director and state climatologist; Al Dutcher, Nebraska Extension agricultural climatologist; Stonie Cooper, technical administrator; and Glen Roebke, Mesonet manager; and part-time employees Shellie Hanneman, data quality technician at the High Plains Regional Climate Center covering a six-state area; Tyler Williams, educator based out of Lancaster County Extension office; and Shawna Richter-Ryerson, communications associate. With our skills, we hope to continue building the solid history of climatological work in the state.

That work started in the 1970s, when a federal program was implemented that put a climatologist in each state. Nebraska's was based at the Conservation and Survey Division in Nebraska Hall. When the federal program ended, Nebraska opted to continue supporting a State Climatologist, and eventually based the climatologist with the University of Nebraska-Lincoln Department of Agricultural Meteorology on East Campus.

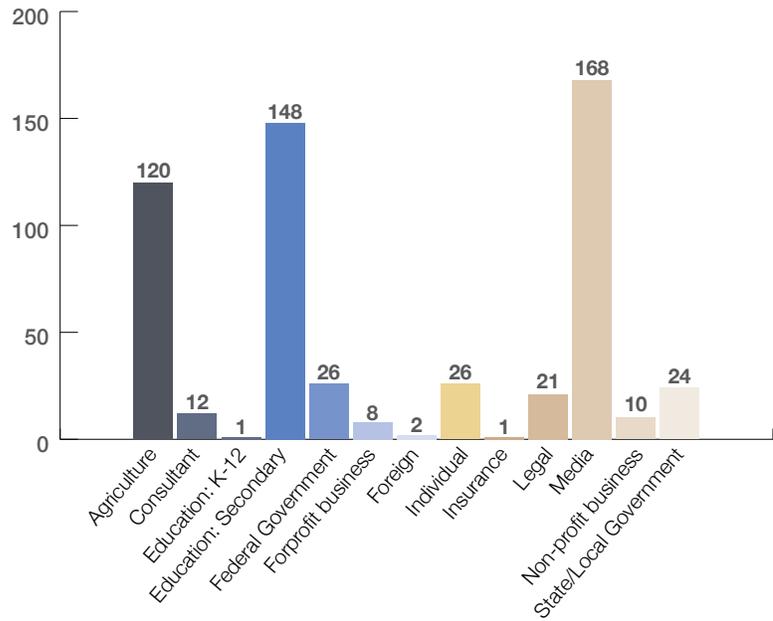
Dutcher became the state's fourth state climatologist in 1991. It was a position he held for 25 years. On Jan. 1, with the launch of the state climate office as an independent one, Shulski took on the role of state climatologist.

What's in our future

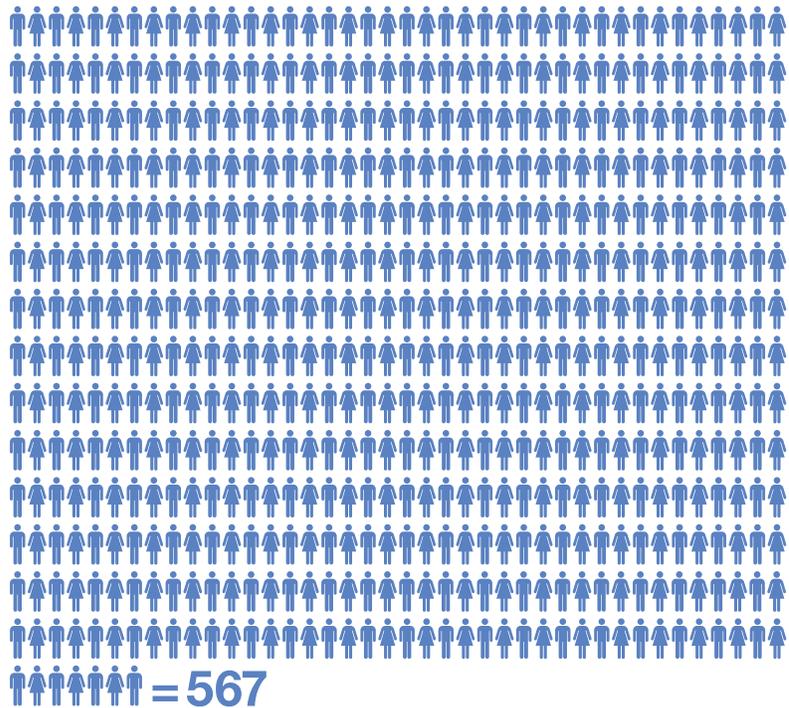
After the launch of our sister websites, which made available to the public observations in near real-time, the state climate office will look to new products and summaries. We launched the monthly summary report in September, and with this edition, have launched our quarterly summary, the Climate Dispatch.

We will build on current products such as the Cattle Comfort Index and Growing Degree Days and will continue to support Nebraska Extension, researchers and a wide range of stakeholders in need of timely weather and climate data.

Data requests by sector since Jan. 1



Total data requests since Jan. 1



* Data through Nov. 30

MEET OUR DIRECTOR MARTHA SHULSKI

In her career, one thing has driven State Climatologist Martha Shulski: The desire to use her knowledge about weather to help inform people's decisions.

It just so happens that it also is the mission of the Nebraska State Climate Office at the School of Natural Resources, which formed Jan. 1 and is headed by Shulski.

"I've always been a service climatologist," she said. "I wanted to help people by discovering what they need and developing products to meet those needs."

Her guiding principal has been to match climate science to the decisions users have to make. If it doesn't, she said, it misses the mark.

"The science needs to be applied and useful," she said.

In her current role, she does just that. Her job is to help the public understand climate data collected through the Nebraska Mesonet, a statewide weather observation network, as well as regionally and nationally collected data, and how it can be used to solve issues affecting a broad range of people and industries.

"Of great importance is how these changes impact our society and environment," she said. "Climate is a critical component to most all environmental issues."



NSCO

It's critical to farmers across the state – and to municipalities, too. Farmers regularly look to the state climate office for the information they need to make decisions on their farms: When should I plant? Can I apply anhydrous or will it be too windy? Are my cows in danger of heat? Is it time to harvest that damp corn or will it still have time to dry out?

Municipalities such as Lincoln also are turning to climatologists like Shulski to help plan for future weather and climate conditions. Through June 2018, Shulski and Natalie Umphlett, interim director of the High Plains Regional Climate Center, are working with cities in a four-state area to analyze historical data and provide projec-

tions of weather conditions expected to exceed historical records. This can help cities determine whether they need to invest in larger waterways or for more catastrophic weather events such as tornadoes.

Some of these lessons are the focus of the Climate in Crisis course, which Shulski teaches for the School of Natural Resources. Students discuss the drivers of climate change, look at the data, talk about the complexities of and feedbacks in the climate system, and investigate solutions for adaptation and mitigation.

It's all in the name of informing decisions – giving students, customers and the public the best information and tools available to make the best decisions possible.

Shulski has a doctoral degree in soil science and climatology from University of Minnesota. She earned her master's degree in agriculture meteorology at Nebraska, and her bachelor's in meteorology from North Carolina State University. She joined the faculty at Nebraska in 2009 after working for seven years at the Alaska Climate Research Center in Fairbanks. She is the previous director of the High Plains Regional Climate Center with the School of Natural Resources.

EXPECT HIGHLY VARIABLE WINTER TEMPS

AL DUTCHER

AGRICULTURE EXTENSION CLIMATOLOGIST

As winter rapidly approaches, it's time to look at current conditions and what weather patterns are expected to impact North America during the next six months.

Although the temperature and precipitation patterns in October 2016 were similar to those in October 2015, the underlying causes were polar opposite patterns in the Equatorial Pacific. Last year in October, we were entering an exceptionally strong El Nino; this year a weak-to-moderate La Nina appears to be unfolding.

We know that weather patterns around the globe are influenced by conditions in the Equatorial Pacific and that these patterns are usually dominant during the North American winter. The impact of stronger events can last into the late spring or span multiple years.

The dominant winter trend during a La Nina event in the United States is for wet conditions across the Pacific Northwest southward through northern California, along with the eastern Corn Belt. Drier-than-normal conditions materialize across the southern third of the United States. During El Nino years, these same areas exhibit opposite trends.

The unfolding La Nina event is just

beginning to show signs of the typical winter patterns we would expect to see across the U.S. A cursory look at the most recent U.S. Drought Monitor indicates widespread drought conditions are developing across a substantial portion of the southeastern U.S. Abnormal dry to moderate drought conditions also are developing in pockets from the southern to northern High Plains, especially in western Nebraska.

The Gulf of Alaska upper air low has aggressively pushed energy into the Pacific Northwest and is showing no signs of abating. In fact, it appears that it is building further southward as we

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WINTER, FROM 3

approach the start of winter. If the current pattern continues to develop, I expect the upper air low pressure will strengthen and build southward. I also expect the sea surface temperatures to cool along the southern Alaska coastline, which will help play a significant role in the amount of cold air drawn southward into the continental U.S. during this upcoming winter.

Colder-than-normal temperatures are developing across the Pacific Equator. However, the northward extent of this cold pool is being limited by the residual warmth below the surface of the water left over from the multiyear El Niño that ended late this spring. This alone should support weak La Niña conditions into the early spring.

If the Gulf of Alaska sea surface temperatures continue to cool and expand southward, ocean currents should pull this pool southward along the west coast and eventually into the eastern Equatorial Pacific. If this occurs, this projected La Niña event may strengthen significantly, with an outside chance of becoming a multiyear event. This is not currently in the consensus forecast of global weather models.

Active Weather Pattern Possible for Western Corn Belt this Winter

If snow activity is centered over the upper Great Lakes and eastern Corn Belt,

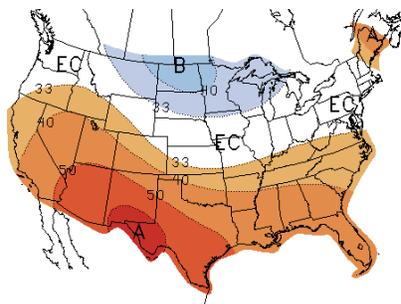


Figure 1. Three-month temperature outlook for December-February, with a 1.5-month lead time.

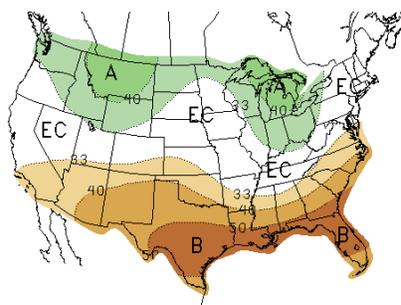


Figure 2. Three-month precipitation outlook for December-February, with a 1.5-month lead time.

SOURCE: NOAA CLIMATE PREDICTION CENTER

Nebraska likely will experience a roller coaster of temperatures this winter, similar to the Polar Vortex winters that have impacted the eastern third of the country in recent years. Most precipitation activity likely would remain east of Nebraska, but the initial cold air intrusions would spill southward across

the western High Plains. High pressure would build in from the west and push the cold air east on a fairly regular basis.

The southeastern U.S. drought also may play an important role in the eventual storm track of winter systems moving across the country. Drought conditions are intensifying as high pressure aloft is forcing lows moving out of the western U.S. to move northeast into the upper High Plains before moving eastward across the Great Lakes and northeastern U.S.

If this pattern persists through the winter, much of the northern High Plains and Great Lakes region are likely to experience heavy snowfall and below-normal temperatures. Movement of low-level moisture around the periphery of the southeastern U.S. high pressure would move Gulf of Mexico moisture northeastward from eastern Texas to the southern Minnesota. This opens the possibility that an active weather pattern may be in store for the western Corn Belt as lows eject eastward out of the western U.S.

Temperatures this winter across Nebraska would be expected to average below normal during a La Niña winter, especially across the northern third of the state. If early season snow activity doesn't melt across the northern Plains, I would expect below-normal temperatures would impact southern Nebraska more than forecasted by CPC in Figure 1.

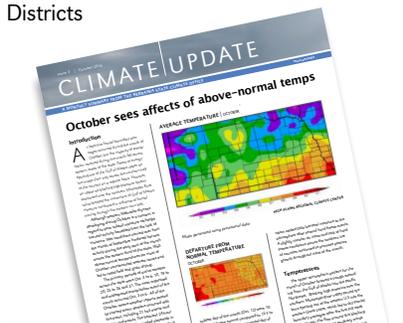
— Portions of this outlook also appeared in *CropWatch*, a resource for University of Nebraska–Lincoln Extension

FEATURED PRODUCT

Our goal at the Nebraska State Climate Office is to generate tools you can use to help make decisions. Each quarter we'll highlight one. This quarter we're featuring our Monthly Summary.

The newsletter is meant to summarize and provide context to the prior month's climate and weather observations. Did you experience a 10-inch rain in one 24-hour period one day in April? How did that stack up against other places in the state? Did it break a record? Al Dutcher, our Nebraska Extension agricultural climatologist, collects the data, interprets it and writes an easy-to-understand roundup of pertinent data.

The summary, of interest to everyone from farmers to integrated water managers, is particularly useful to the Department of Agriculture, Department of Natural Resources, the Natural Resource Districts

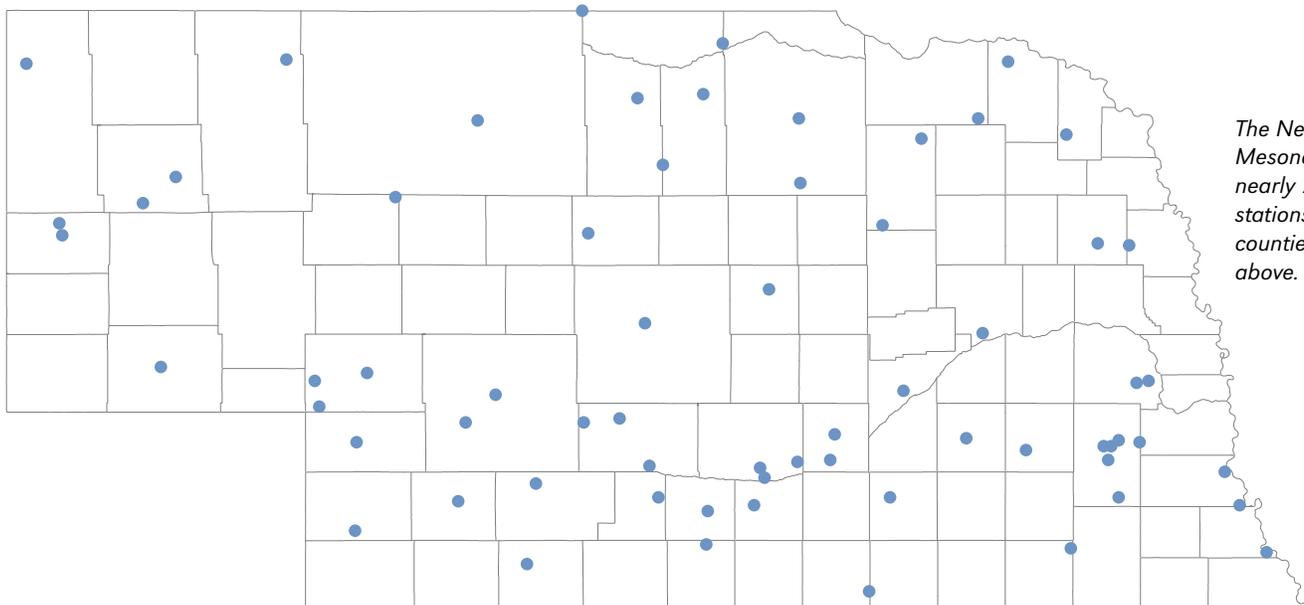


and Extension offices. Of great interest to all groups is the outlook, which interprets the NOAA Climate Prediction Center's 30- and 90-day precipitation and temperature prediction maps.

With the launch of the Nebraska State Climate Office in January, one of our main goals was to make sure information is easily accessible to users. Currently, the monthly summary is released in PDF form through our website, nsco.unl.edu.

Get the latest edition here: <https://nsco.unl.edu/october-2016-nebraska-climate-summary-available>

Look for the release of November data edition soon.



The Nebraska Mesonet has nearly 70 stations in 46 counties, shown above.

MESONET NETWORK CONTINUES TO GROW

The Nebraska Mesonet is a state-wide weather observation network that began in 1981 with just five stations.

It has grown to nearly 70 stations in 46 counties, and we've made it our goal to have at least one station in each of Nebraska's 93 counties.

Originally a network designed for the agriculture community, we've broadened our scope to serve as an environmental monitoring program. This means we are collecting and making available real-time data on:

- Air temperature
- Humidity
- Wind speed and direction
- Precipitation
- Solar radiation
- Soil temperature and moisture
- Barometric pressure.

During this year's annual maintenance schedule, we upgraded all stations so data would update hourly on our website, mesonet.unl.edu. In the coming years, we will continue modernizing our stations by adding soil temperature and moisture readings at depths of 2, 4, 8, 20 and 40 inches below grass.

As funds become available, tower observation stations may be installed at select sites across the state. We've



SHAWNNA RICHTER-RYERSON | NSCO

already installed one at our research and development site at Rogers Farm, University of Nebraska-owned property east of Lincoln, and another on the university's East Campus. These towers, in contrast to our tripod configuration, will give us a perspective of how temperature and winds fluctuate with

height; sensors are installed at 30 feet, in addition to the standard 6 feet and 9 feet on our tripod configuration.

Our network is supported by the State of Nebraska in collaboration with the Department of Natural Resources and the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln. Many agencies and individuals, such as Nebraska's Natural Resource Districts, contribute to network operations through service agreements for specific stations.

This support helps us maintain the highest caliber, research-grade system possible. The equipment and sensors are regularly calibrated by our in-house mesonet manager, Glen Roebke, which assures the quality of the system and the information gathered.

NSCO charges the minimum possible to operate its stations. A new one costs \$15,000 for a standard tripod configuration and \$17,500 for a 10-meter tower. Annual recurring costs are \$2,600 per station for maintenance, calibration and upkeep. A complete cost breakdown is available upon request.

For more information on how to get a tower in your county, visit mesonet.unl.edu.

WHERE TO FIND US

Our schedule is busy heading into the new year, and we have a number of talks and meetings with stakeholders planned through March, when our next newsletter will be released. We look forward to seeing you!

AL DUTCHER, OUT AND ABOUT

Agriculture Extension Climatologist Al Dutcher has dozens of talks planned in the upcoming months. Here are a few highlights of where he'll be and what he'll be talking about between now and March:

Dec. 13, Lincoln: Curry Group – Agricultural Weather Outlook

Dec. 15, Lincoln and Dec. 20, Beatrice: Producer Hybrids – Agricultural Weather Outlook

Dec. 14, York: Upper Big Blue NRD – Agricultural Weather Outlook

Jan. 6, North Platte: UNL Beef Focus Working Group – Climate Trends for Nebraska

Jan. 6, York and Jan. 20, Kearney: UNL Crop Production Clinics – Agricultural Weather Outlook and Mesonet Trend Analysis

Jan. 24, Beatrice: Southeast Community College (Beatrice Campus) – Agricultural Weather Outlook

Jan. 25, North Platte, and Jan. 26, Kearney: Nebraska Sorghum Growers Association – Agricultural Weather Outlook

Jan. 27, Lincoln: LEAD Group – Climate of Nebraska

Jan. 31, Holdrege: Holdrege Water Conference – Keynote Speaker – Agricultural Weather Outlook

Feb. 9, Buffalo County Fairgrounds: Central Platte NRD Water Programs Conference – Agricultural Weather Outlook

Feb. 13, Kearney and Feb. 15, North Platte: Pioneer Seeds – Agricultural Weather Outlook

Feb. 14, Beloit: Farmway (Beloit, Kansas) – Agricultural Weather Outlook

Feb. 28, Shickley: Lower Big Blue NRD – Climate Change

CROP PRODUCTION CLINICS

We're on the agenda for the upcoming Crop Production Clinics scheduled for across the state and hosted through University of Nebraska-Lincoln's Department of Agronomy. Register for a clinic at agronomy.unl.edu/cpc.

Jan. 4, Gering: Gering Civic Center, 1050 M St., Gering

Jan. 5, North Platte: Sandhills Convention Center, 102 S. Jeffers, North Platte

Jan. 6, York: Holthus Convention Center, 3130 Holen Rd, York

Jan. 10, Beatrice: Beatrice Country Club, 1301 Oak St., Beatrice

Jan. 11, Hastings: Adams County Fairgrounds, 947 S. Baltimore, Hastings

Jan. 12, Mead: Saunders County Extension Office, ARDC (Mead) 1071 County Road G, Ithaca

Jan. 17, Atkinson: Atkinson Community Center, 206 W. 5th St., Atkinson

Jan. 18, Norfolk: Lifelong Learning Center, NECC, 601 E. Benjamin Ave., Norfolk

Jan. 19-20, Kearney: Nebraska Crop Management Conference

77TH MIDWEST FISH AND WILDLIFE CONFERENCE

The 77th Midwest Fish and Wildlife Conference is an annual event that attracts more than 800 biologists and students from state, federal, and tribal natural resources agencies from the Midwest, Great Plains, Rocky Mountains and Canadian provinces.

There are nearly 400 technical presentations, poster displays, plenary sessions, networking opportunities and social events.

NSCO will be one of them.

Martha Shulski, along with the High Plains Regional Climate Center, is hosting a workshop titled "Integrating Weather and Climate Information Into Management Decisions" at **9 a.m. Feb. 5** at the Lincoln Marriott Cornhusker Hotel in Lincoln. The goal of this program is to discover how fish and wildlife professionals use climate information to instruct management decisions and where there may be gaps.



CLIMATE DATA & MUNICIPAL PLANNING WORKSHOP

Martha Shulski, with NSCO, and Natalie Umphlett, interim director of the High Plains Regional Climate Center, have paired up on a grant that helps cities prepare for changes in climate in their planning.

The workshop, tentatively titled Utilizing Climate Data to Inform Municipal Planning and Increase Resilience, is planned for **March 30 to 31** in Lincoln.

Cities that are confirmed on board for the municipal climate adaptation project are the following:

- Lincoln
- McCook
- Hays and Garden City, both in Kansas
- Kansas City and St. Peters, Missouri
- Sioux City, Des Moines and Dubuque, all in Iowa

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