# 2019-2020 ACTIVITY REPORT

In FY 2020, the State Climate Office of North Carolina (SCONC) has supported NC Cooperative Extension and the College of Agriculture and Life Sciences in three key areas:

**Data access and translation**: *Cardinal*, a new, tailor-made interface for accessing and interpreting weather and climate data for the state of North Carolina and a new API

**Education and training**: Custom workshops for NC Cooperative Extension and partners

**Monitoring**: Supporting the NC ECONet, a statewide weather network that takes 1.5M environmental observations a day

## **Data Access and Translation**

*Cardinal* (due early 2021), will serve as a high-powered, user-oriented, one-stop shop for North Carolina weather and climate data housed at SCONC. This system replaces CRONOS, a tool that was state of the art for its time, but no longer serves the increasingly sophisticated needs of our clientele.

*Cardinal* was designed with the goal of making weather and climate data more accessible to users, with features and prompts meant to take the guesswork out of station and parameter identification and selection. The system was designed with user feedback from engagements in 2019 and 2020, including partners from NC Cooperative Extension.

New features and upgrades in Cardinal include:

- A request builder interface, developed as a result of user engagement, that walks users through selecting locations, time periods, and weather data of interest.
- New relational databases that allow access of 4.5 TB of data stored at the State Climate Office

 A new Application Programming Interface (API) for users who need frequent access to large quantities of data for applications (e.g., phone apps, dynamic maps)

SCONC staff are finalizing the last pieces, which include a "view your requests" page, which allows users to access saved requests, and a new interface for user account creation and management. Due to delays associated with COVID-19, the launch has been delayed until 2021, but SCONC will continue to engage "super users" in the final phases and beta testing.

Other data access work with CALS faculty (Drs. Nelson and Saia) included a collaboration to retrieve data stored at the State Climate Office for the ShellCast app. Specifically, this web application will forecast growing area closures due rainfall events and alert growers who sign up for the pilot program.

| Parameter                | Hourly | Daily      | Monthly | More » |
|--------------------------|--------|------------|---------|--------|
| 🌡 Air Temperature        | Select | Select (3) | Select  |        |
| 式 Air Pressure           | Select | Select     | Select  |        |
| line Humidity            | Select | Select     | Select  |        |
| Precipitation            | Select | Select 🚺   | Select  |        |
| 式 Wind Speed & Direction | Select | Select     | Select  |        |
| 式 Wind Gust              | Select | Select     | Select  |        |
| Sky Conditions           | Select | Select     | Select  |        |
| Solar Radiation          | Select | Select     | Select  |        |
| Soil Temperature         | Select | Select     | Select  |        |
| Soil Moisture            | Select | Select     | Select  |        |
| Apparent Temperature     | Select | Select     | Select  |        |
| Or Degree Days           |        | Select     | Select  |        |
| Y Evapotranspiration     |        | Select     | Select  |        |
| 💋 Leaf Wetness           | Select | Select     | Select  |        |

The new interface simplifies the selection process for weather parameters (above). Feedback from beta users helped streamline this and other aspects of Cardinal.







# **Education and Training**

In 2019-20, the SCONC refined its efforts to provide education and training in climate, weather, and related areas of interest to Extension. We reached over 200 Extension Agents, Faculty, and partners through these efforts.

*County Workshops* - Duplin and New Hanover (August 2019)

- Climate patterns, accessing and interpreting information, and what to expect in the future
- Attendance from Master Gardeners, Extension Agents, and interested members of the public

State Cooperative Extension Conference - Raleigh (October 2019)

 Climate change and North Carolina 101 presentation, activity, and resources

#### К-12/4-Н

- Richmond County 4-H Science Adventures (October 2019)
- Weather Scavenger Hunt for 4-H Daily Spark (May 2020)

Following these workshops and associated evaluations, we developed a curriculum bank to use and apply for future workshops and trainings. Each time we engage with Extension personnel or the clients they serve, we collect feedback on climate needs and information gaps, and these continue to inform our future directions.

*Future directions*: One of the key needs identified from these interactions is that extension agents want information on how climate change affects North Carolina. SCONC plans to host an online workshop series aimed at Extension agents and specialists covering climate change in NC, including findings from the recently released NC Climate Science Report (July - October). In concert with these, we will publish factsheets designed to be quick-reference guides. A webinar with the Southern Fire Exchange (May 2020) provided an opportunity to pilot the content and delivery of this information over a virtual setting.

### Monitoring

The North Carolina Environment and Climate Observing Network (ECONet) is a network of 43 research grade weather stations maintained by the SCONC. This network is utilized by CALS faculty and graduate students, Public Safety agencies (e.g., National Weather Service, North Carolina Emergency Management), and NCARS staff. Approximately 22.3 million one-minute observations were recorded by ECONet stations in 2019.

New to the NC ECONet

- 9-meter temperature to inform emergent research and decision support on dicamba drift and inversions
- Black globe temperature, which offers NC Extension agents valuable data on extreme heat as it affects farmers and other outdoor laborers

# Possible Future Work

- Future-Ready Farmer's Almanac - updating the old classic with current climate data for agricultural decision making
- Wet Bulb Globe Temperature -Exploring collaborative proposals for understanding and measuring heat stress
- First, second, and false springs

   using data mining techniques to better understand late freezes and their impacts on NC
- Adaptation guides for foresters
- Exploring ways to support K-12 education in a post-COVID 19 world
- Coastal work with NC Sea Grant and Cooperative Extension

|  | Jeff Chandler<br>⊜jhchandl   |                 | Ň |  |  |
|--|--|-----------------|---|--|--|
| May 10. Mother's Day. Current conditions: temps rising from a low of 29.5F. Below freezing temps for 3+ hours. |  |                 |   |  |  |
| Frost<br>again,  | Frost protecting apples 🍎 by overhead irrigation,<br>again, with help of data from ECONet @NCSCO |                 |   |  |  |
| 6  | :37  | 11 <del>-</del> | - |  |  |
| ۸A   | e climate  | e.ncsu.edu      | C |  |  |
| CLIMATEOFFICE  |  |                 |   |  |  |
|  | SELECT A PAGE  |                 |   |  |  |
|  | Currentl   | y at FLET       |   |  |  |
| Μ  | Mtn Horticultural Crops Res Stn<br>in Mills River, NC  |                 |   |  |  |
|  | Choose a different station:  |                 |   |  |  |
|  | FLET - Mills River, NC   |                 |   |  |  |
|  | From today at 6:35 AM<br>(2 minutes ago)   |                 |   |  |  |
| Ai   | r Temp.:   | 29.5°F          |   |  |  |
| Re   | l. Humidity:   | 93%             |   |  |  |
| W  | inds:  | Calm            |   |  |  |
| 24   | 24-Hr. Precip.: None   |                 |   |  |  |
|  | More information from this station   |                 |   |  |  |

ECONet data supports a variety of agricultural decisions across the state.