

Innovating Drought Communications with North Carolina Stakeholders

Corey Davis

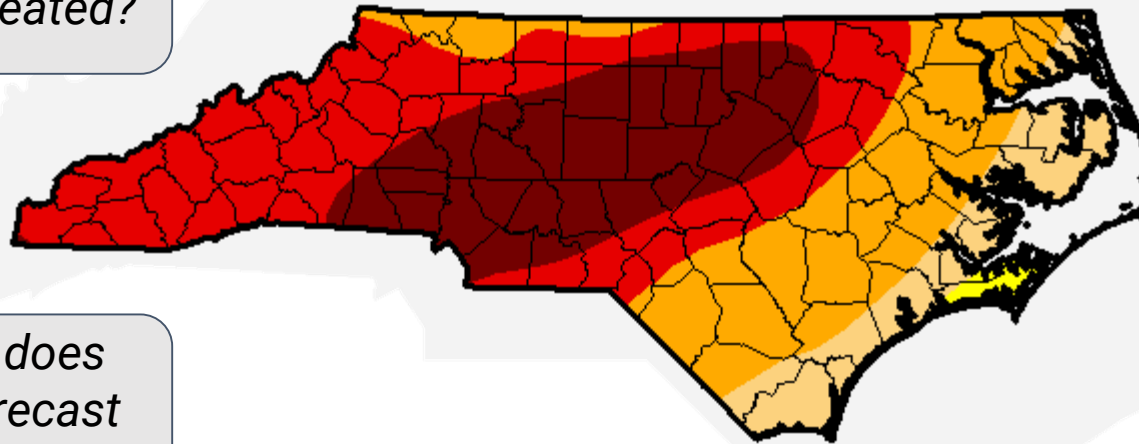
Applied Climatologist
State Climate Office of North Carolina

Project Background

How was this map created?

Who is discussing drought in NC, and how often?

*How is this affecting **my** sector?*



What does the forecast show?

*Why doesn't this map reflect conditions I'm seeing in **my** area?*

How can I find out about local conditions?

Project Background

Goal: Provide *relevant*, *accessible*, and *actionable* drought-related information to decision makers in the *agriculture*, *forestry*, and *water resources* sectors

Official Title: *“Innovating Approaches to Drought Communications with North Carolina Decision Makers”*

Code Name: *Project Nighthawk*

Project Team: Rebecca Ward (SCO),
Kirsten Lackstrom (CISA)

The common nighthawk. Photo by Andy Reago and Chrissy McClarren, shared under CC BY 2.0.



Project Nighthawk Phases

Fall 2018

Summer 2020

Phase 1

Identify

Refine priorities for new products with project partners and target audiences

Phase 2

Develop

Develop tailored information and communication prototypes

Phase 3

Evaluate & Refine

Assess prototypes with stakeholder assessment and engagement, refine and enhance information and communication deliverables

Phase 4

Implement & Integrate

Integrate and implement communication strategies

Phase 5

Evaluate

Evaluate project activities and outcomes

Water Resources Sector



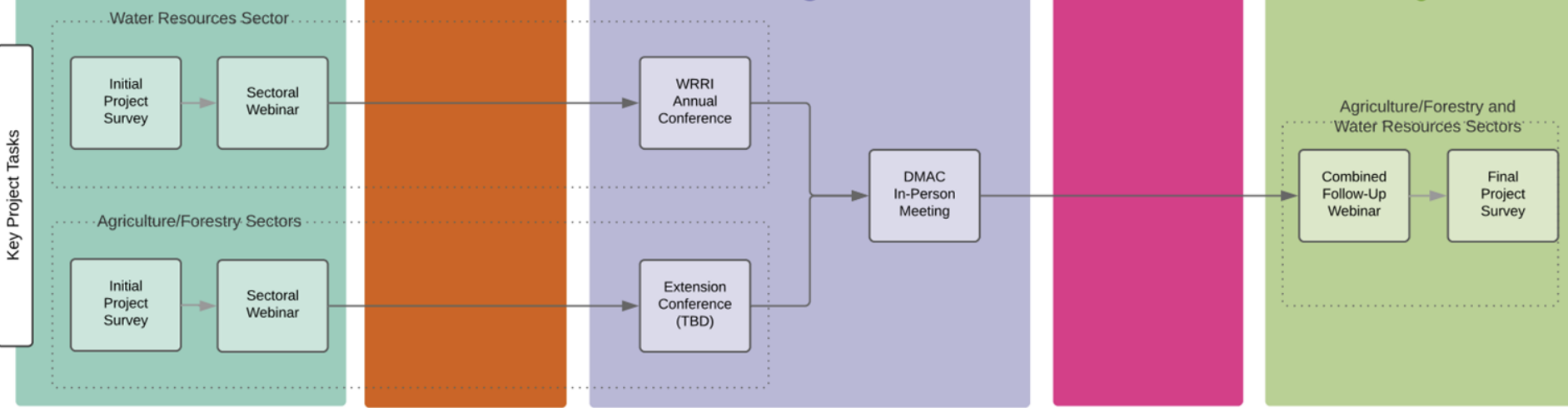
Agriculture/Forestry Sectors



Agriculture/Forestry and Water Resources Sectors



Key Project Tasks

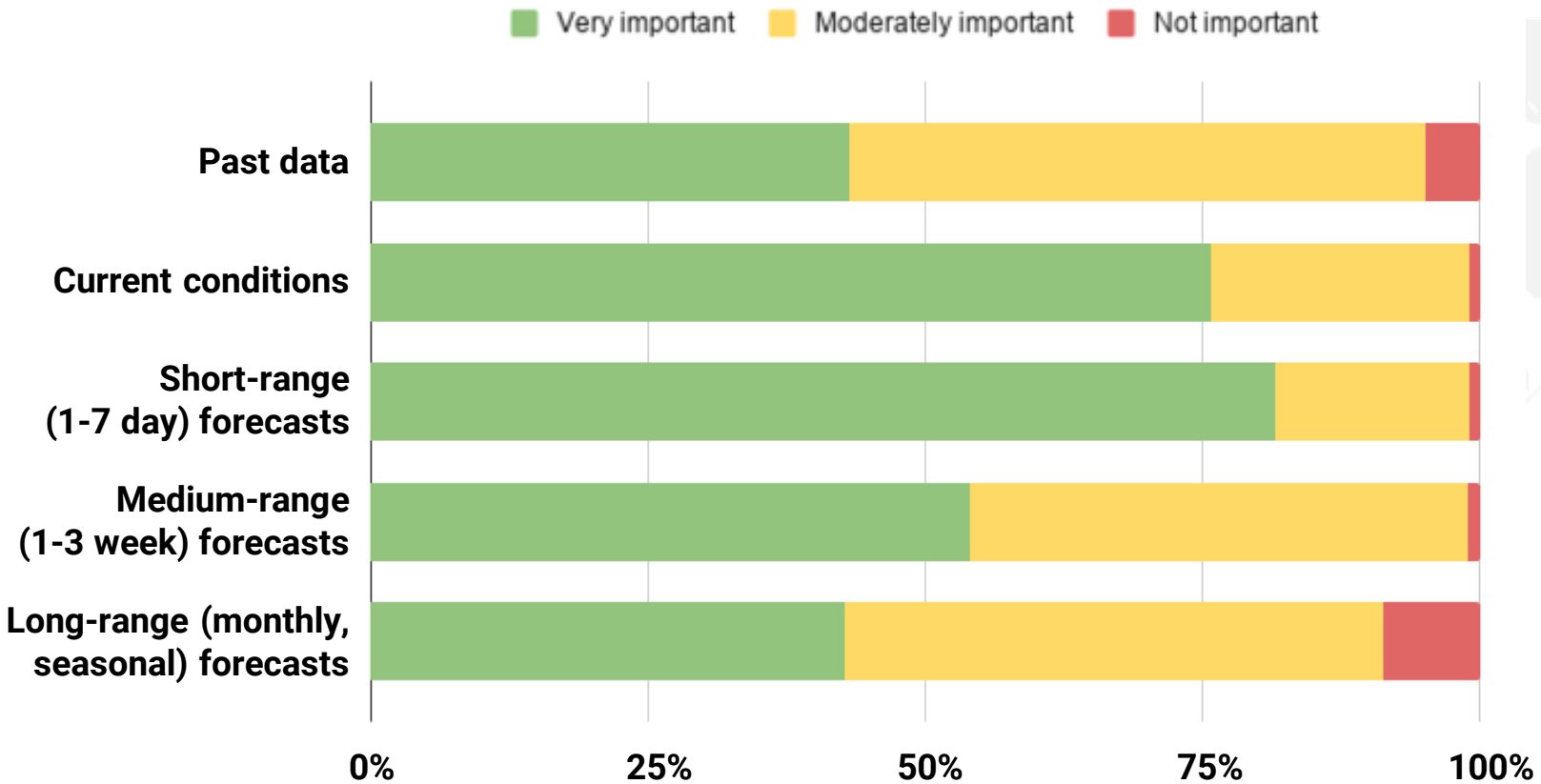


Pre-Project Surveys

- Last September, we sent **501 survey invitations** to representatives from our target sectors
 - NC Cooperative Extension agents & specialists
 - NC Forest Service regional & district foresters
 - Managers of large public water systems
- **140 surveys** were fully or partially completed (28%)

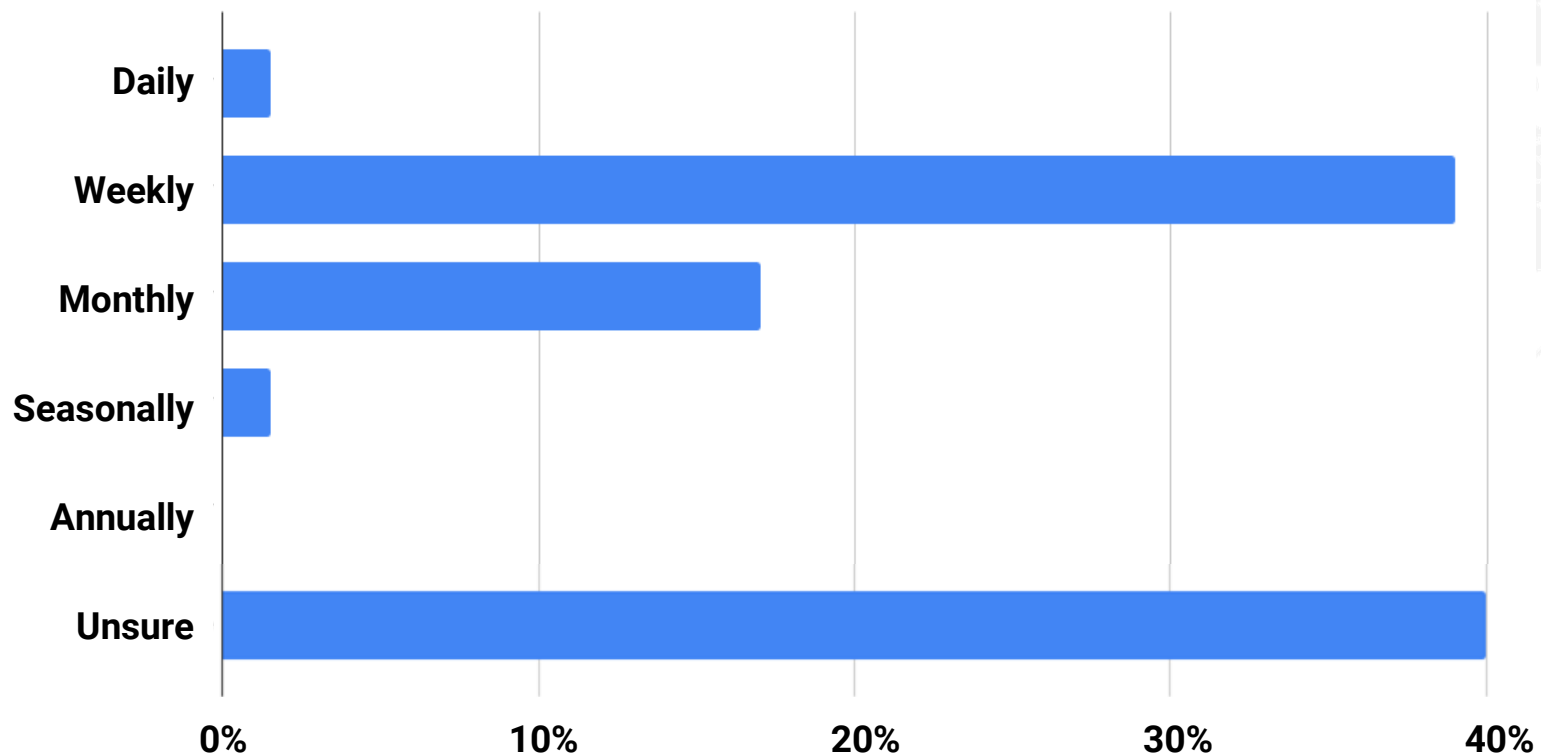
Information Timescales

For your sector, how important are the following types of weather, climate, and drought info.?



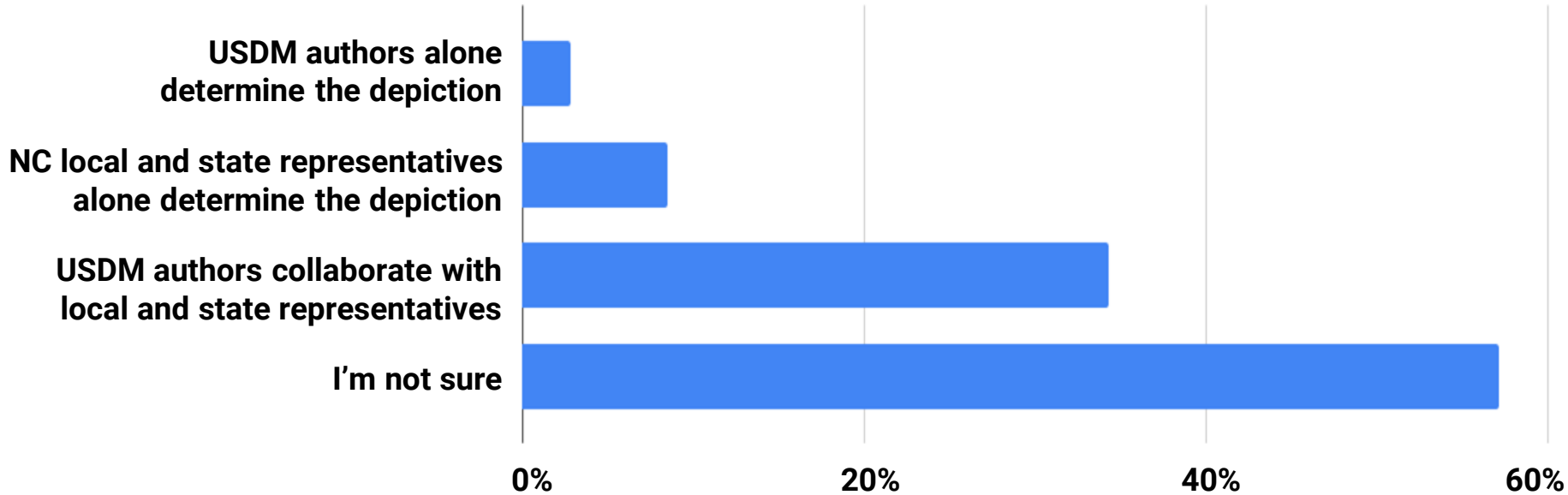
Drought Monitoring

To your knowledge, how often is the US Drought Monitor updated?



Drought Monitoring

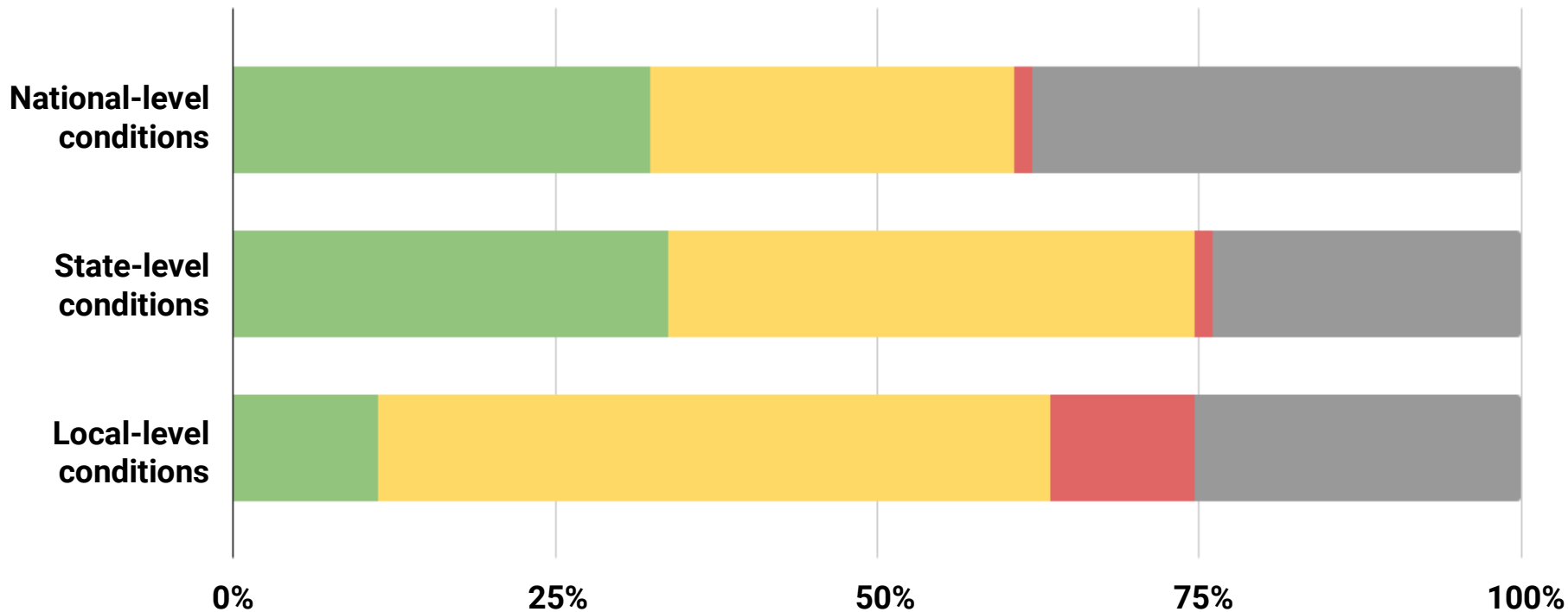
To your knowledge, how is the US Drought Monitor's depiction of conditions in North Carolina determined?



US Drought Monitor

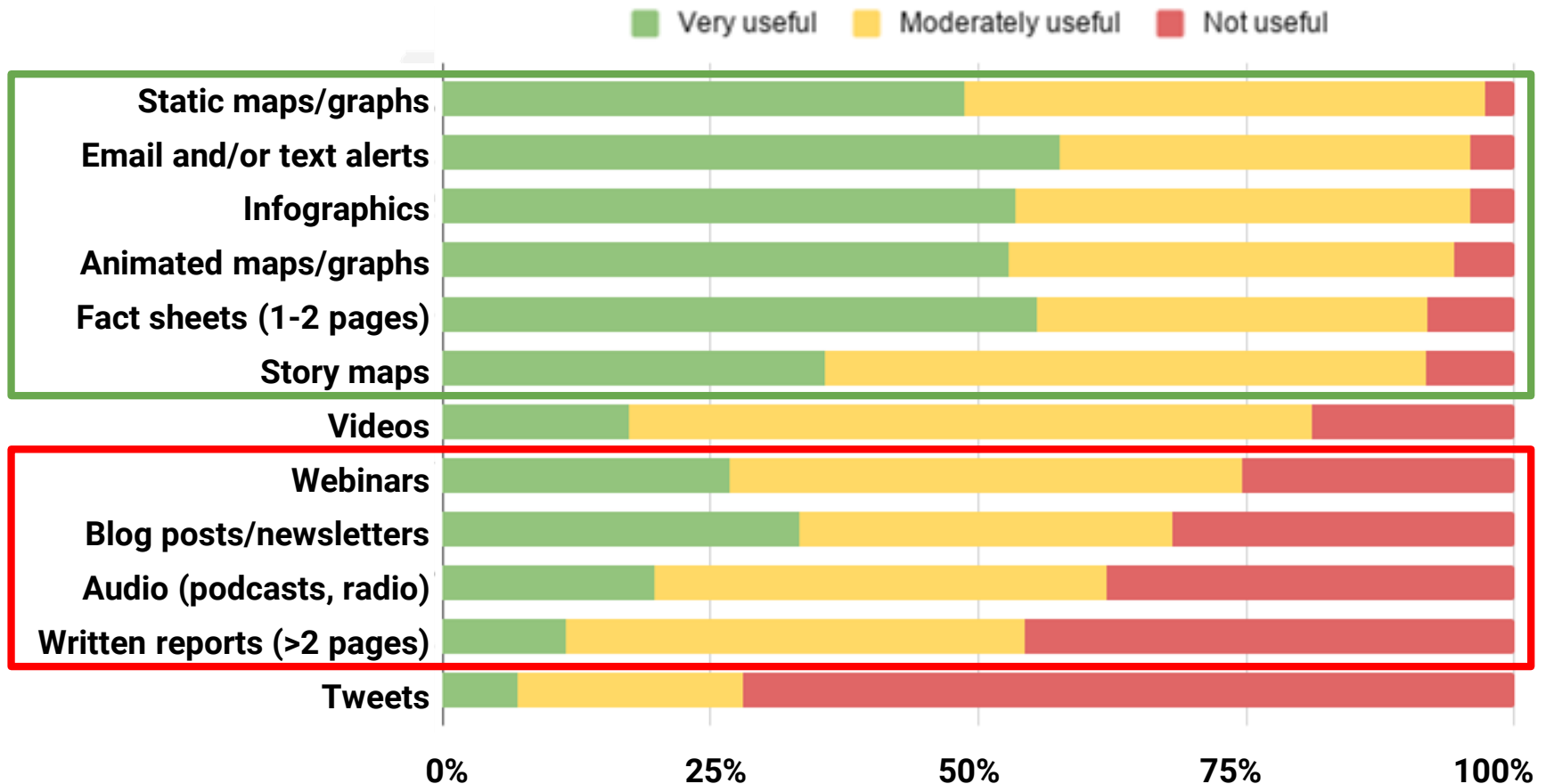
How would you rate the accuracy of the US Drought Monitor in capturing:

Very accurate Moderately accurate Not accurate Unsure



Communications Channels

Please rate how useful each drought information format is for you.



Weekly Drought Updates

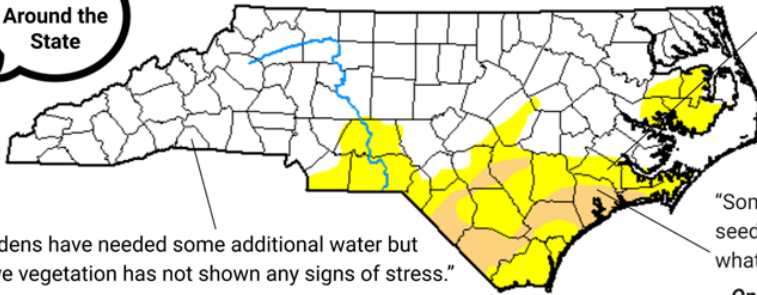
North Carolina Drought Update

For the week ending August 20, 2019

This Week's Drought Monitor of North Carolina Map

From the US Drought Monitor, authored by Jessica Blunden (Ntl. Centers for Environmental Information) with input from the North Carolina Drought Management Advisory Council (ncdrought.org)

Heard Around the State



"Gardens have needed some additional water but native vegetation has not shown any signs of stress."

CoCoRaHS Condition Monitoring Report, Polk County

"Rainfall ranging from 1.5 to 4.5 inches limited harvest of corn and tobacco a well as cutting of hay. However, past rainfall within the last ten days has improved growing conditions."

Mike Carroll, Craven County Extension

"Some soybean fields look sparse since seed didn't come up a few weeks ago, but what did come up looks happier now."

Onslow County Extension

Statewide Condition Summary

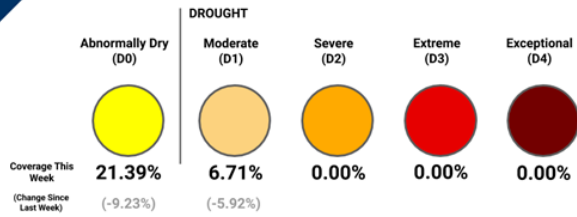
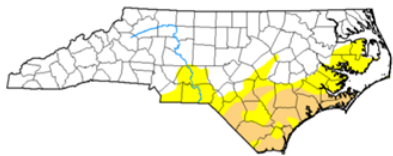
Rain last weekend helped improve drought conditions in many areas, although Moderate Drought remains in the southern Coastal Plain. Elsewhere, a few hot, dry weeks has parts of the western Piedmont on the verge of Abnormal Dryness.

Good News: Heavy rainfall along the coast led to improvements in short-term streamflow conditions. Three-month precipitation deficits in places such as Wilmington were effectively cut in half.

Bad News: While conditions improved with last week's rainfall, longer-term dryness continues to impact crops planted earlier this summer.

Relief on the Way: Forecasts show more rain possible across the state this weekend as a cold front sags southwards. Tropical development is also becoming more likely as we near the typical peak of hurricane season.

Last Week's Drought Map



A PRODUCT OF PROJECT NIGHTHAWK
<https://climate.ncsu.edu/nighthawk>



PROJECT NIGHTHAWK



NORTH CAROLINA CLIMATE OFFICE



Short-Range Outlooks

Short-Range Outlooks for North Carolina

Week 1: June 12 to 16

Forecast Confidence



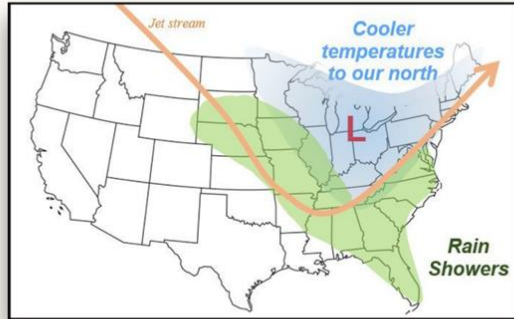
There is agreement between different forecast models over the US, but some discrepancies regarding timing exist.

Cooler Weather Approaches: After the brief heatwave at the end of May and early June, a low is predicted to move into the eastern US, bringing cooler temperatures.

Rain Rushes In: The eastern US has been bereft of rain for a month, the incoming system is likely to bring rain to eastern Carolina.

Main Weather Patterns

Week 2: June 14 to 20



Forecast guidance from the NWS Climate Prediction Center

Forecast Confidence



There is consistency between models, but the exact evolution of this pattern during week 2 is uncertain

Cooler Weather Begins to Fade: As the week continues, the low pressure system will begin to move northward, taking the cool weather with it. However, there is still a chance for cool weather throughout the western Carolinas.

Rain Branches Out: A jet stream diving southward over the central US will bring storm systems up the Appalachians, allowing for higher chances of rain across the eastern US.

Week 2: June 14 to 20



Forecast guidance from the NWS Climate Prediction Center

Weeks 3 and 4: June 22 to July 5

Forecast Confidence



Both the temperature and precipitation forecasts have high levels of agreement throughout various models.

Temperature: As the month progresses, temperatures are expected to trend around the typical for this time of year.

Precipitation Chances Decline: After a brief relief from dry conditions, the likelihood of rain begins to decline as high pressure builds.



Forecast guidance from the NWS Climate Prediction Center



<http://climate.ncsu.edu/nighthawk>



NC DMAC Background

A Story Map



DMAC Weekly Process

Water

The DMAC assesses hydrologic conditions using streamflow, groundwater, and surface reservoir levels from across the state. These data are explored in conjunction with historical information for the given month or day, as well as any water management actions that may influence them.

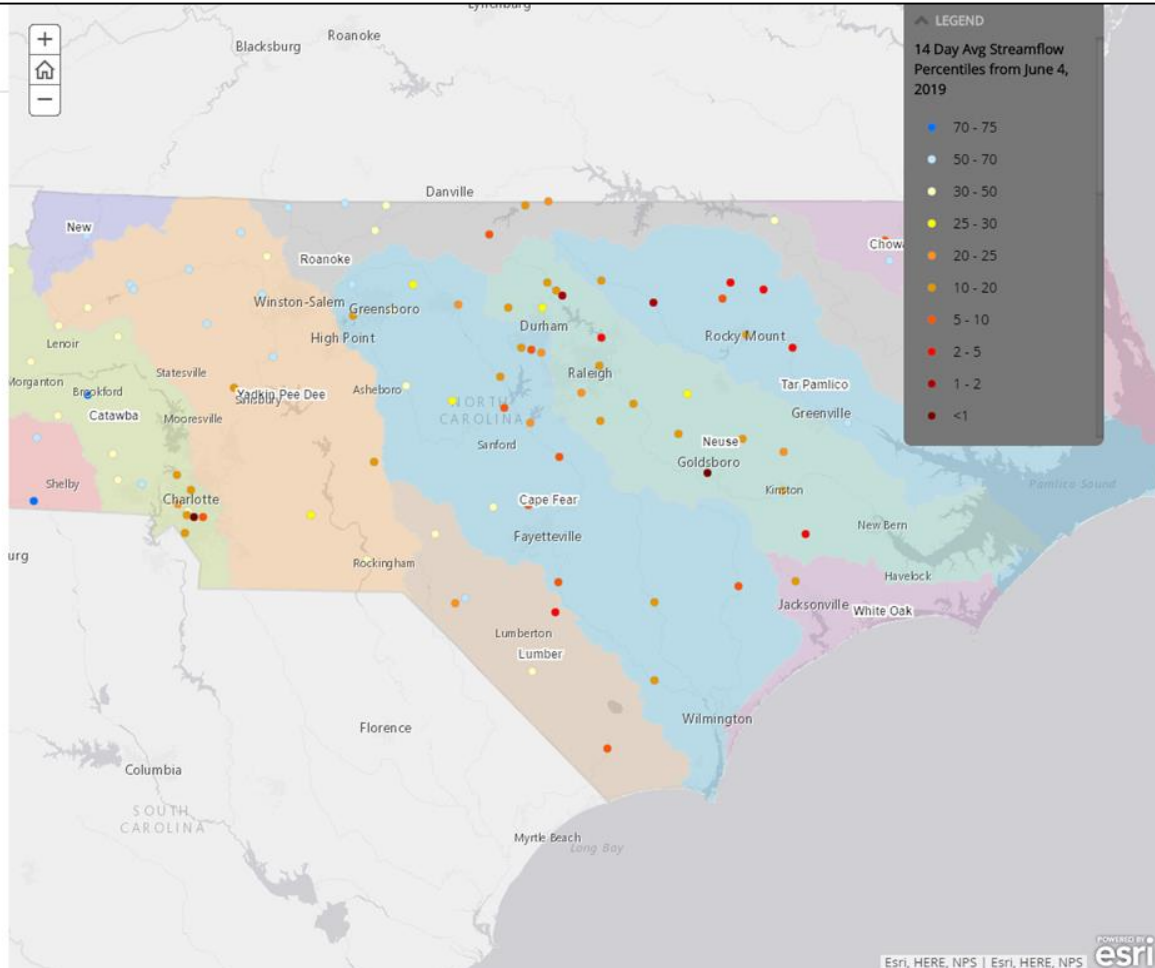
The NC DMAC examines streamflows over multiple periods to identify short- to long-term patterns in hydrologic conditions. For example, a 7-day averaging period would indicate how streamflow levels are responding to more-recent weather events, while 28-day average streamflows are used to gauge longer-term trends in hydrologic status.

The **United States Geological Survey (USGS)** provides information about streamflow and groundwater levels and percentiles. Percentiles place current values within a historical context, facilitating drought assessment. The map to the right shows 14-day averaged streamflow percentiles for USGS gauges. In general, values around 25-75 are considered "near normal," values below 25 are considered "below normal," and anything below 10 would be considered "much below normal." Notice how much of eastern North Carolina has streamflows that are less than the 25th percentile, with a few places below the 10th percentile, indicating below and much below normal conditions at this timescale.

The **NC Department of Environmental Quality (DEQ), Division of Water Resources (DWR)**, alongside USGS, monitors groundwater levels across the state and shares this information with the DMAC. These data are combined with other hydrologic information, such as streamflow levels, to calculate estimates for baseflow.

Much of western and central North Carolina rely on surface reservoirs (man-made lakes) for water supply. Several groups provide reservoir operations information to the NC DMAC.

Chief among these is the **US Army Corps of Engineers (USACE)**, a federal agency under the Department of Defense. Within North Carolina, the USACE manages five dams and four river basins.



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Next Steps

- Continue updating the new NC DMAC website
- Create weekly drought updates and outlooks
- Conduct usability testing of prototypes
- Final webinar and survey

North Carolina
Drought Management Advisory Council

CURRENT CONDITIONS > NEWS & UPDATES MAP ARCHIVES EDUCATION ABOUT CONTACTS

Current Conditions
as of September 10, 2019 at 8am ET

US Drought Monitor of North Carolina

USDA NDMC NCEM NOAA

Drought Classifications

- D0 - Abnormally Dry
- D1 - Moderate Drought
- D2 - Severe Drought
- D3 - Extreme Drought
- D4 - Exceptional Drought

S - Short-Term impacts, typically less than 6 months (e.g. agriculture, grasslands)
L - Long-Term impacts, typically greater than 6 months (e.g. hydrology, ecology)

North Carolina Drought Advisory

The North Carolina Drought Advisory issued by the Drought Management Advisory Council has been updated to reflect drought conditions on **September 10, 2019** indicated on the weekly U.S. Drought Monitor of North Carolina.

Until further notice, the NC DMAC strongly urges the implementation of the following drought response actions - in addition to previous advisories - for all water users located in or dependent on water resources from the areas of the state experiencing the following drought conditions:

D0 - Abnormally Dry

- Alleghany
- Anson
- Ashe
- Avery
- Burke
- Cleveland
- Gaston
- Granville
- Hoke
- Lincoln
- Mitchell
- Northampton
- Orange
- Person
- Polk
- Richmond
- Robeson
- Rowan
- Rutherford
- Scotland
- Stokes
- Surry
- Union
- Vance
- Warren
- Watauga
- Wilkes
- Yadkin
- Yancey

Total: 29

www.ncdrought.org

Takeaways for State Drought Committees

- Do people understand how the drought monitoring process works in *your* state?
 - Only ~33% do in North Carolina
- Do you have a state drought website? Is it easy to use?
 - Consider story maps for sharing background information

Takeaways for USDM Authors

- People **DO** look at the US Drought Monitor!
 - It informs decisions about planting, harvesting, forest management, water conservation, etc.
- But the raw maps don't have context about the potential impacts or response
- Only ~10% of respondents consider local conditions very accurately represented

Takeaways for Info. Intermediaries

- People prefer partially translated or synthesized information
 - Not time-consuming or text-heavy formats
- Which communication and delivery formats work best for your audience(s)?
 - Use a combination, such as web-based and email
- Where does social media fit in?



Thank you!

<https://climate.ncsu.edu/nighthawk>