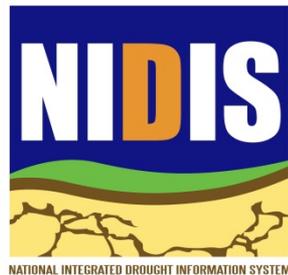


# The Coastal Carolinas Drought Early Warning System (DEWS) Program

Kirsten Lackstrom  
Carolinas Integrated Sciences & Assessments



# Drought and coastal ecosystems



- “Coastal Drought”
  - Changes in the availability and timing of freshwater to support animals, plants, and habitats
  - Changes to water quality conditions, particularly increasing salinity levels and fluctuations
- Drivers
  - Rainfall
  - Freshwater inflows
  - Tidal regimes

# Scoping Workshop



- Wilmington, NC, Summer 2012
- Priorities
  - Evaluate and develop drought indicators for coastal ecosystems
  - Facilitate the use of drought forecasts and other products for decision making
  - Improve drought impacts monitoring and reporting

# Activities



- Indicators and tools
  - Coastal salinity index (CSI)
  - Ecological indicators of drought
  - Coastal zone fire risk (NC)
  - Blue crab fishery forecast (SC)
- Hydroclimate extremes atlas
  - Duration, frequency, intensity of drought and high rainfall events
- Impacts: CoCoRaHS-condition monitoring project
  - Drought onset and recovery
- Engagement
  - CSI Workshop (2014)
  - Interviews
  - 50+ presentations



# Atlas of hydroclimate extremes

## Carolinas Precipitation Patterns & Probabilities

### An Atlas of Hydroclimate Extremes

#### Carolinas-wide

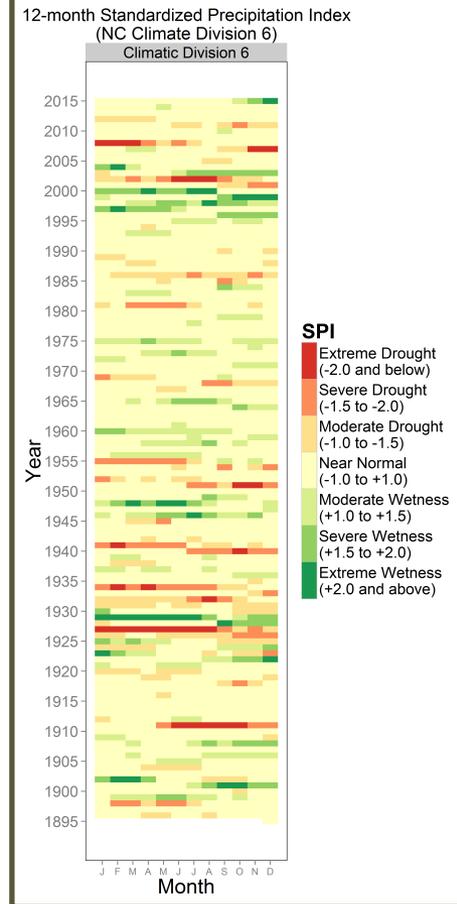
- [Average precipitation](#)  
1895-2014 Precipitation (Monthly Data); 2002-2014 Precipitation (Daily Data); Annual Precipitation by Year (Daily Data); Summer Precipitation by Year (Daily Data)
- [Drought return periods \(contour 1\)](#)
- [Drought return periods \(contour 2\)](#)
- [Drought indexes](#)  
PDSI; PHDI; PMDI; SPI1; SPI2; SPI3; SPI6; SPI9; SPI12; PI24; ZNDX
- [Recurrence intervals](#)

#### Climate Divisions

- [NC drought indexes](#)  
PDSI; PHDI; PMDI; SPI1; SPI2; SPI3; SPI6; SPI9; SPI12; PI24; ZNDX
- [SC drought indexes](#)  
PDSI; PHDI; PMDI; SPI1; SPI2; SPI3; SPI6; SPI9; SPI12; PI24; ZNDX

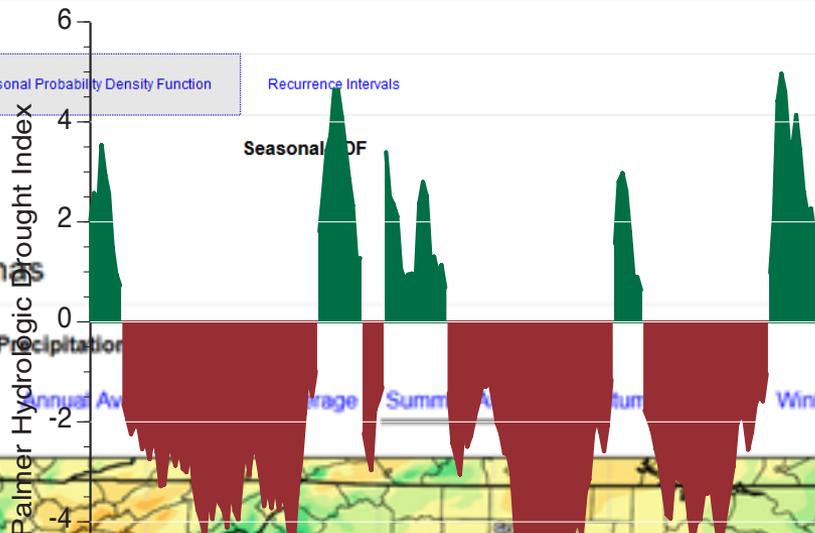
#### Individual Stations

- [Albemarle example](#)  
SPIs; Probability density function of seasonal precip; Probability density function of duration; Intensity-duration-frequency curves



# Albemarle

- SPIs
- Probability Density Function
- Seasonal Probability Density Function**
- Recurrence Intervals



## Average Precipitation in the Carolinas

1895-2014 Precipitation (Monthly Data)

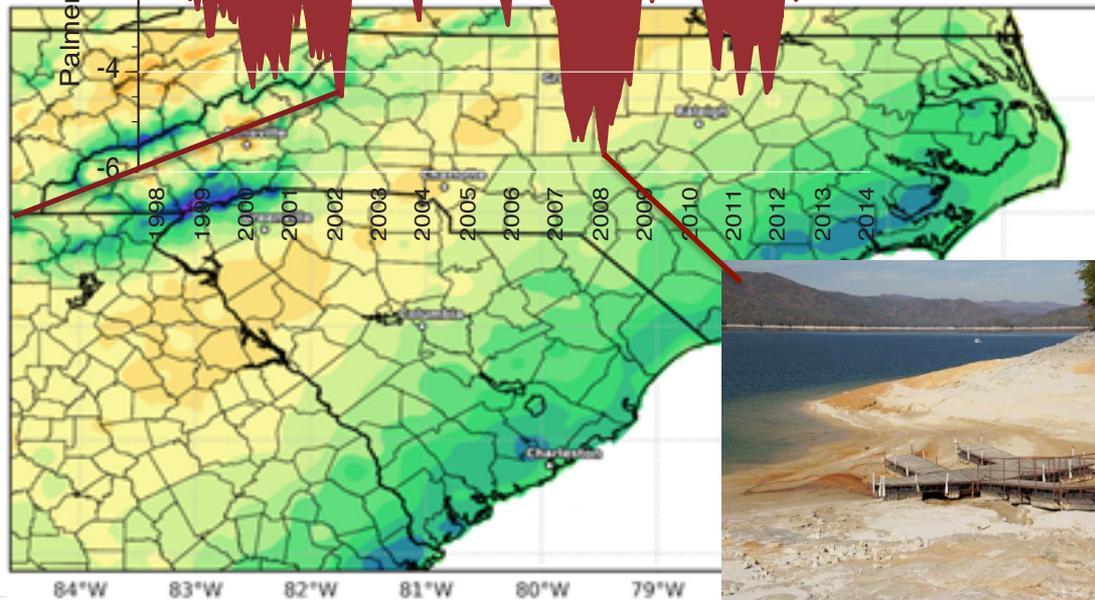
2002-2014 Precipitation (Daily Data)

Annual Precipitation by Year (Daily Data)

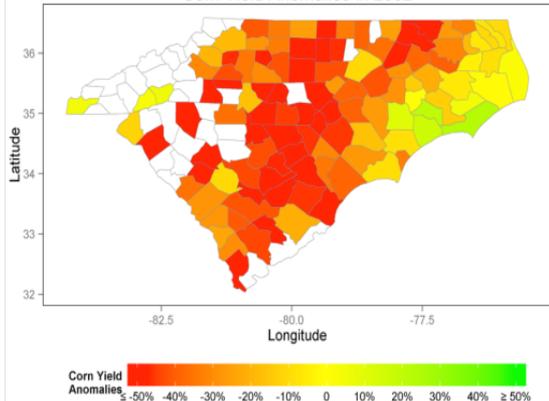
Summer Precipitation by Year (Daily Data)

1895-2014 Precipitation

Annual Average Summer Average Autumn Average Winter Average



Corn Yield Anomalies in 2002



# CoCoRaHS Citizen Science Condition Monitoring Project

- Improve understanding of impacts
- Assess the usefulness of citizen science engagement as a means to monitor drought conditions and inform decisions
- Uses existing tools
- Sept 2013-Dec 2015
  - 68 volunteers
  - 1500+ reports



CoCoRaHS COMMUNITY COLLABORATIVE RAIN, HAIL & SNOW NETWORK  
"Because every drop counts"

Home | States | View Data | Maps My Data Entry | Login

Welcome to CoCoRaHS! "Volunteers working together to measure precipitation across the nation."

**CoCoRaHS March Madness 2015**  
March 1–31, 2015  
How many new volunteers can you recruit in your state?

6,914 daily precipitation reports received today as of 3/12/2015 1:50 PM EDT

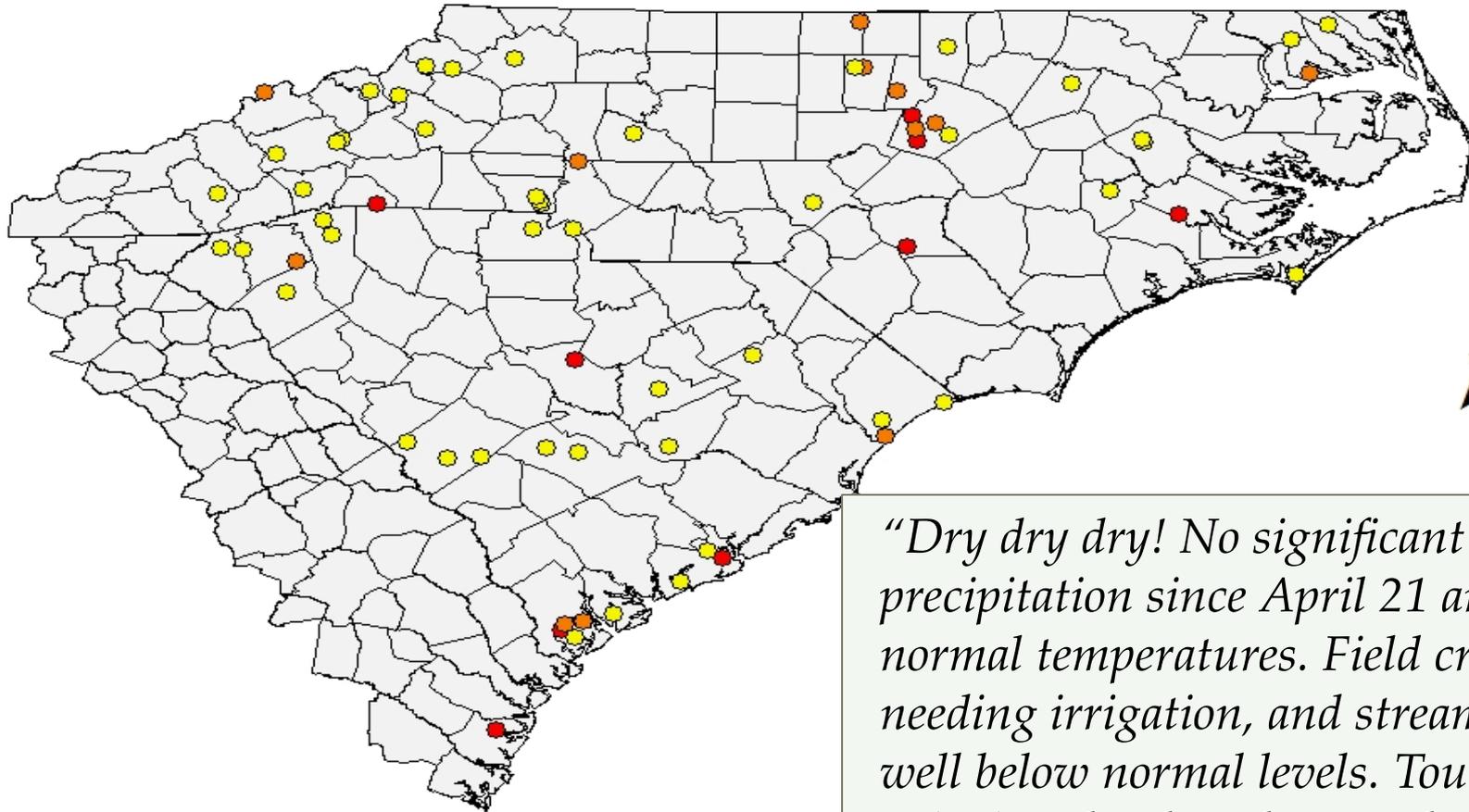
Daily Precipitation (inches x.xx)  
USA  
3/12/2015

0.0
Trace
0.00 - 0.31
0.32 - 0.62
0.63 - 1.55
1.56 - 3.73
3.74 - 5.60
5.61 - 6.23

Things to know about...

- Rain
- Hail
- Snow

## Condition Monitoring Reporter Locations, September 2013-December 2015



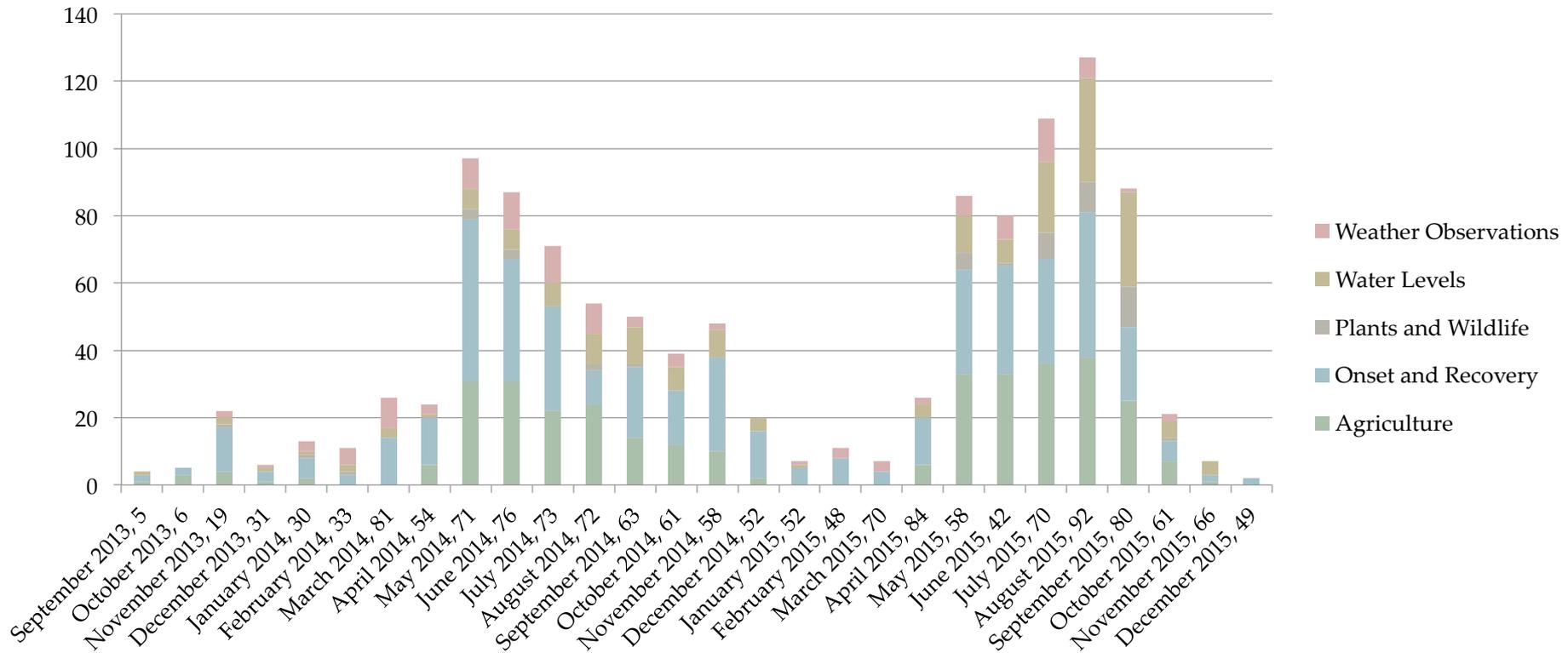
*“Dry dry dry! No significant precipitation since April 21 and above normal temperatures. Field crops are needing irrigation, and streams are well below normal levels. Tourists are enjoying the clear dry weather, tho hiking is dusty and sneezy! Pollinators are few and far between.”*

May 11, 2015

Buncombe County, NC

# Regular Condition Monitoring

**Number of References to Dry Conditions**  
(Numbers is x-axis labels indicate reports submitted for the month)



# Phase Two

- Based on feedback from decision makers
- Condition scale bar
- Web map



**Condition Monitoring Report Form** Submit Data Reset

**Station Number :** SC-RC-51  
**Station Name :** Columbia 6.6 SE

Condition monitoring reports are submitted on a regular (weekly, biweekly, monthly) basis to share information about the effects of local precipitation on the environment and society. By submitting reports on a regular basis, you create a baseline to see change through time, such as seasonal differences or changes caused by more or less precipitation. Please refer to the [Condition Monitoring training slide show](#) for more information.  
*\* indicates required field*

**Report Date \***  
4/22/2016

**Condition Scale Bar** [More information on the scale bar](#) Clear Scale Bar

Severely Dry	Moderately Dry	Mildly Dry	Near Normal	Mildly Wet	Moderately Wet	Severely Wet
<input type="radio"/>						

**Description**  
Please provide a description of how dry, normal or wet conditions are affecting you, your livelihood, your activities, etc. \*

**Report Categories**  
Please check at least one report category. If you check a category, please provide supporting information in the description. [More information on condition monitoring categories.](#)

- General Awareness
- Agriculture
- Business And Industry
- Energy
- Fire
- Plants And Wildlife
- Relief Response
- Society And Public Health
- Tourism And Recreation
- Water Supply And Quality

Submit Data Reset

# Condition Monitoring Web Map

[www.cisa.sc.edu/webmap](http://www.cisa.sc.edu/webmap)

