

# Improving the Characterization of Drought and Understating of Impacts on Water and Ecological Resources

Greg Carbone, Kirstin Dow, Kirsten Lackstrom, Dan Tufford

15 March 2012

## CAROLINAS INTEGRATED SCIENCES & ASSESSMENTS

# About CISA

CISA principal investigators and staff are based at

- NOAA Southeast Regional Climate Center, UNC-Chapel Hill
- NC Sea Grant and SC Sea Grant Consortium
- University of South Carolina (main program office)

Supported by NOAA's Regional Integrated Sciences and Assessments (RISA) program in the Climate Programs Office. Current Funding: 2011–2016



# Drought

- Dynamic Drought Index Tool (DDIT)
- Salinity Intrusion Project
- Drought and Coastal Ecosystems State of Knowledge Report
- NIDIS Pilot Project



# DYNAMIC DROUGHT INDEX FOR BASINS IN NORTH AND SOUTH CAROLINA

Home Drought Indices Help Contact Us

## Steps

- ☒ Select time scale
- ☒ Select drought index
- ☒ Select display type

## Result Map

Station List

Create Graph

Create Table

Status: Feature selected

Hide Tools

Hide Layers

Hide Legend

X: 505,951 m Y: 3,835,002 m

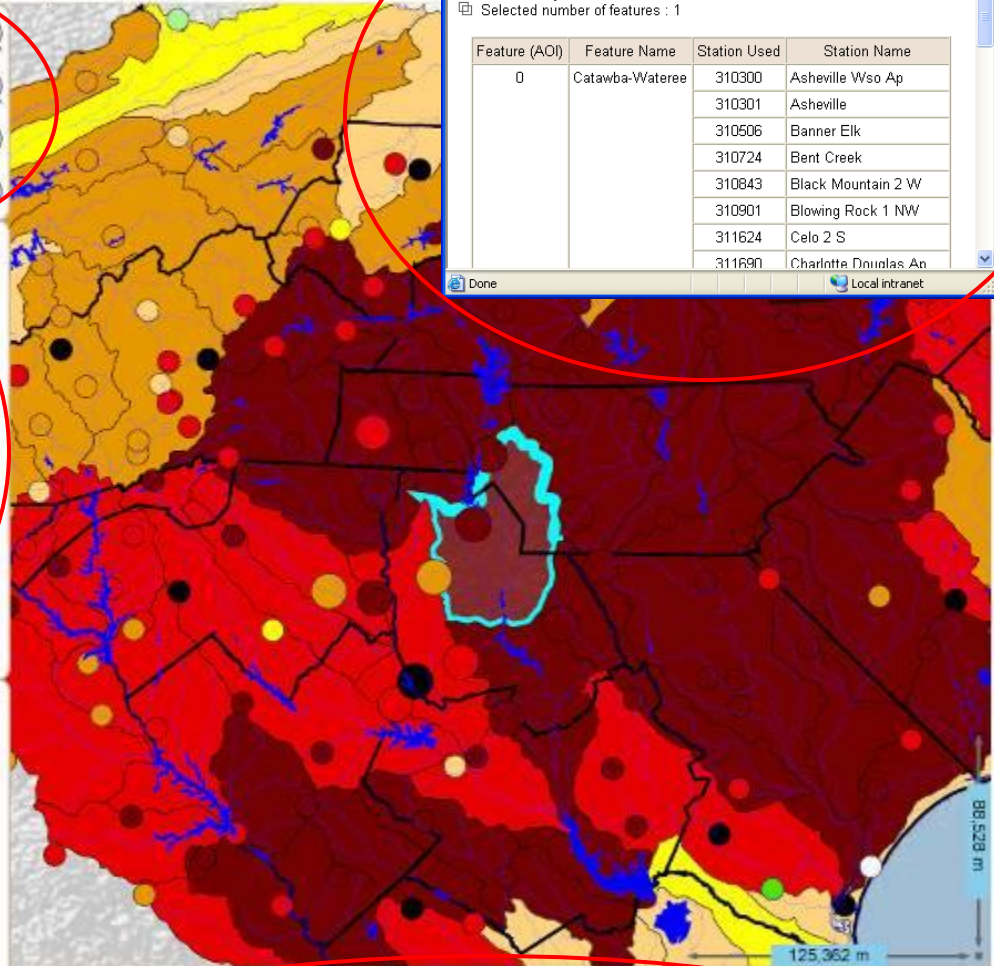


- Layer
- ☐ USGS Stream Gages
  - ☒ NWS Weather Stations
  - ☐ States
  - ☐ SC Drought Management Areas
  - ☐ Climate Divisions
  - ☐ Counties
  - ☐ 2-Digit HUC Areas
  - ☐ 4-Digit HUC Areas
  - ☐ 6-Digit HUC Areas
  - ☒ Watersheds of Interest
  - ☐ 8-Digit HUC Areas
  - ☒ Hydrology
  - ☒ Shaded Relief

## Legend

8-Digit HUC Areas

- 7.77 < to -4.00 (Extreme drought)
- 4.00 < to -3.00 (Severe drought)
- 3.00 < to -2.00 (Moderate drought)
- 2.00 < to -1.00 (Mild drought)
- 1.00 < to -0.50 (Incipient drought)
- 0.50 < to 0.50 (Near normal)
- 0.50 < to 1.00 (Incipient wet spell)
- 1.00 < to 2.00 (Slightly wet)
- 2.00 < to 3.00 (Moderately wet)
- 3.00 < to 4.00 (Very wet)
- 4.00 < to 5.00 (Extremely wet)
- No Data



Blend index value

-4.83

Region

03

South Atlantic-Gulf Region

Subregion

0305

Edisto-Santee

Accounting unit

030501

Santee

Cataloging unit

03050103

Lower Catawba, North Carolina, South Carolina

## Weather Station List - Microsoft Internet Explorer

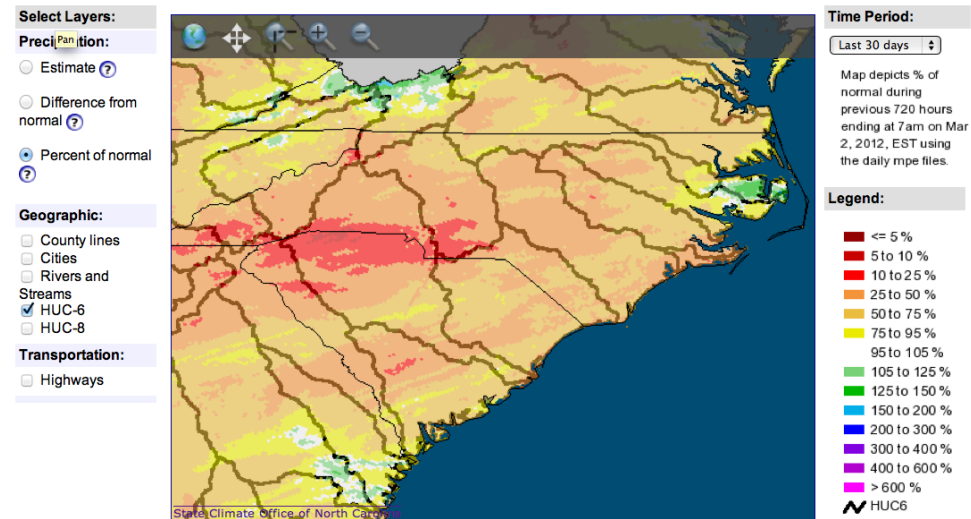
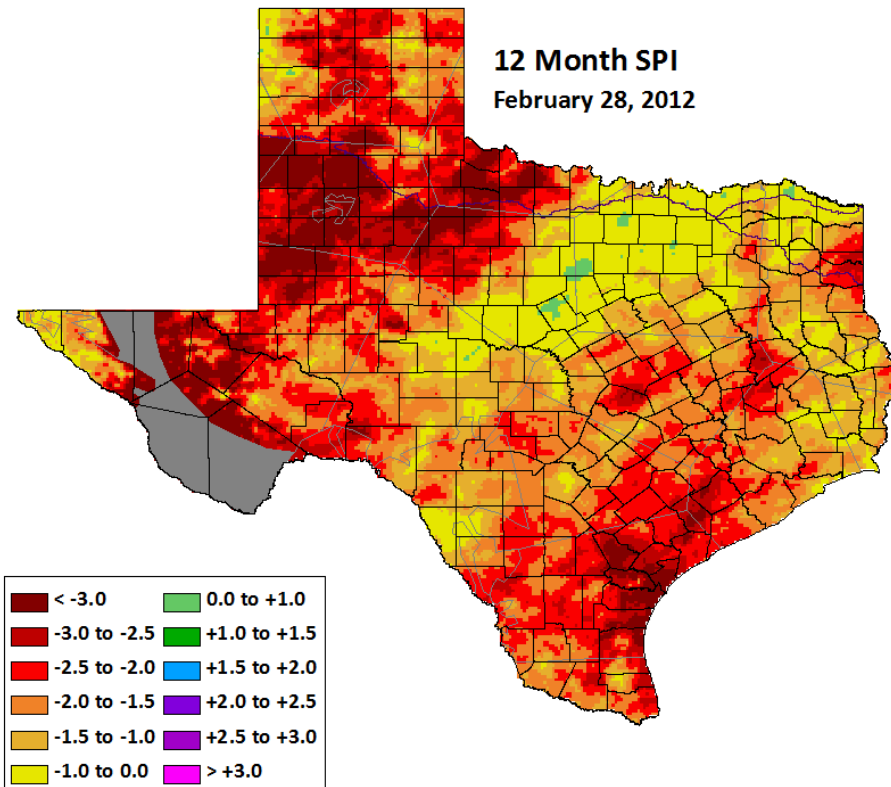
- ☒ Selected layer : Watersheds of Interest
- ☒ Selected number of features : 1

Feature (AOI)	Feature Name	Station Used	Station Name
0	Catawba-Wataree	310300	Asheville Wso Ap
		310301	Asheville
		310506	Banner Elk
		310724	Bent Creek
		310843	Black Mountain 2 W
		310901	Blowing Rock 1 NW
		311624	Celo 2 S
		311690	Charlotte Douglas An

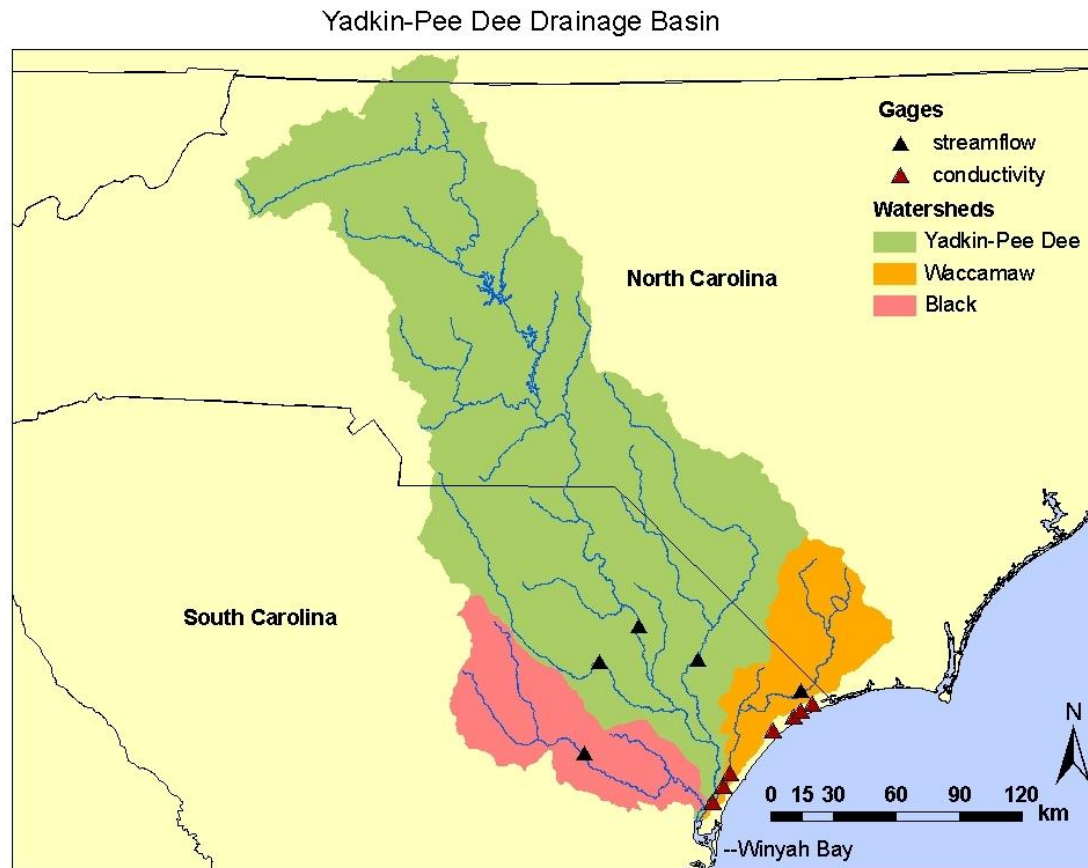
User-defined  
Index, region,  
time period,

Map Tools  
Navigation  
Metadata  
Tools

# Adding radar to the DDIT



# Winyah Bay Watersheds



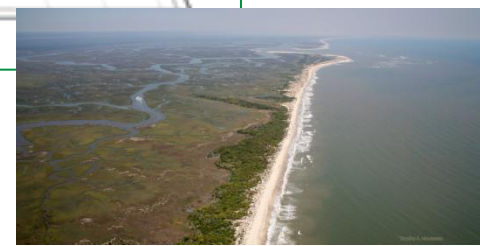


100% of the respondents (n = 100) were female, and 100% (n = 100) were white. The majority of the respondents (n = 80) were aged 18 to 24 years, and 100% (n = 100) were currently attending a postsecondary institution. The majority of the respondents (n = 80) were currently employed, and 100% (n = 100) were currently attending a postsecondary institution. The majority of the respondents (n = 80) were currently employed, and 100% (n = 100) were currently attending a postsecondary institution.

Global & Regulation

drain  
watersh





# Input Data for Models

Freshwater



Saltwater

## Riverine Flows

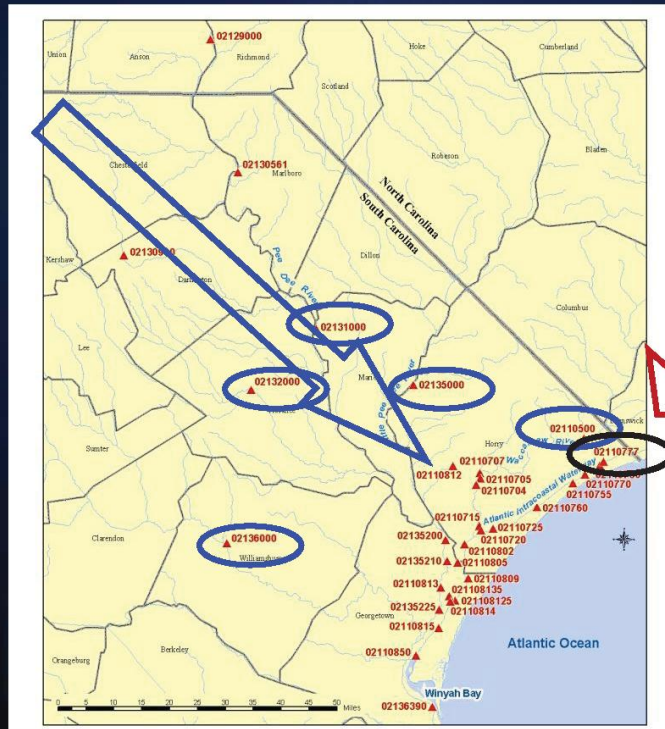
Pee Dee\*

Little Pee Dee

Lynches

Black

Waccamaw



## Tidal Forcing

Mean Water level

Tidal Range

Little River Inlet

Note: Specific conductance is not used as an input

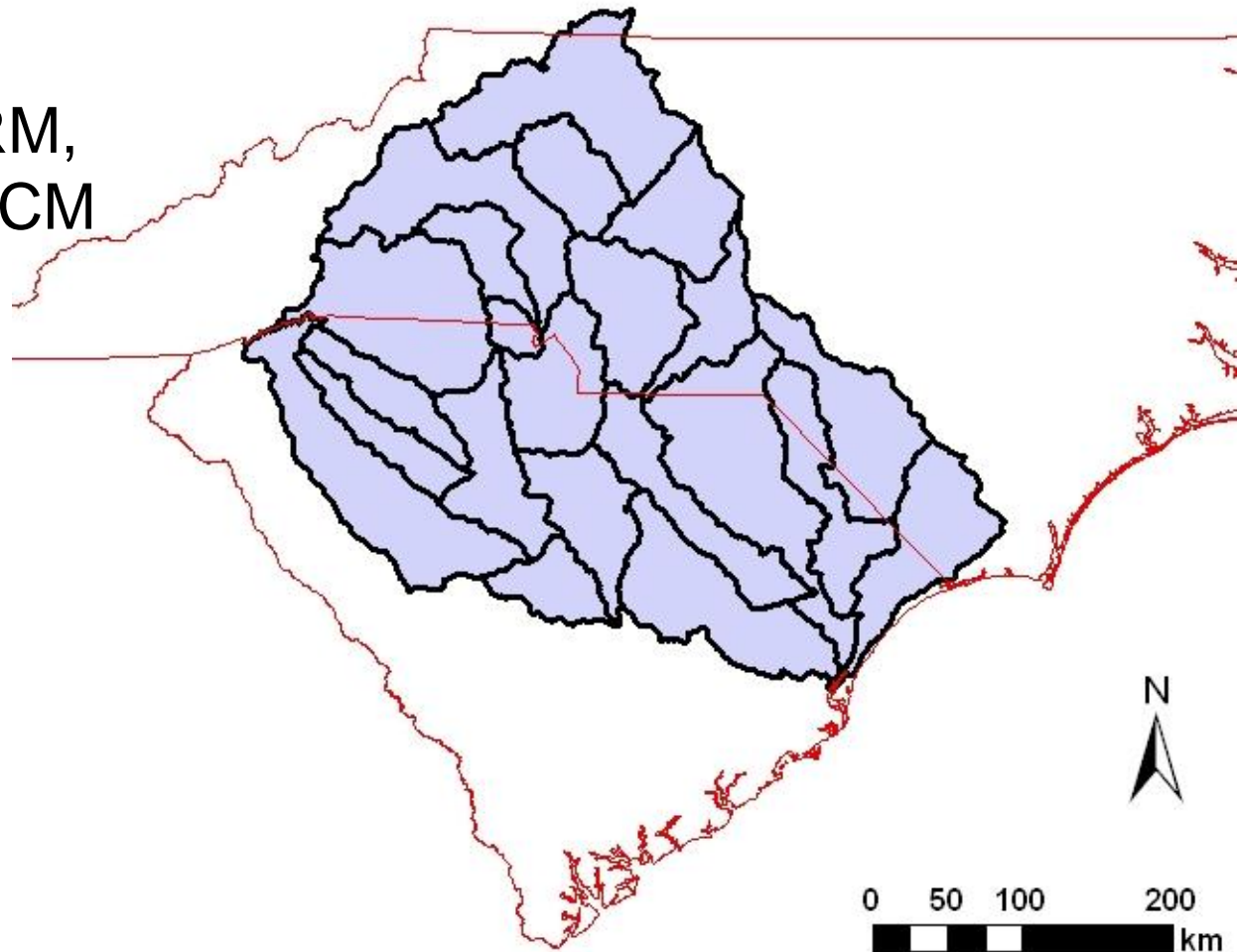
\*User controlled input

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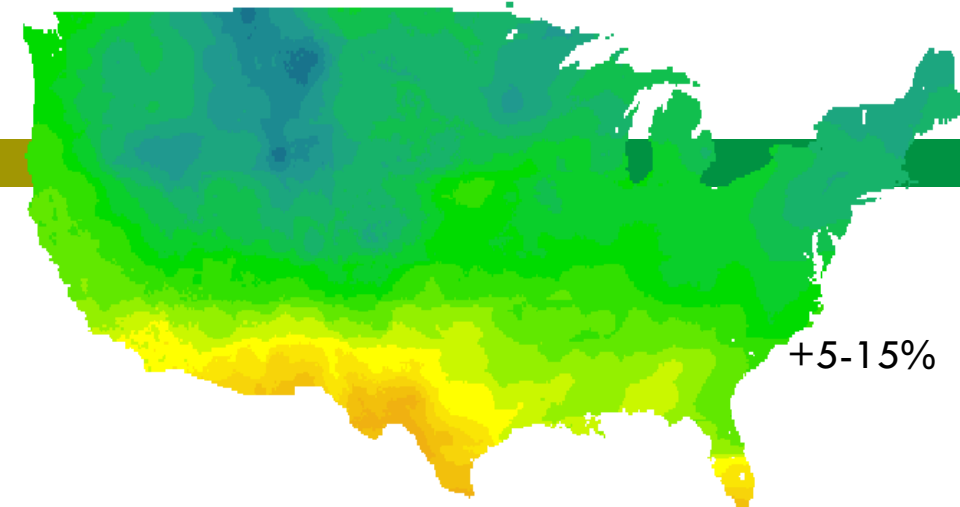


# Climate Change Scenarios

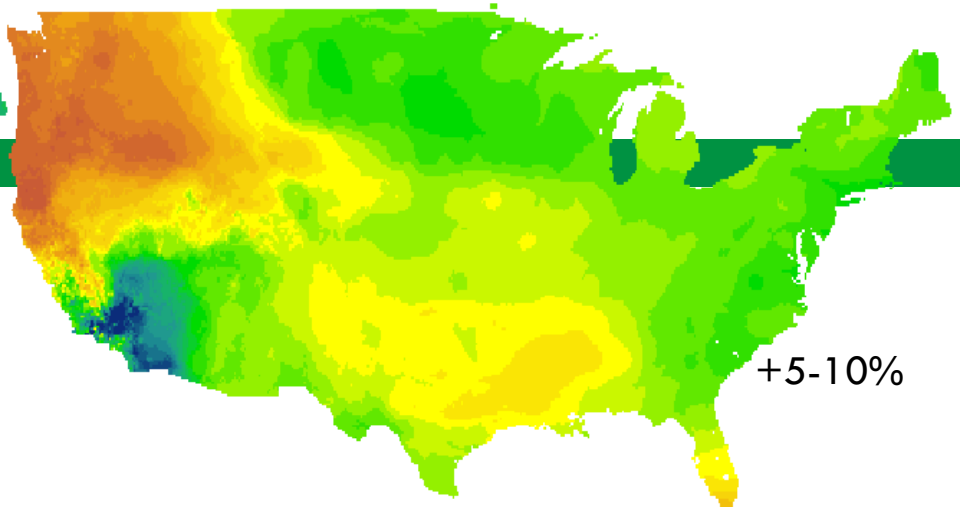
- Historical: 1980-2010
- Future: 2040-2070
- Models: CCSM, CNRM, **ECHO**, GFDL, and PCM



## Ensemble average

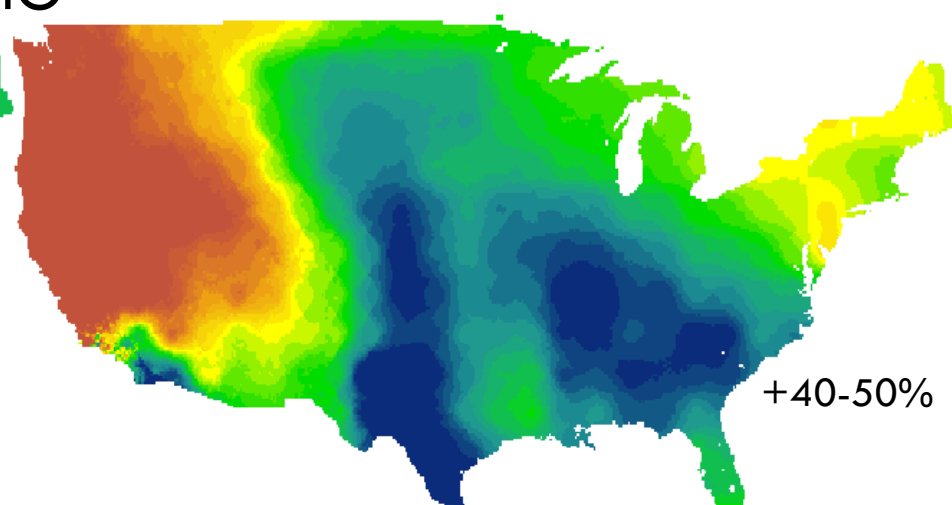
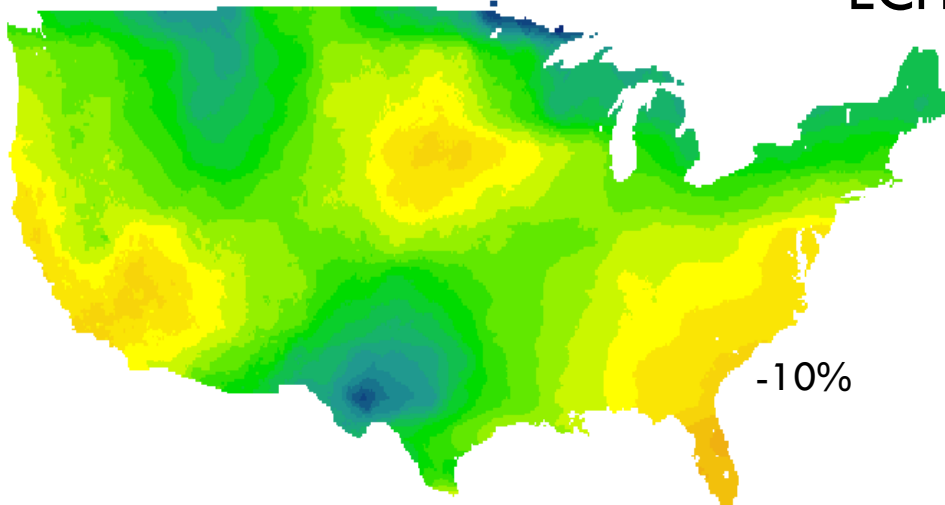


WINTER



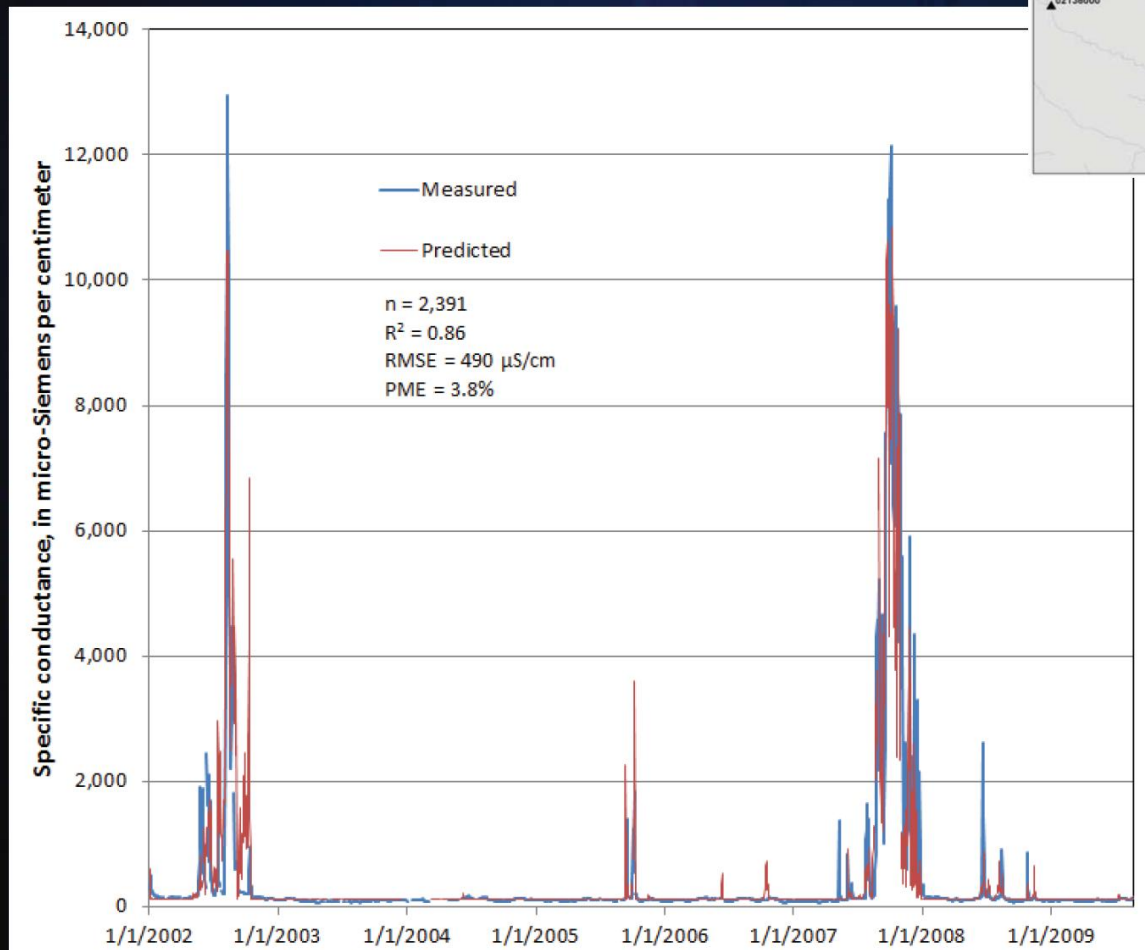
SUMMER

## ECHO



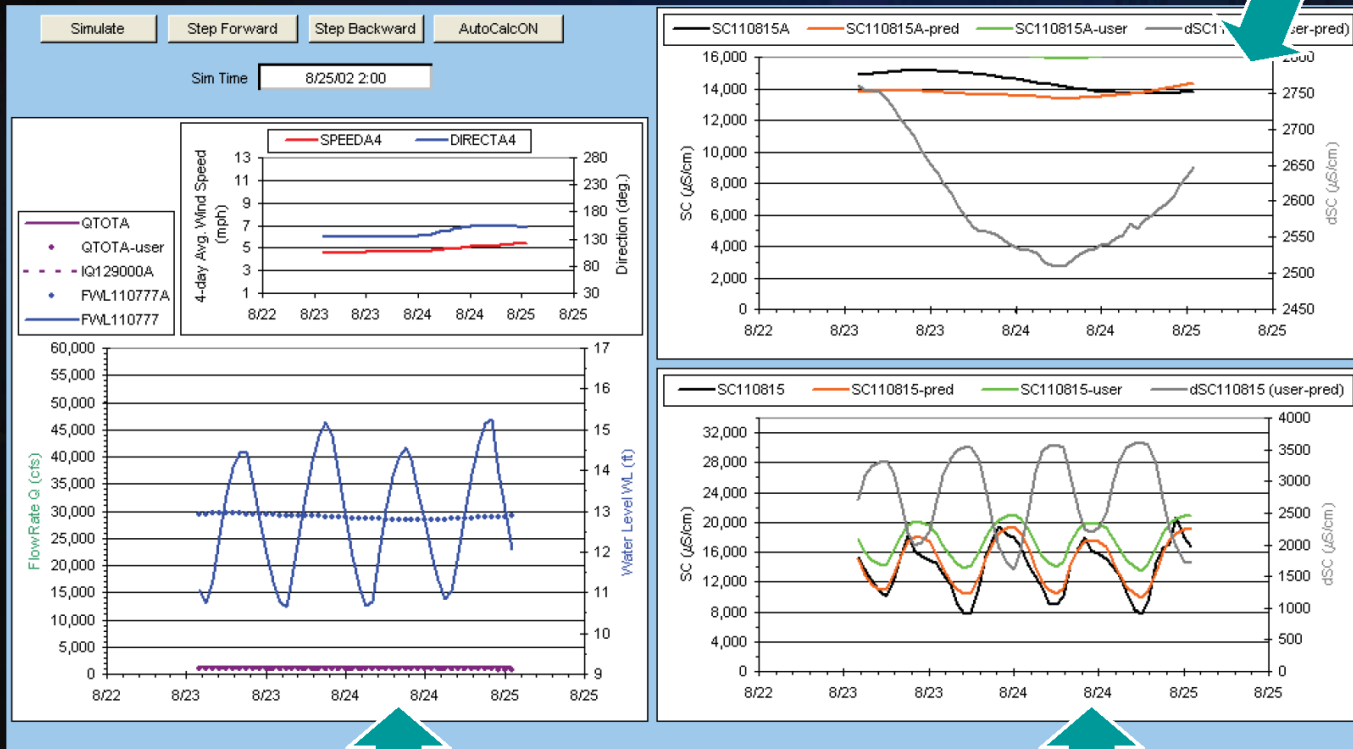
# Model Performance

## Pawleys Island



# Graphical Display

## Specific Conductance – daily predictions



**Input data - wind,  
water level, and flow**

**Specific Conductance  
– hourly predictions**

Actual data –  
black

Model  
prediction –  
red

User  
specified  
condition –  
green

Difference  
b/w user and  
actual - gray

Paul Conrads





# The Impact of Drought on Coastal Ecosystems in the Carolinas

State of Knowledge Report January 2012

Steve Gilbert  
Kirsten Lackstrom  
Dan Tufford

**cisa**   
carolinas integrated sciences & assessments



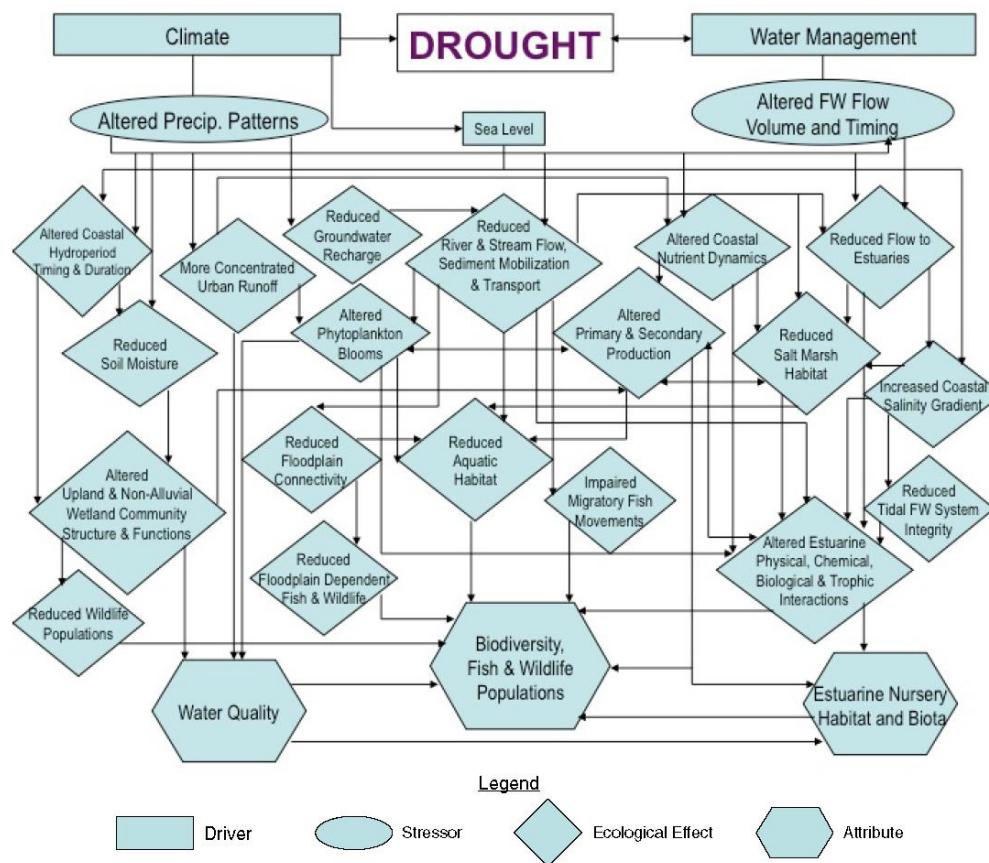


Figure 2. Conceptual Ecological Model for Drought Impacts on Coastal Southeast Atlantic Ecosystems.