

From Global Climate Models to Local Choices: Lessons Learned about Providing and Using Climate Information in the Carolinas

Carolinas Integrated Sciences & Assessments

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2014 Water Education Summit

Global Water Quality in a Changing Climate

September 9, 2014

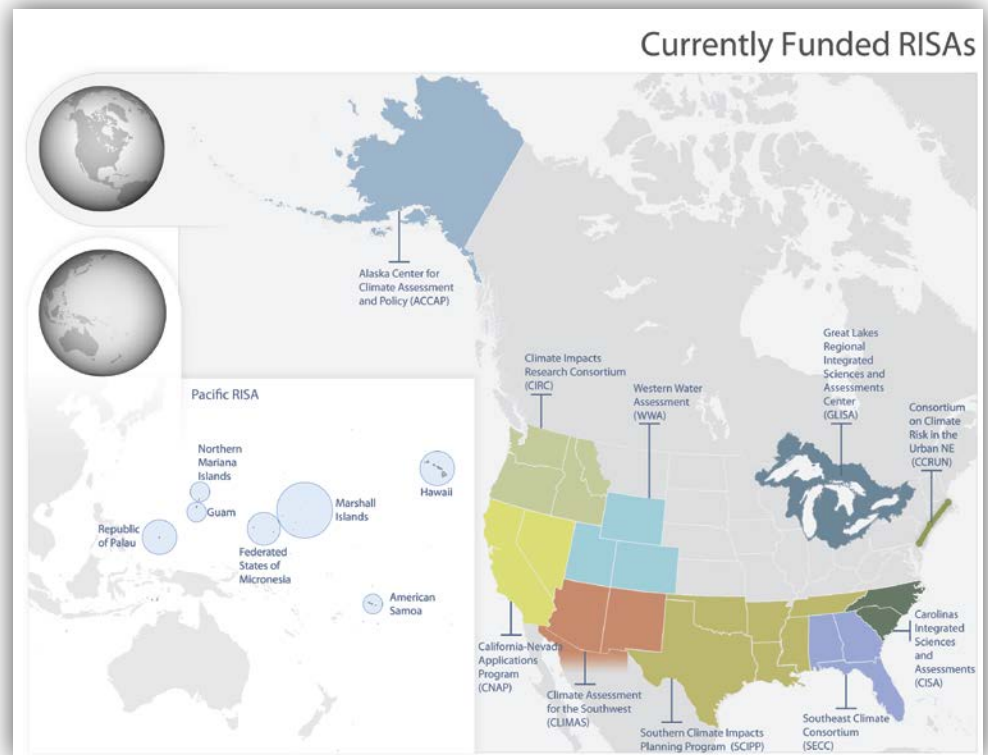


Regional Integrated Sciences & Assessments

NOAA's RISA programs support research teams that help build the nation's capacity to prepare for and adapt to climate variability and change.

RISA teams work with public and private user communities to:

- Understand decision contexts
- Develop actionable knowledge
- Maintain diverse, flexible networks
- Innovate services to enhance the use of science in decision making





Partner Organizations:

- Southeast Regional Climate Center
- SC Sea Grant Consortium
- NC Sea Grant
- NC & SC State Climate Offices
- Federal, State, & Local Agencies
- Private Sector
- NGOs

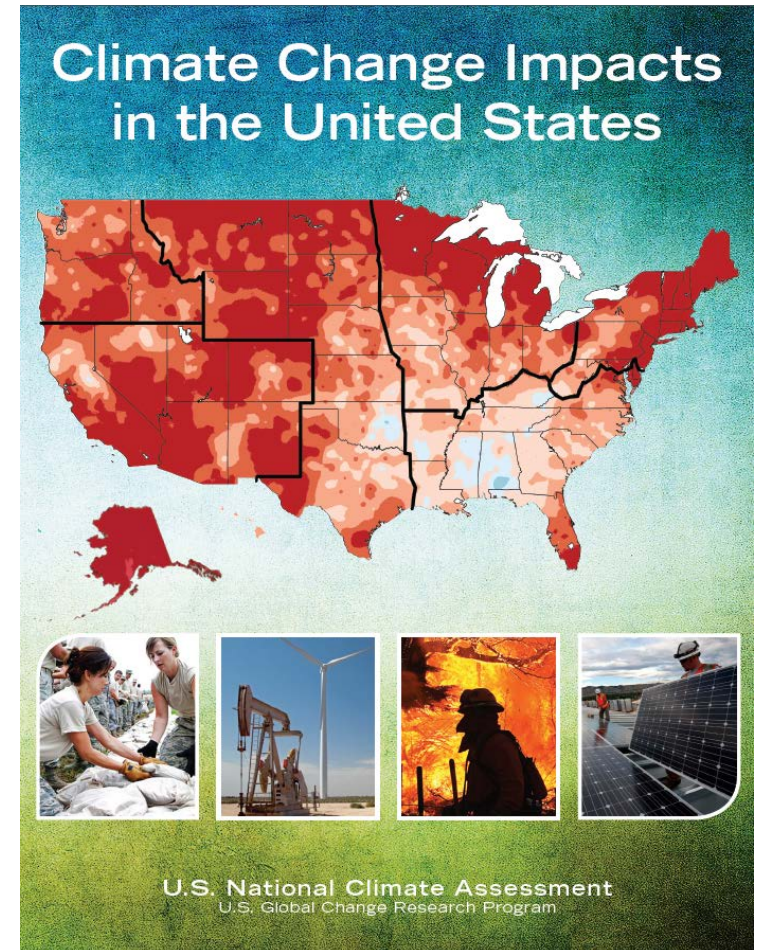
CISA's Core Focus Areas:

- Drought
- Climate Modeling & Downscaling
- Watershed Modeling
- Coastal Climate
- Public Health & Climate
- Adaptation

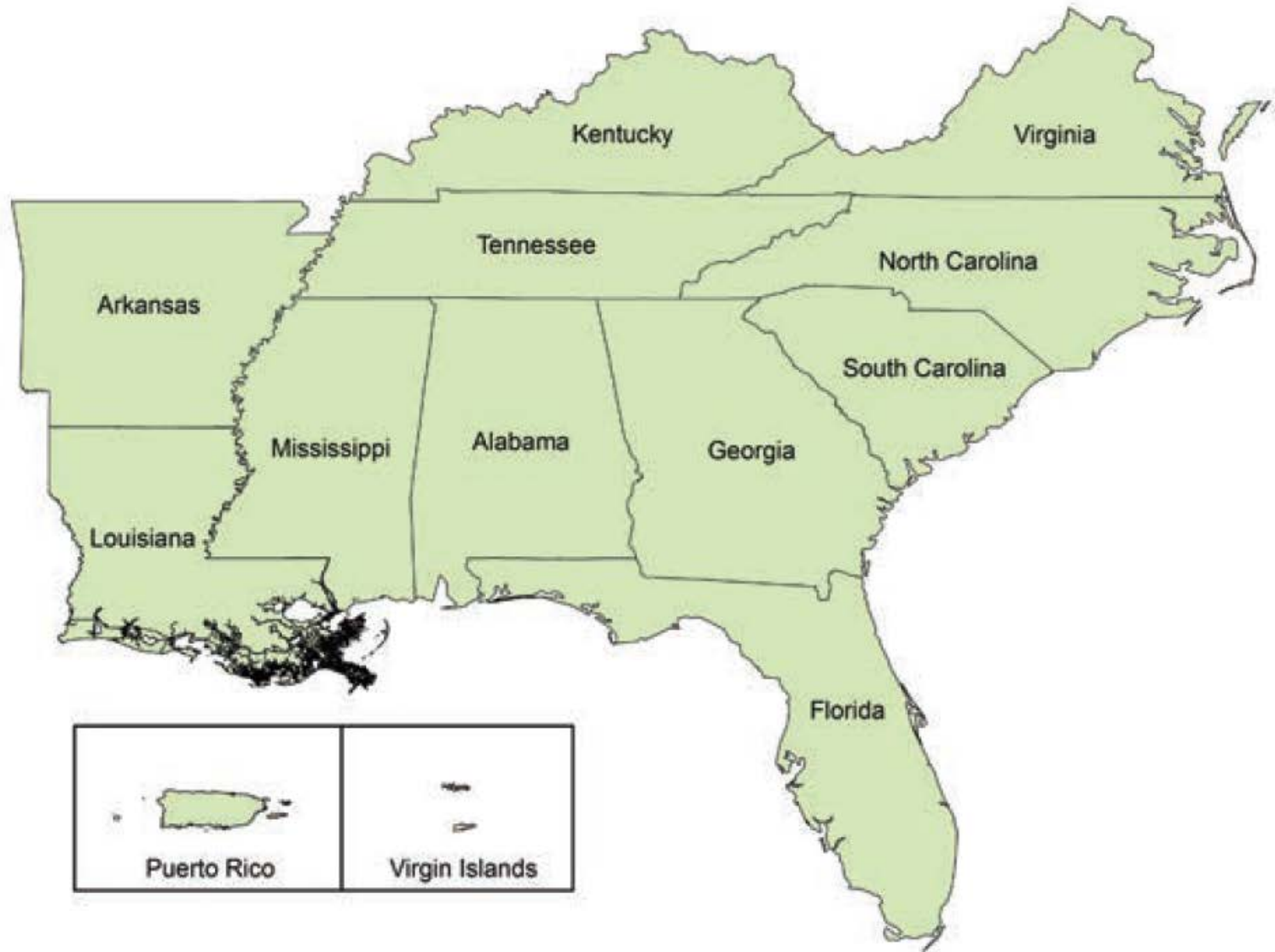


What We Know About Water Resources under Future Climate Conditions: Findings From the Third National Climate Assessment (NCA)

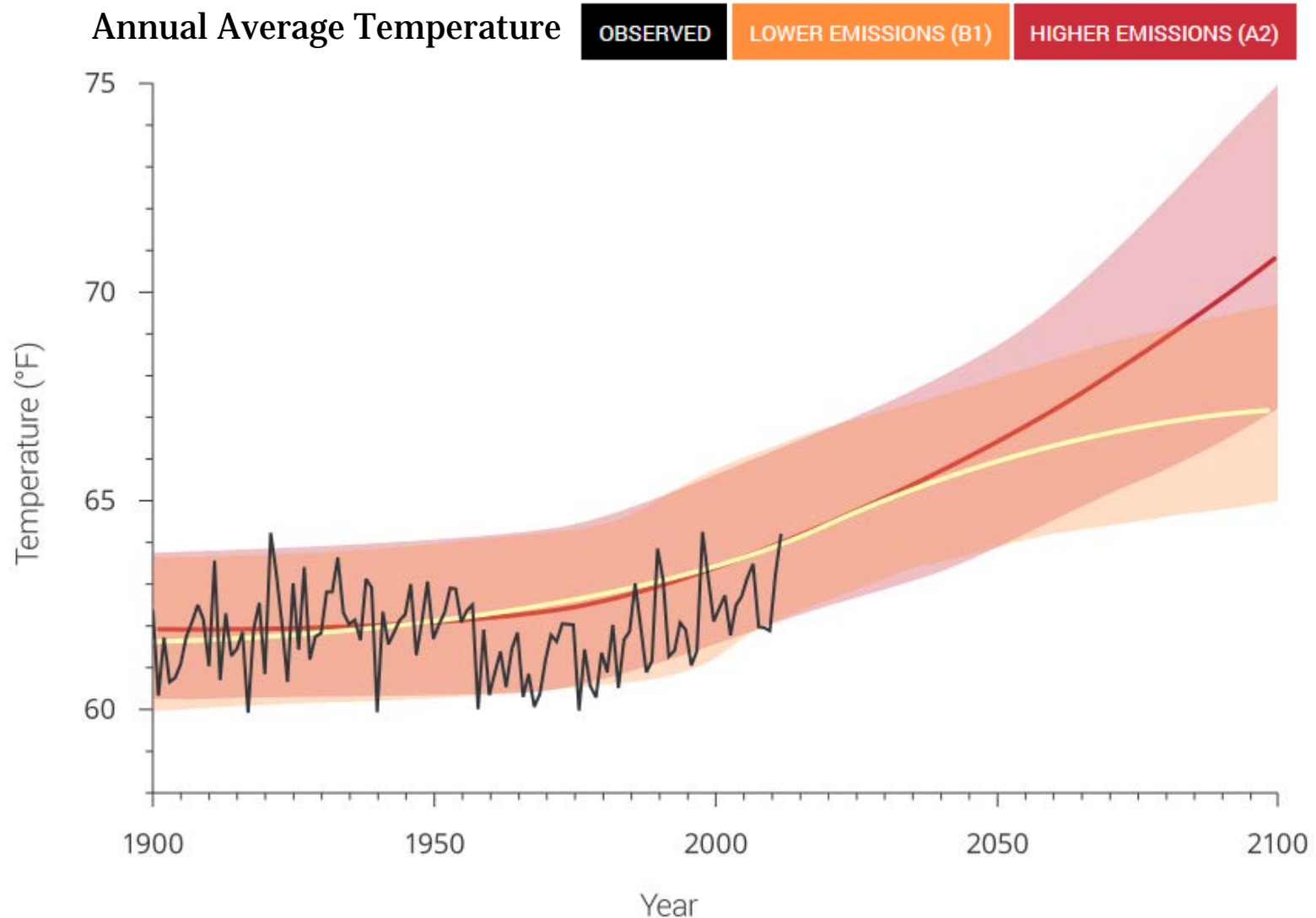
- Released May 2014
- Report organization
 - Projected climate changes (temperature, precipitation, sea level rise, extreme events)
 - Sector impacts (water, energy, transportation, agriculture)
 - Regional impacts
 - Response strategies
- Interactive online design
(www.nca2014.globalchange.gov)
- Informed by many sectoral and regional reports
 - Climate of the Southeast United States: Variability, Change, Impacts & Vulnerability



NCA Southeast Region

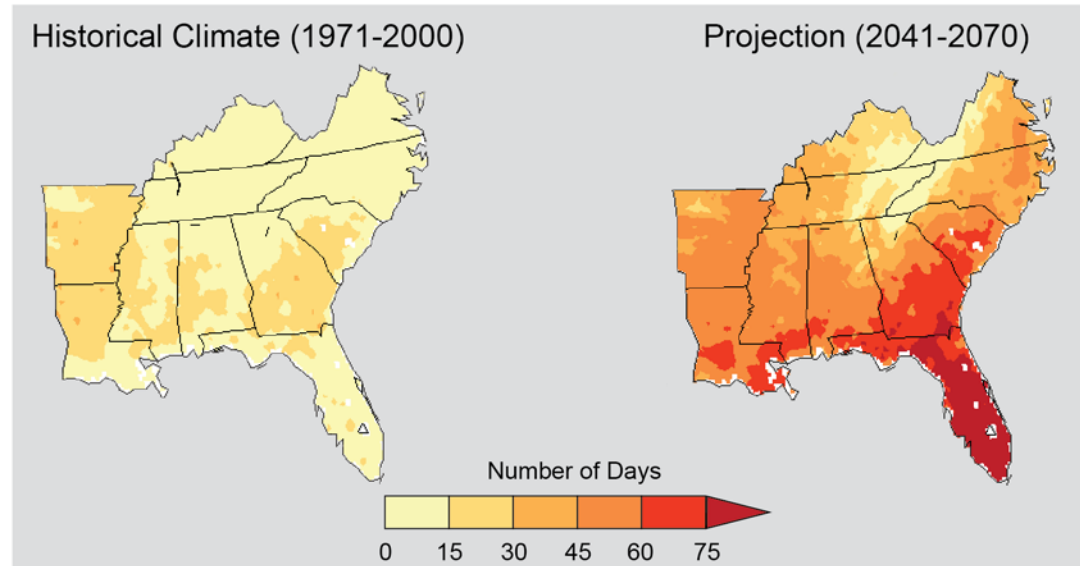
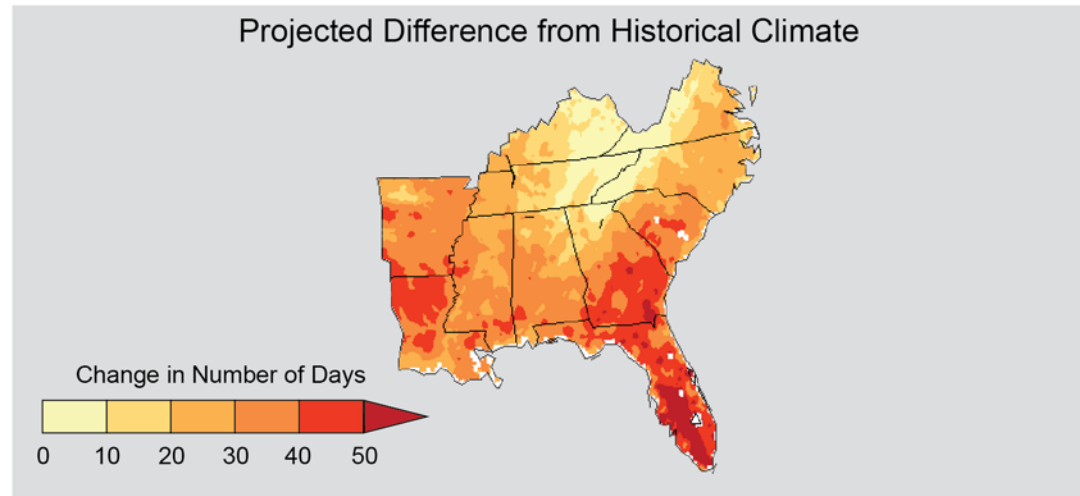


Southeast U.S. Temperature Projections

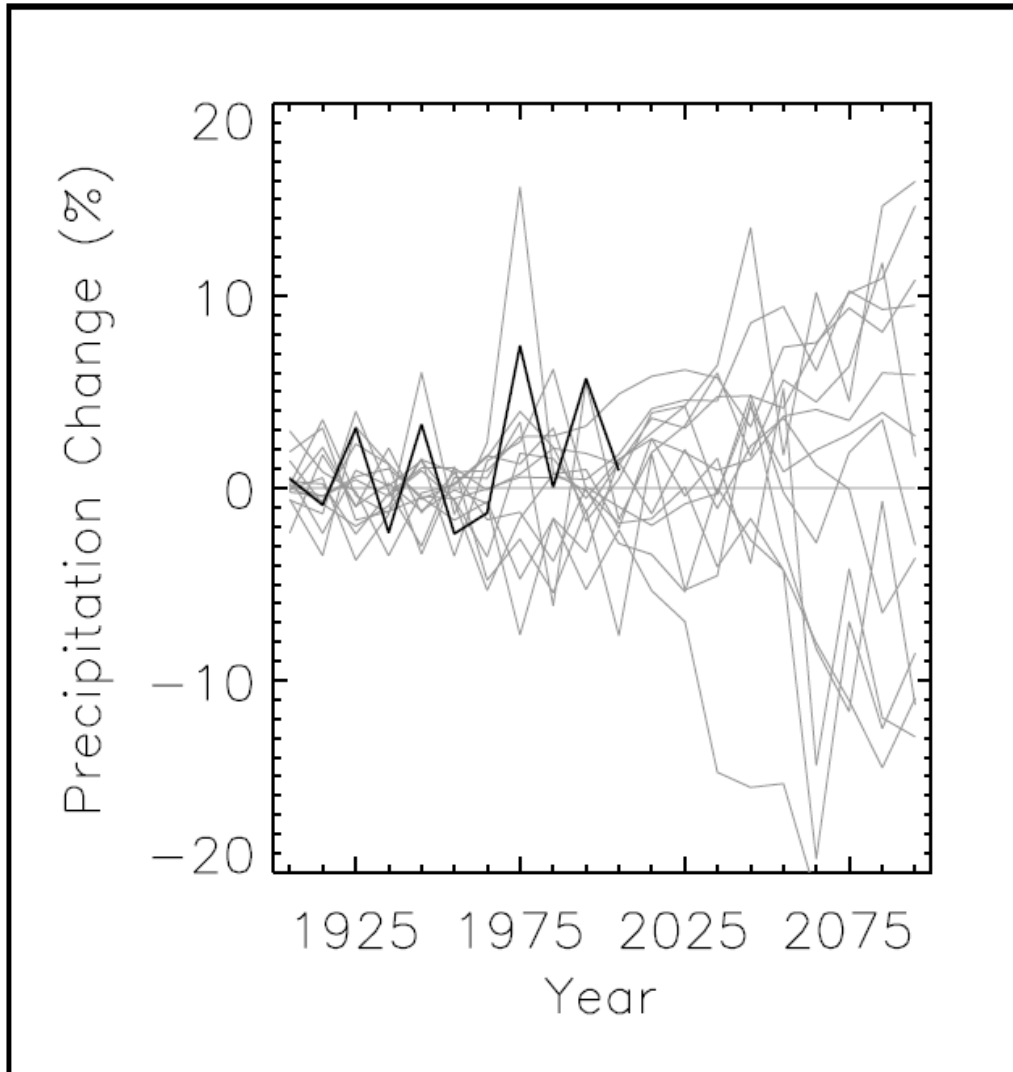


Southeast U.S. Temperature Projections

Projected Change in Number of Days Over 95°F



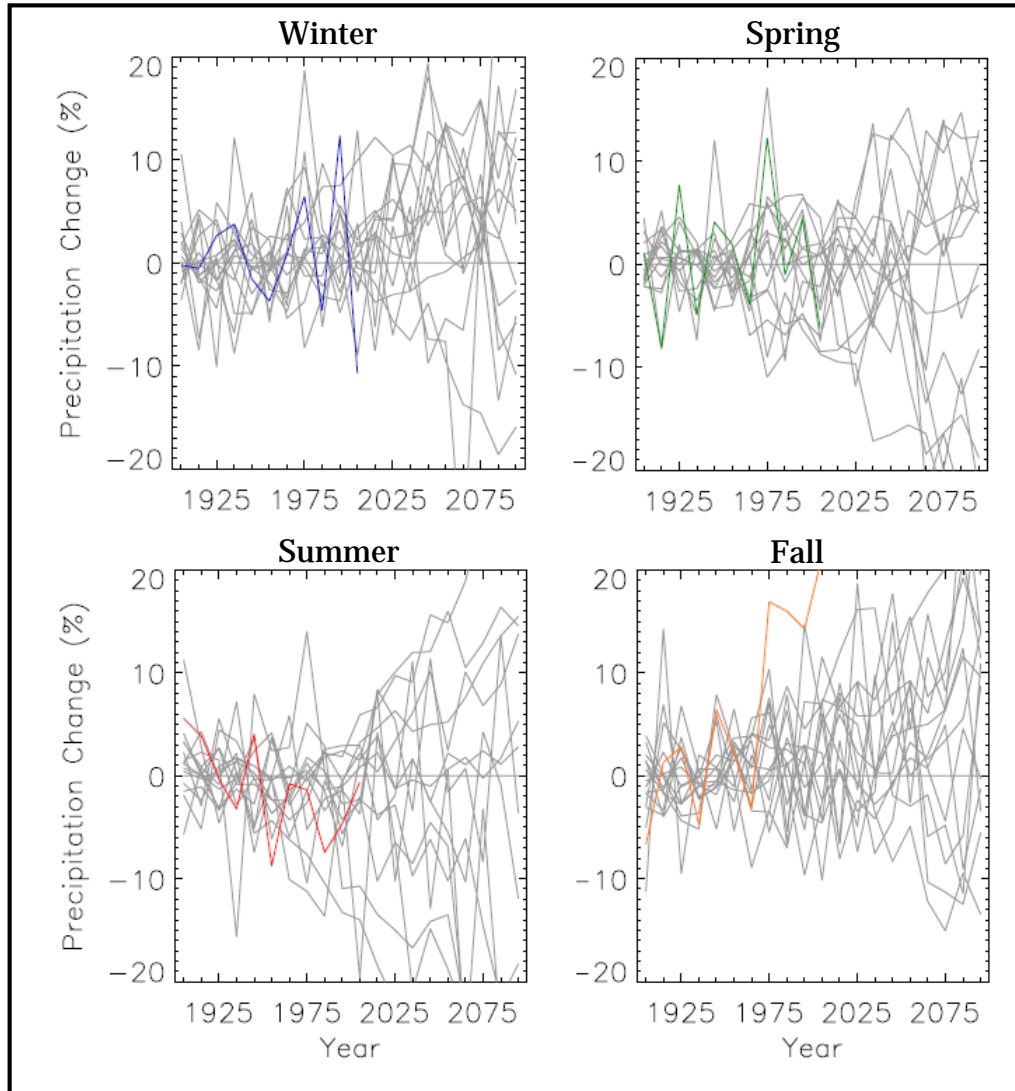
Southeast U.S. Precipitation Projections



Black line – Observed decadal mean annual precipitation change

Gray lines – Model simulations from 15 CMIP3 models for the high (A2) emissions scenario.

Southeast U.S. Precipitation Projections



Colored lines – Observed decadal mean annual precipitation change

Gray lines – Model simulations from 15 CMIP3 models for the high (A2) emissions scenario.

Changes in Water Quality

Lower and more persistent low flows under drought conditions as well as higher flows during floods can worsen water quality.



Tugalo River, Oconee County SC, 2008

Changes in Water Quality

Increasing precipitation, along with the effects of wildfire and fertilizer use, are increasing sediment, nutrient, and contaminant loads in surface waters used by downstream water users, and ecosystems in some places.



Nutrients and sediments entering the Mississippi River in the form of surface runoff.

Changes in Water Quality

Changing land cover, flood frequencies, and flood magnitudes are expected to increase mobilization of pollutants and sediment into waterways.



Source: www.holycitysinner.com

Kayaking through the Charleston City Market,
August 28, 2012

Sea Level Rise

Vulnerability to Sea Level Rise

Coastal Vulnerability Index

incorporates:

- Tidal range
- Wave height
- Coastal slope
- Shoreline change
- Landform & processes
- Historical rate of relative sea level rise





USING CLIMATE INFORMATION FOR WATER RESOURCES MANAGEMENT AND PLANNING

CISA's work in the Carolinas

Examples of CISA Projects

- **Adaptation**
 - The Vulnerability, Consequences, and Adaptation Planning Scenarios Process
- **Drought**
 - Development of a Hydroclimate Extremes Atlas
 - Forecasting the SC Blue Crab Fishery Using Real-Time Freshwater Flow Data
 - Improving Understanding of Coastal Drought Impacts through Citizen Science
- **Climate and Hydrological Modeling**
 - Assessing the Impact of Saltwater Intrusion in the Carolinas under Future Climatic and Sea Level Conditions
- **Coastal Climate**
 - Climate Change Impacts on Water Infrastructure
 - Incorporating Future Climate Projections Into the SC Coastal LID Manual
- **Public Health and Water Quality**
 - *Vibrio* monitoring and projections in the Winyah Bay estuary

Incorporating Future Climate Projections into a Coastal LID Manual

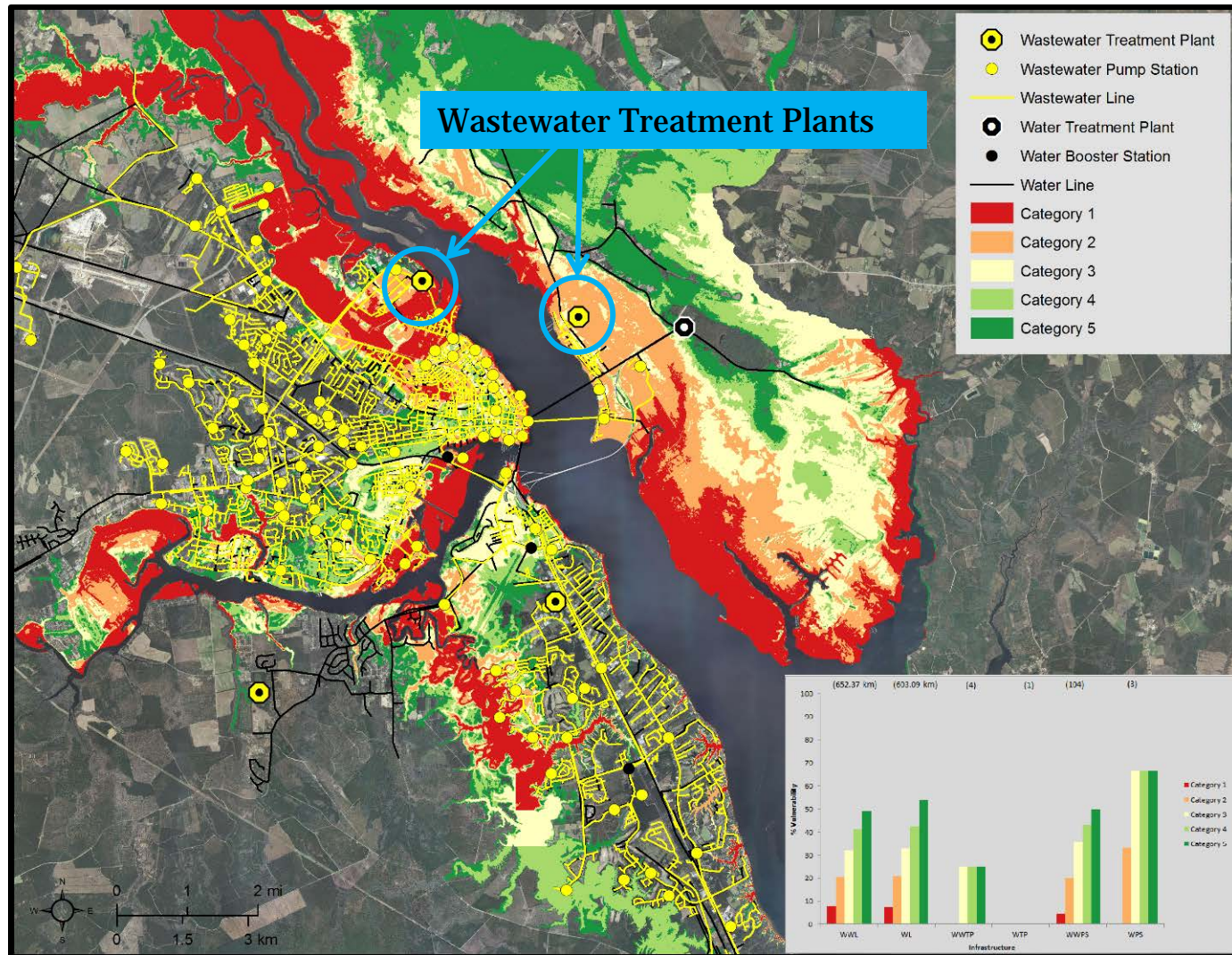
- **Climate changes and impacts considered**
 - Sea level rise
 - Larger, more intense storm events
 - Potential drought and shifts in plant communities
- **Stormwater strategies to adapt to climate change:**
 - Implement LID practices at the site scale
 - Modify practices to prevent bypass during intense storm events
 - Periodically revisit design storms and mapped floodplains
 - Create adaptable planting plans
 - Use stormwater as a resource



**Low Impact Development
in Coastal South Carolina:
A Planning and Design Guide**



Climate Change Impacts on Water Infrastructure



Source: Tom Allen, ECU

Sea Level Rise Vulnerability in Beaufort County, SC

Potential Adaptation Strategies to Address Current and Future Water Quality Concerns

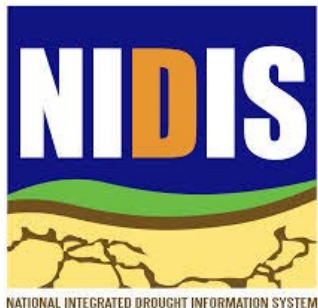
- Establish new regulations for septic systems
- Monitor the health of salt marshes
- Require lagoon/stormwater pond maintenance
- Control water access points through low-lying ditches
- Install tidal gates



Beaufort County Public Input Workshop

Filling the Gaps: Using Citizen Science to Connect Weather and Climate with Local Impacts

- Using existing tools developed by the Community Collaborative Rain, Hail & Snow (CoCoRaHS) network to improve understanding of:
 - How precipitation, a lack thereof, or heavy rainfall events affect plants, animals and communities at the local level
 - The usefulness of citizen science in collecting on the ground weather, climate and impacts information



Thank You

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doi:10.7930/J0Z31WJ2