

Availability of Freshwater along the Carolina Coast Using Climate-Change Scenarios

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Outline

- Motivation
- Salinity Dynamics
- Model development
- Climate change scenarios
- Conclusions

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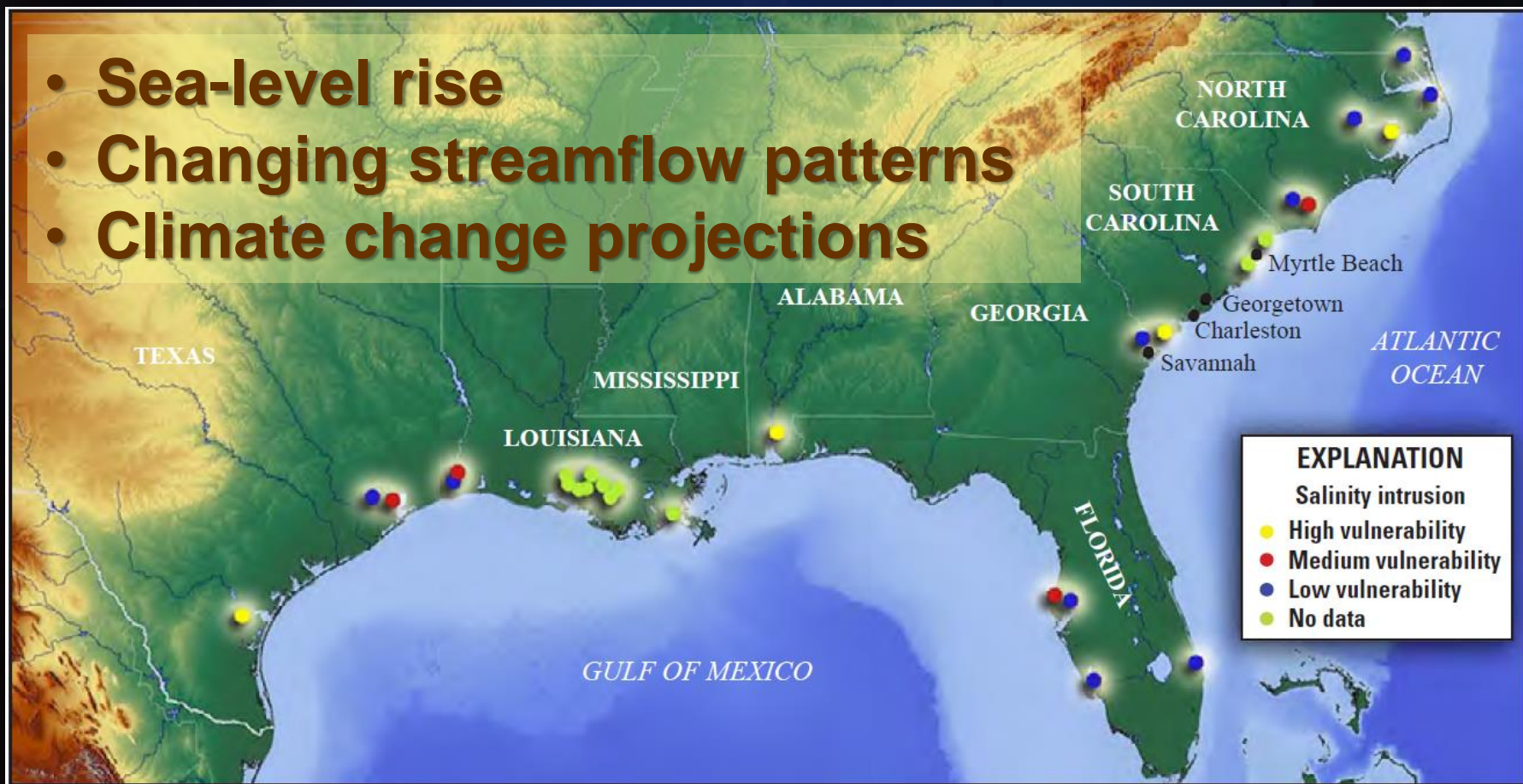
Who Cares?

- Beaufort-Jasper Water and Sewer Authority
- Water Research Foundation
- NOAA- Sectoral Applications Research Program (SARP) Grant

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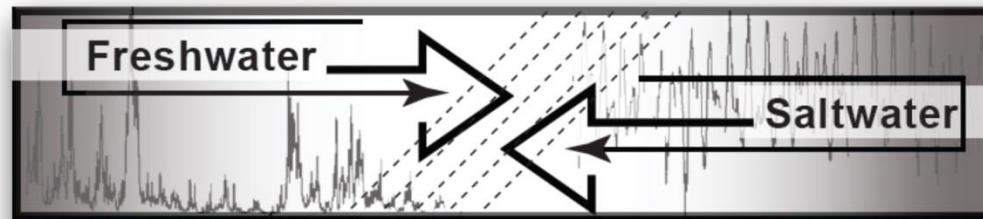
Threaten Intakes along SE Coast Due to Climate Change

- **Sea-level rise**
- **Changing streamflow patterns**
- **Climate change projections**



Short Review Salinity Dynamics

Riverine Flow



Tidal forcing

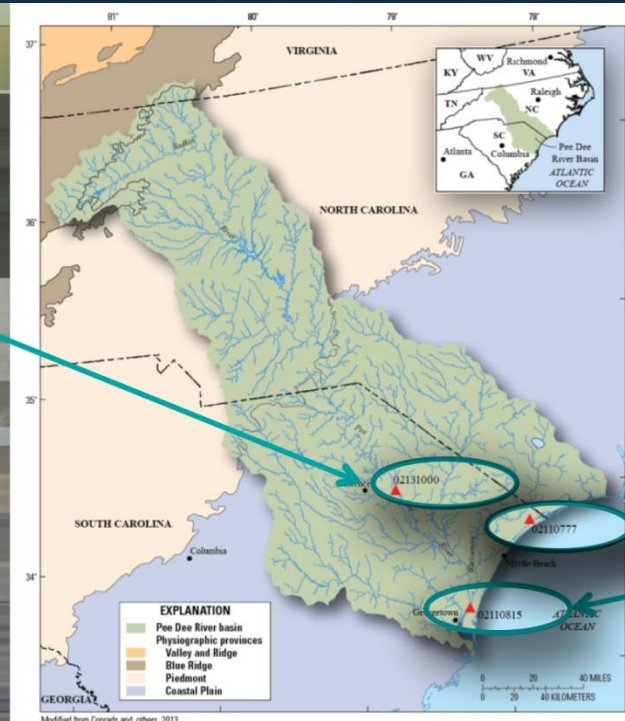
- 1) Mean water level
- 2) Tidal range

“...estuaries may never really be steady-state systems; they may be trying to reach a balance they never achieve.”

Keith Dyer, from Estuaries – A Physical Introduction (1997)

Yadkin- Pee Dee Basin

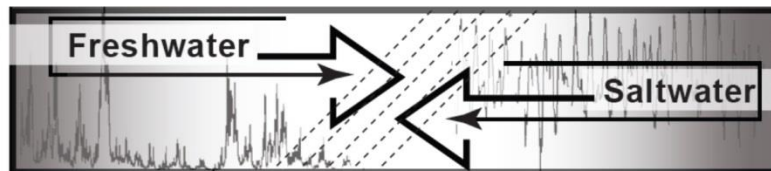
Pee Dee River
Flows



Little River Inlet
Water Levels

Waccamaw River
Salinity

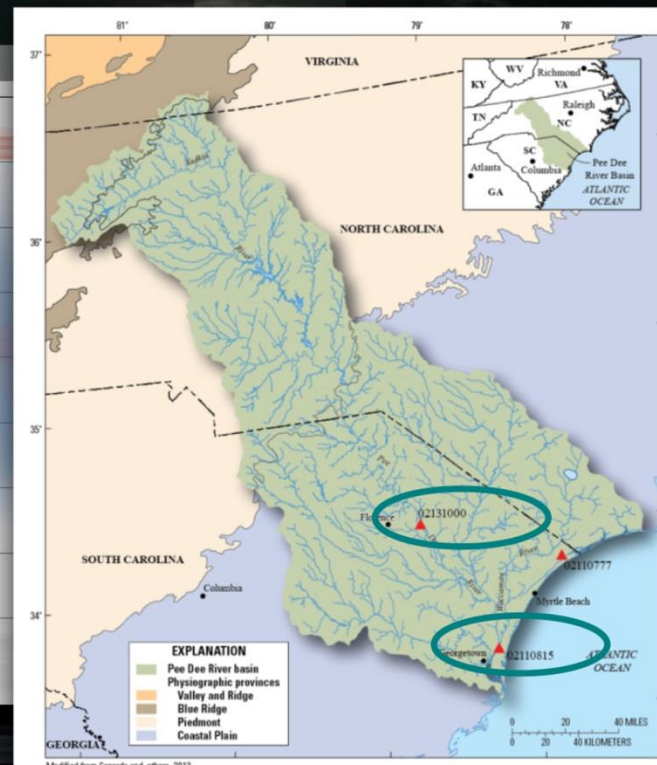
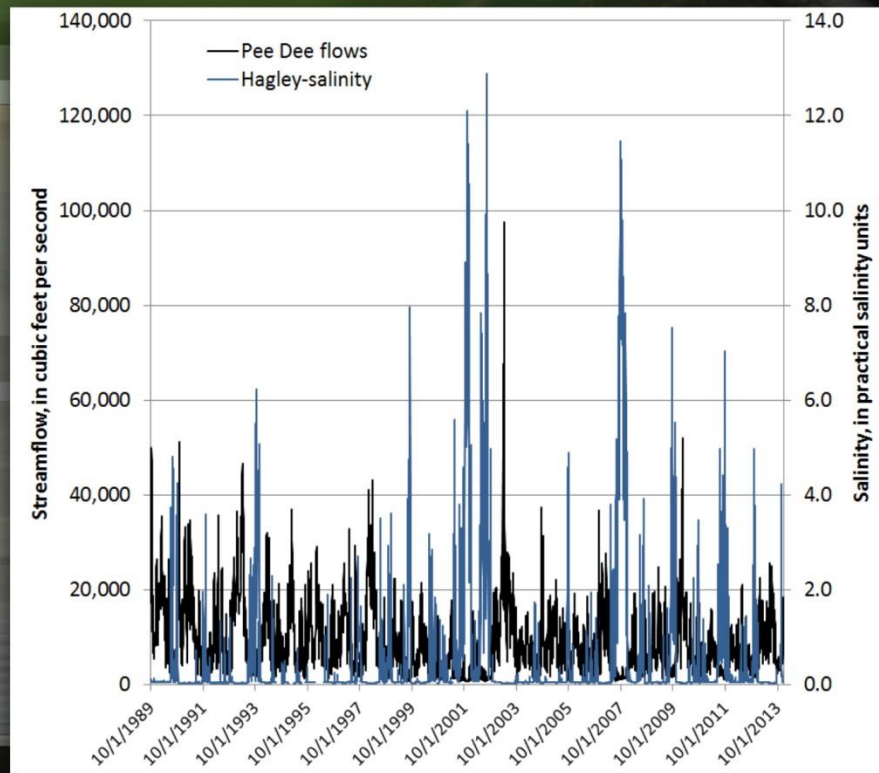
Riverine Flow



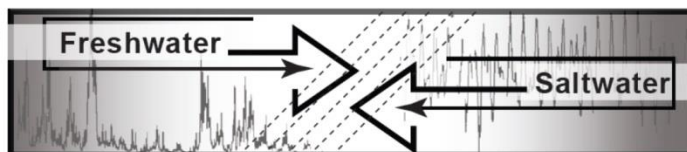
Tidal forcing

- 1) Mean water level
- 2) Tidal range

Flows and Salinity



Riverine Flow



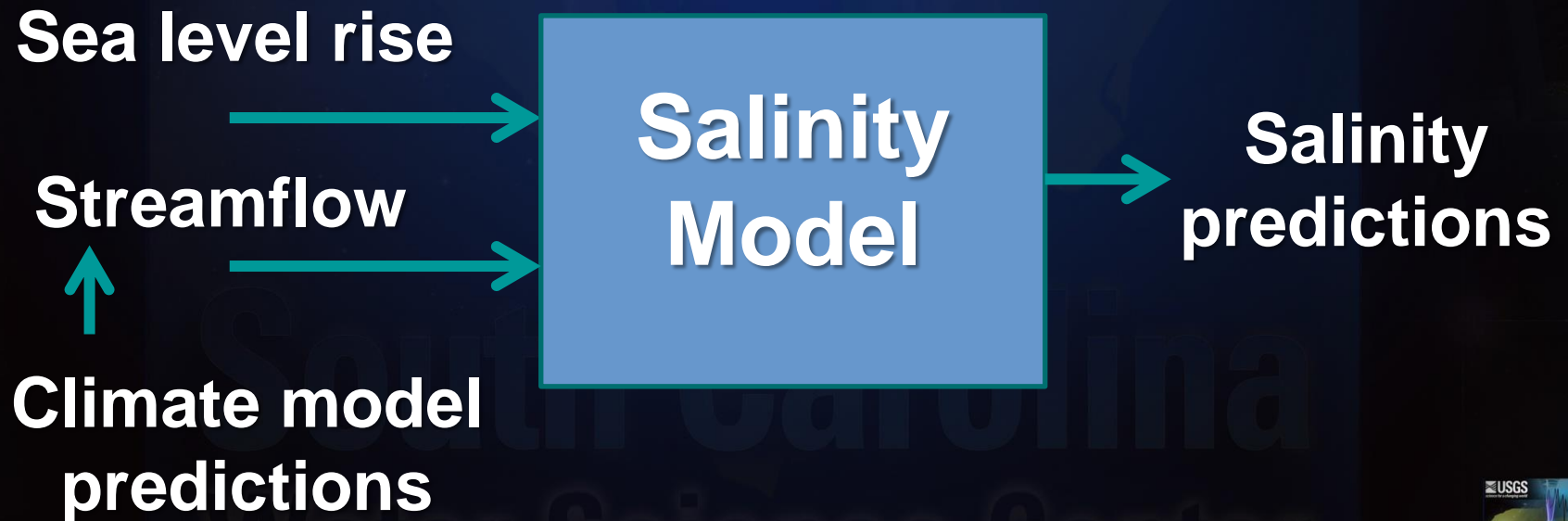
Tidal forcing

- 1) Mean water level
- 2) Tidal range

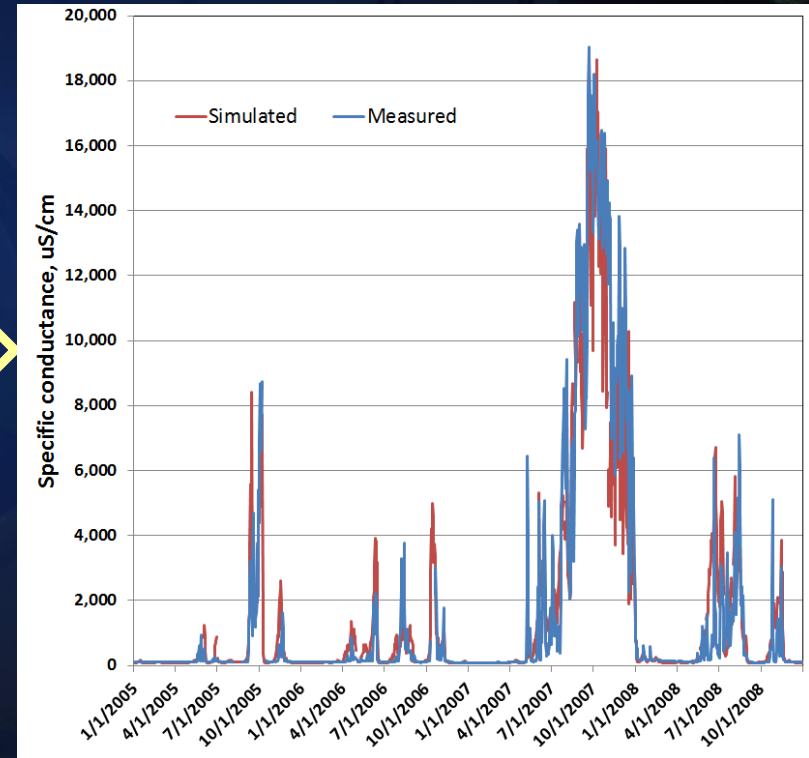
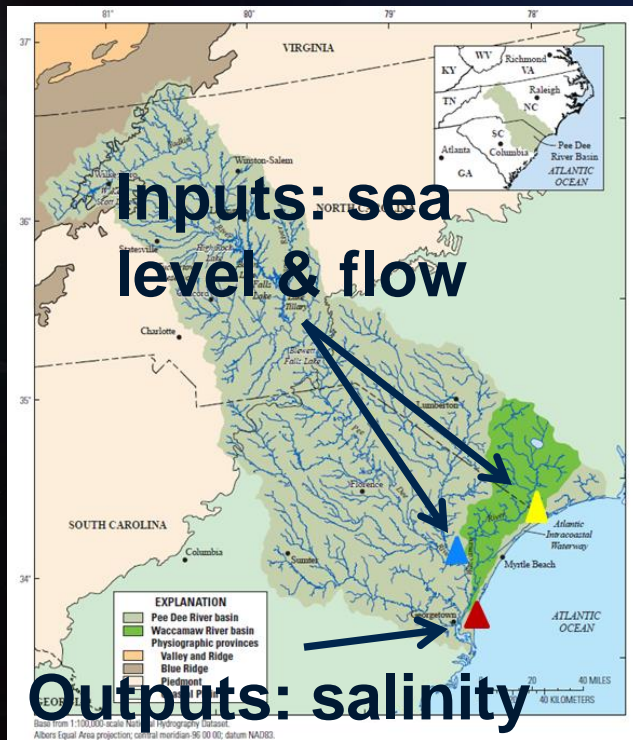


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Simulation Model



Model Performance



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Decision Support System



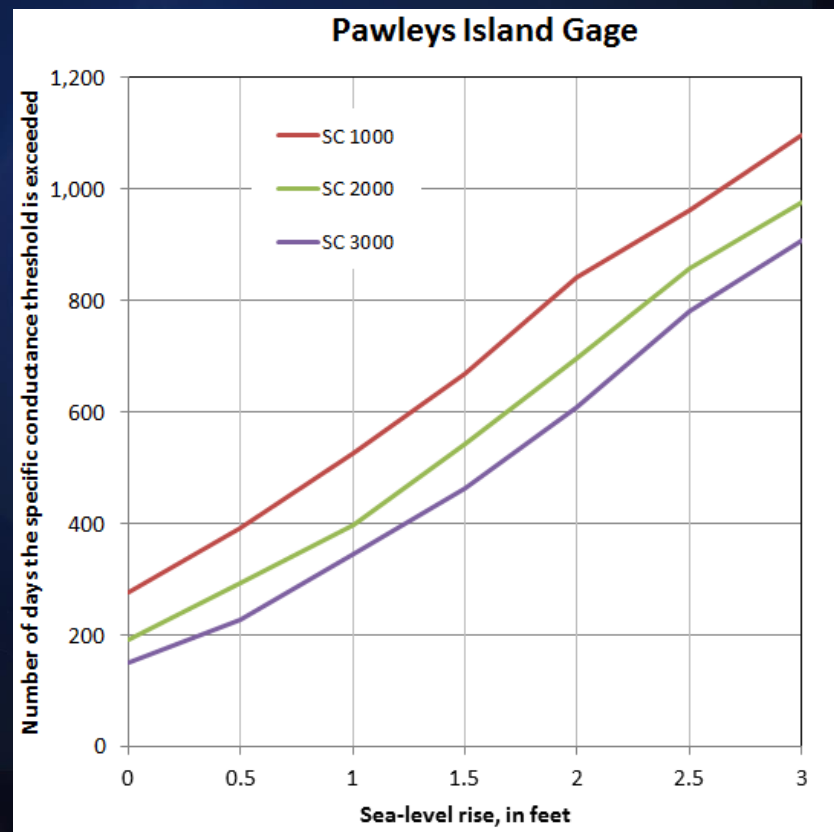
DSS disseminated as an Excel Application

Multiple Model Runs

Sea-level rise

Grand Strand – Pawleys Island Gage

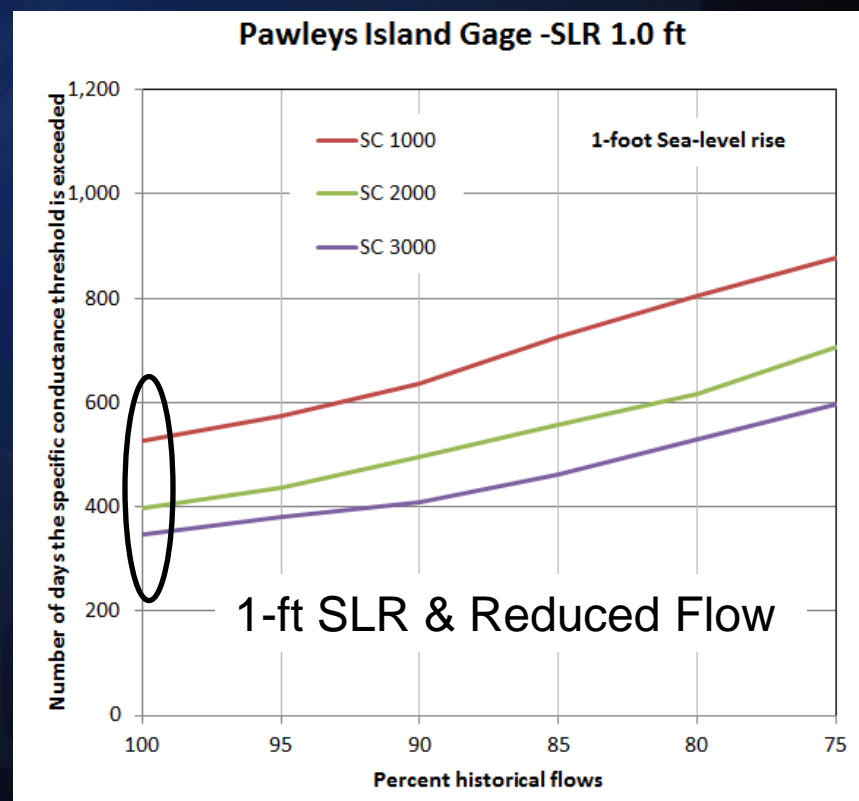
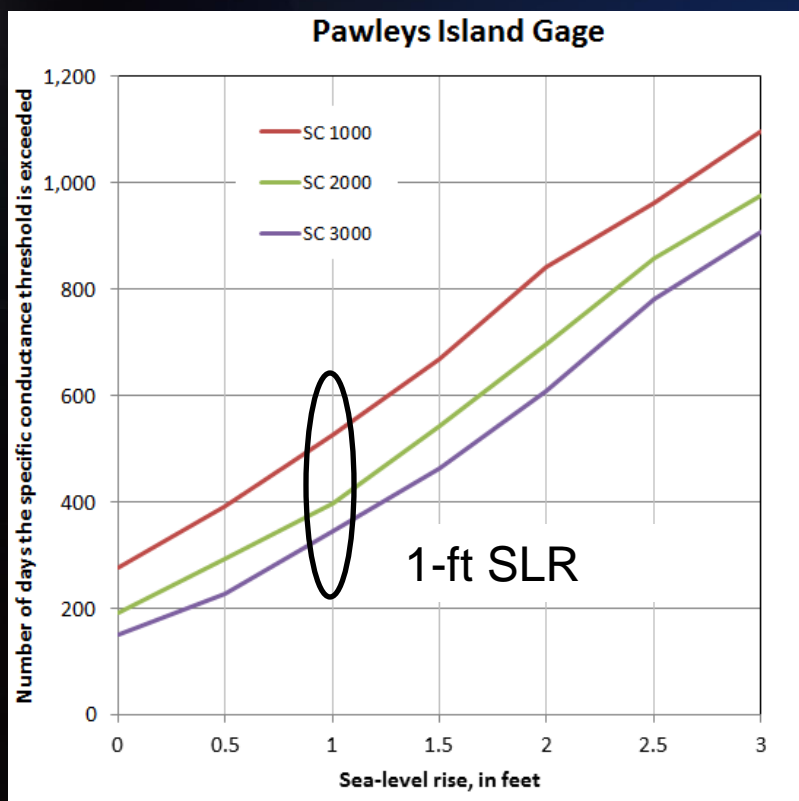
- 14 year simulation
- 0.5 ft incremental SLR up to 3 ft



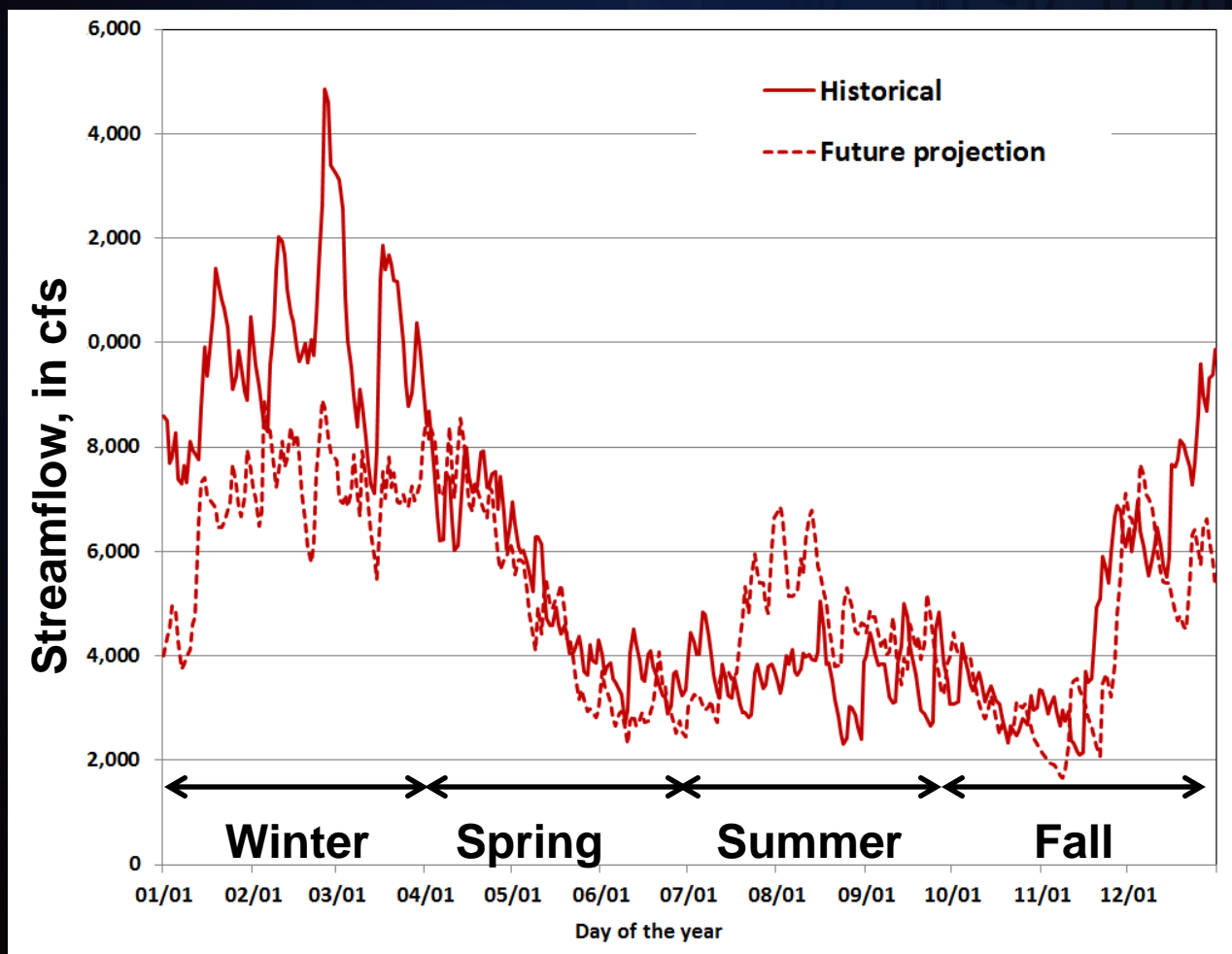
Results – SLR & Reduced flow

Grand Strand – Pawleys Island Gage

5% Reduction in historical streamflow



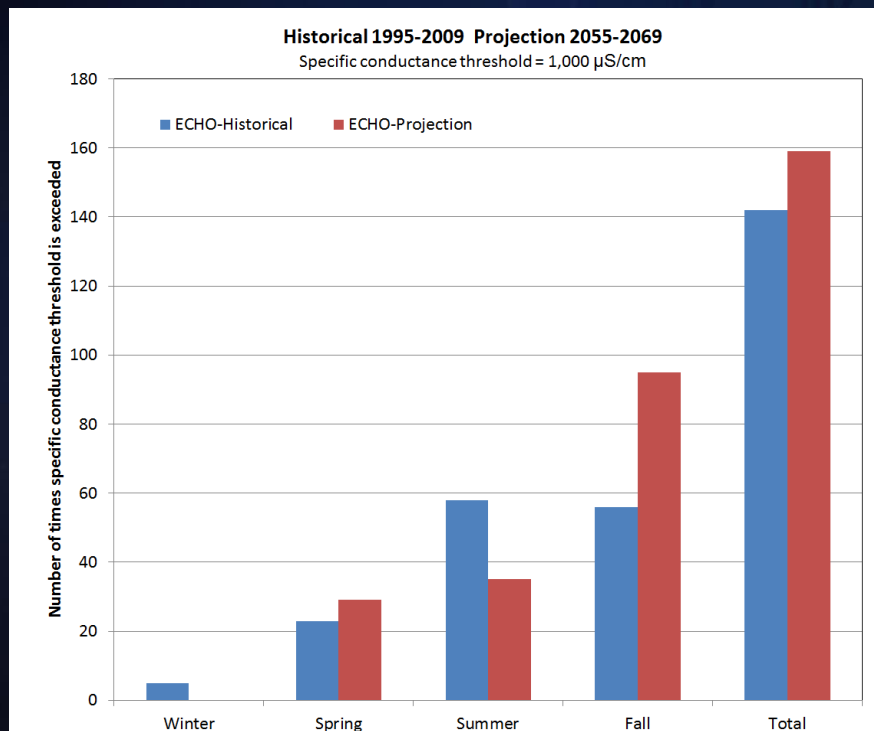
Duration Hydrographs of Projected Flows



Historical 1980-2010, Projection 2040-2070

Projected Seasonal Change in Salinity Intrusion

Number of days SC threshold exceeded



Winter Spring Summer Fall Total

Historical 1995-2009, Projection 2055-2069
Specific conductance threshold = 1,000 $\mu\text{S}/\text{cm}$

Conclusions

- Climate change impacts at local level
- DSS (Excel) levels the technical playing field
- DSS allows a variety of climate change scenarios
- Subtlety of salinity

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Simulation of Salinity Intrusion Along the Georgia and South Carolina Coasts Using Climate-Change Scenarios

Prepared in cooperation with the Beaufort-Jasper Water and Sewer Authority

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U.S. Department of the Interior
U.S. Geological Survey

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