

Resiliency and Charleston's Economic, Environmental, and Socio-Demographic Fabric

M. Richard DeVoe
Executive Director

South Carolina Sea Grant Consortium
Charleston, SC

What is Resilience?

“The ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events” – NAS 2012



What coastal resiliency challenges face SC?

- Earthquakes
- Hurricanes
- Precipitation
- Sea Level Rise/Flooding

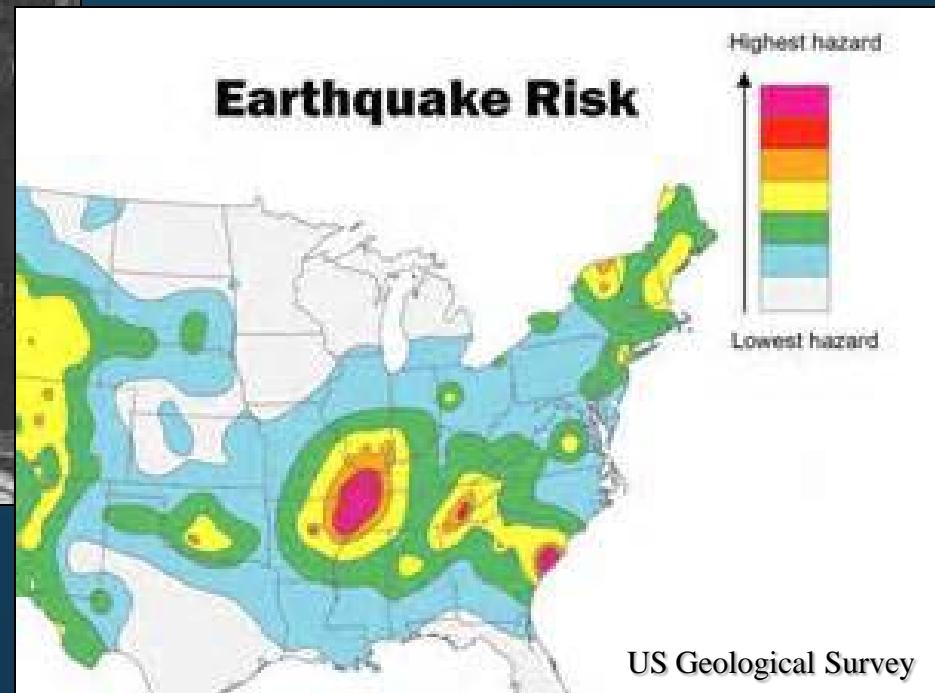


Earthquakes



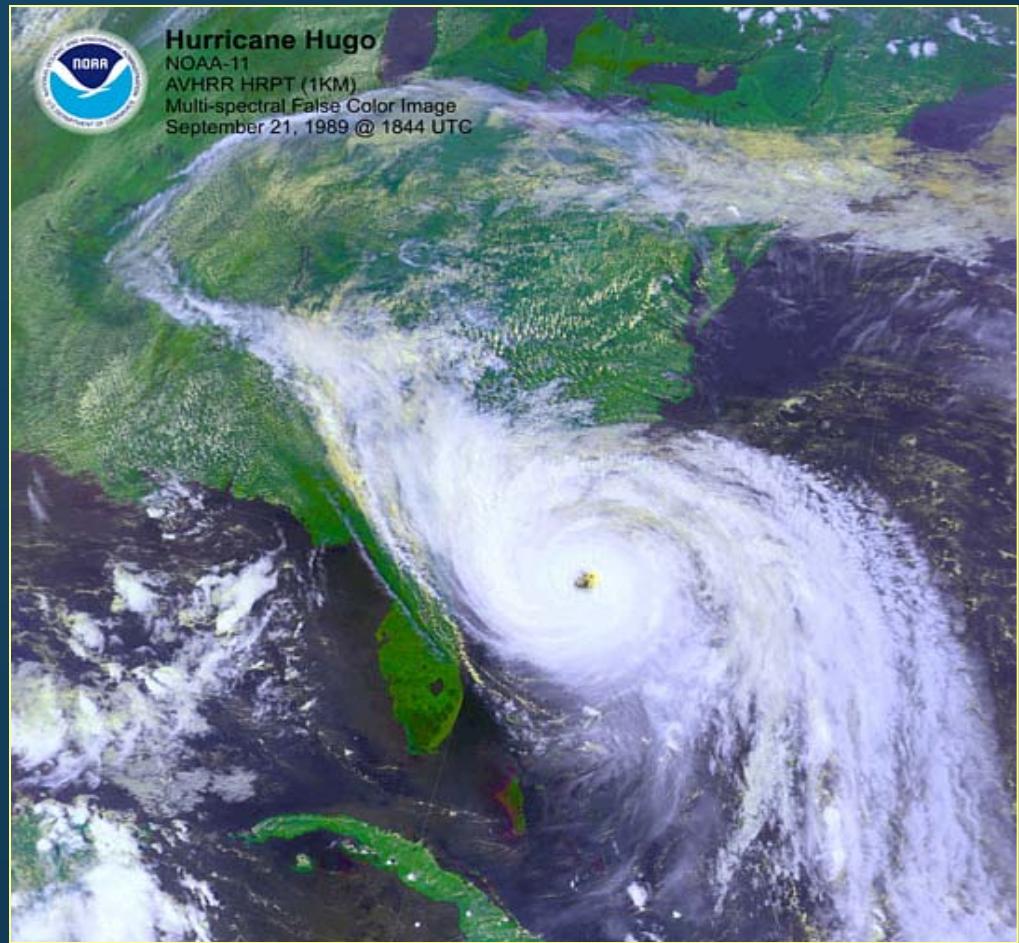
Charleston Earthquake, August 31, 1886

Photo from: *Earth Science Photographs from the U.S. Geological Survey Library*, by Joseph K. McGregor and Carl Abston, U.S. Geological Survey Digital Data Series DDS-21, 1995.



Hurricane Hugo Approaching Landfall

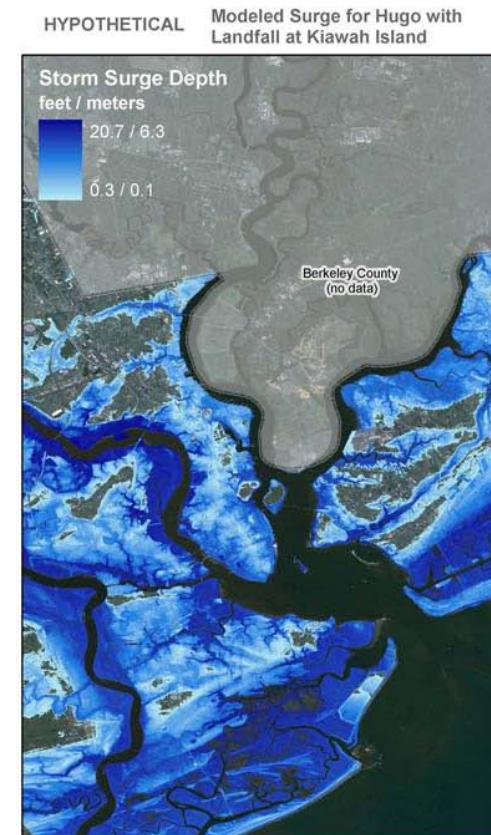
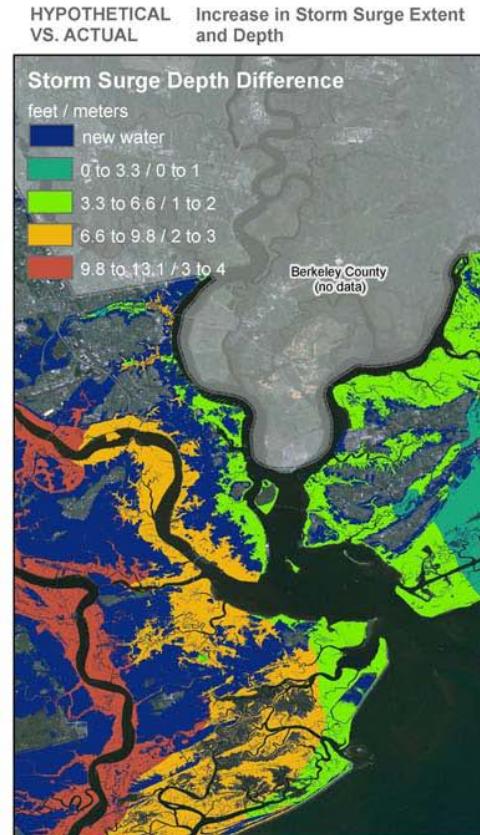
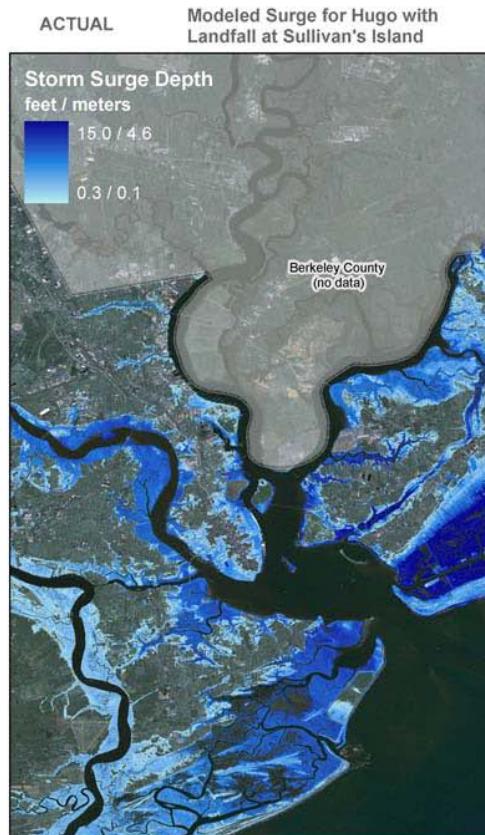
Charleston, SC
September 21, 1989



It Could've Been Worse!

A Visualization of Storm Surge if Hurricane Hugo Had Made Landfall Just 20 Miles to the South

Hurricane Hugo Characteristics at Landfall: Category 4; Winds=120 knots (138 mph); Pressure=935 MB; Northwest Movement=23 knots (26 mph); Tide=0.6 m (2.1 ft)



NOAA Coastal Services Center

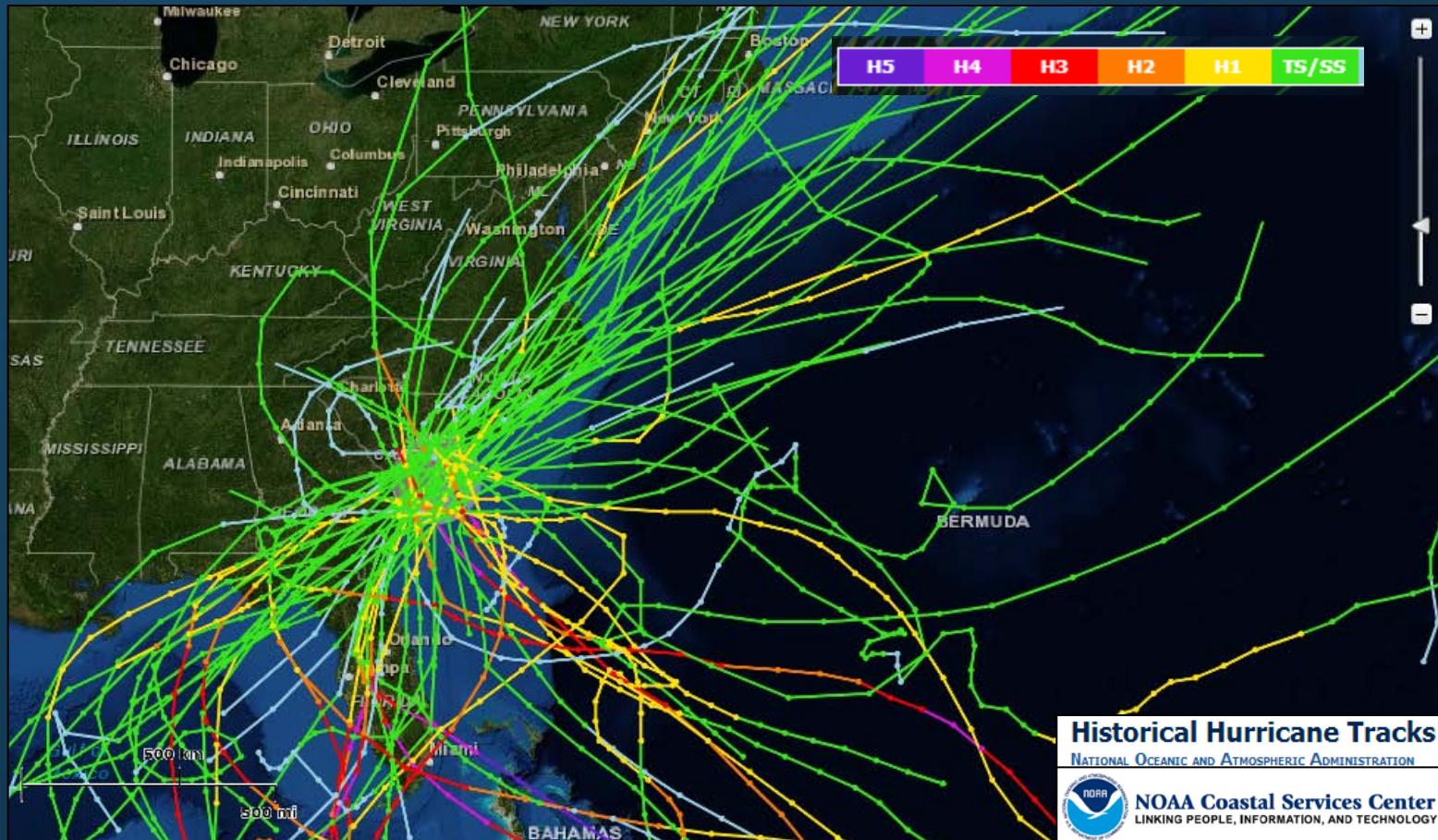
http://www.erh.noaa.gov/chs/images/hugo/hugo_surgecomparison.jpg



South Carolina Sea Grant Consortium



Hurricanes/Tropical Storms 1900-2012



Precipitation Trends

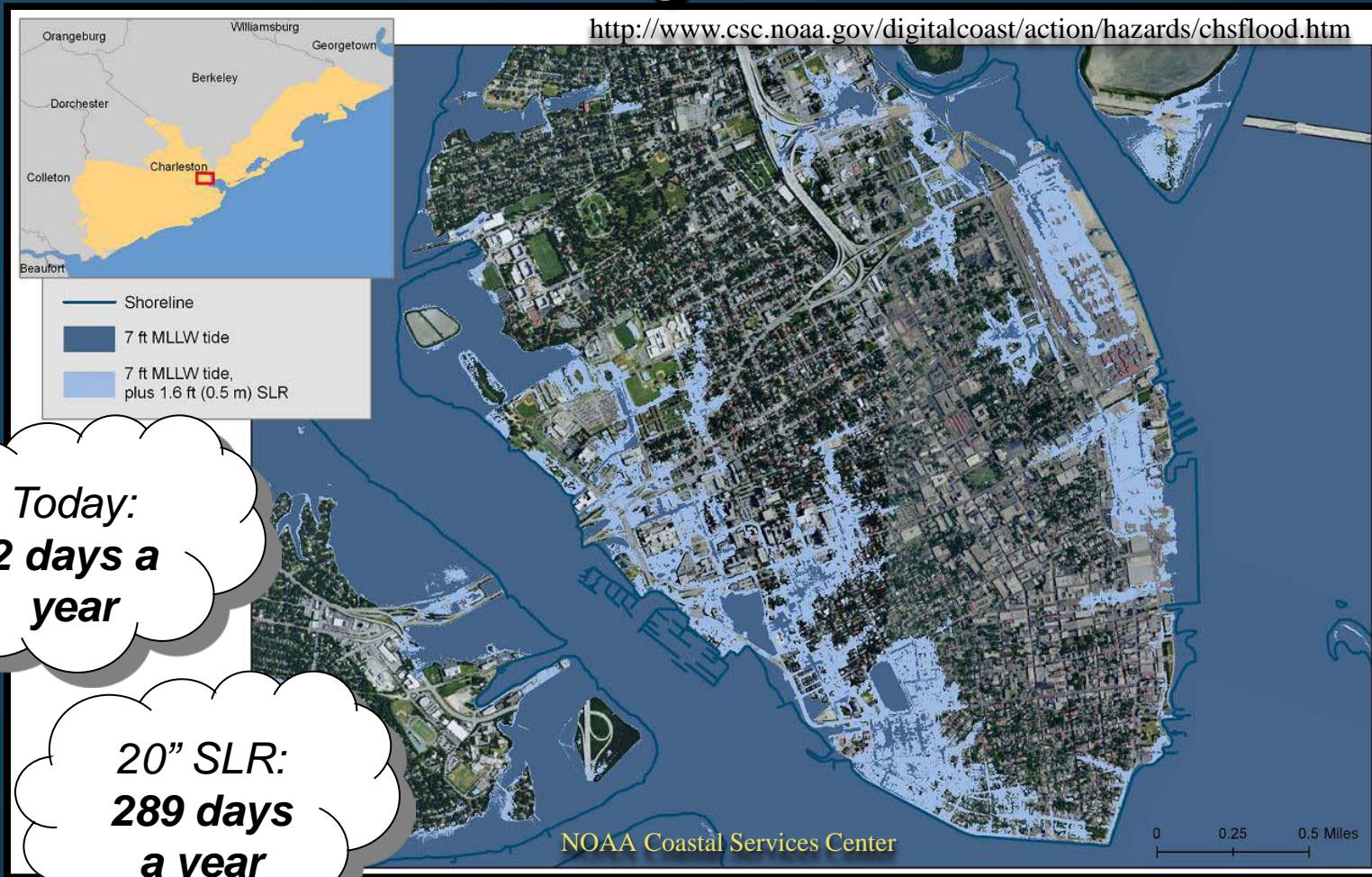
- Rainfall continues to be more variable
 - More frequent floods
 - More frequent droughts



- Impacts/Effects
 - Water quality & quantity
 - Salinity/DO changes
 - Public health implications



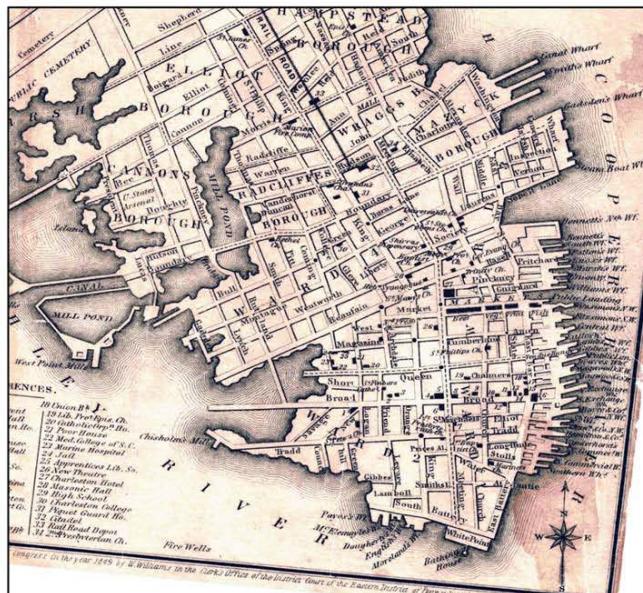
SLR & Coastal Flooding from Astronomical Tides



Sea Level Rise and Artificial Fill in Charleston, SC



Historic Map (1849)



0 0.325 0.65 1.3 Miles

Potential Impact of Sea Level Rise



Legend

- High Tide
- +2 ft.
- +3 ft.

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCan, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Map (left): Department of Geography/University of Alabama; Map (right): Sean Bath/S.C. Sea Grant Consortium



South Carolina Sea Grant Consortium



So, What's at Stake?



South Carolina Coast - Setting

- 8 coastal counties; 1.3M residents
- 28% of S.C. population resides in the 8 coastal counties
- By 2025, coastal population will increase by 700,000 to 2M
- 20% of the total salt marsh area on the entire east coast
- Includes 65% of state's 4,500,000 acres of wetlands
- Property value in SC's coastal counties = ~\$229.6B
- S.C. ranked 6th nationally in # of flood insurance policies



Map courtesy S.C. Department of Health and Environmental Control – Ocean and Coastal Resource Management

Sources include: SC Coastal Zone Management Plan (1979); Clemson University Regional Economic Development Research Laboratory (2002); S.C. Budget and Control Board Office of Research and Statistics (2005, 2010); University of South Carolina Moore School of Business (2009); National Ocean Economics Program (www.OceanEconomics.org/NationalReport:2009); S.C. Department of Natural Resources (<http://www.dnr.sc.gov/water/flood/index.html>; 2014)



Charleston Region - Setting

- Berkeley-Charleston-Dorchester county region spans 3,163 square miles
 - Land area: 2,618 sq. mi.
 - Water area: 558 sq. mi.
- City of Charleston Area: 131 sq. mi.
 - Land Area: 112 sq. mi.
 - Peninsula Area: 8 sq. mi.
- Region includes 17 Sea Islands
- Region has over 200 sites on the National Historic Register

Sources: U.S. Census Bureau, 2010 Census; Fact Sheet, City of Charleston; SC Historic Preservation Office; McKenzie, M.D., and L.A. Barclay. 1980.

Ecological characterization of the Sea Island coastal region of South Carolina and Georgia, U.S. Fish & Wildlife Service



Maps: Charleston Regional Development Alliance; www.crda.org



Charleston Region - Economy

- From 2004-2012, the Charleston's Gross Regional Product (GRP) increased by 35.4%
 - \$33B Regional Gross Domestic Product
- Charleston region is # 1 in US for growth in manufacturing jobs
- Regional military installations have an economic impact of \$8.8B
- Regional public Higher Education institutions employ 16,300 workers and teach 33,000 students
 - Annual economic impact of \$4.4B
- Value of agricultural products from Charleston County is \$24M

Sources: Charleston Regional Development Alliance; US Department of Commerce, Bureau of Economic Analysis; Charleston Metro Chamber of Commerce; US Department of Agriculture, Census of Agriculture



Charleston Region - Economy



- The City of Charleston was named the #1 tourist destination in the US by Condé Nast Traveler
- 4.8 million visitors to Charleston in 2012
- Visitors to the region have increased by 70% over the past 20 years
- Tourism adds \$3B to regional economy/year
- Charleston cruise industry has a regional economic impact of \$37M/year

Sources: Charleston Tourism Management Plan, 2015 Update; Crofts, J. & F. Hefner, An estimate of the economic contributions of the SC State Ports Authority's 2010 cruise ship activity to the region's economy (Report prepared for SC State Ports Authority)



Charleston Region – THE Port

- Port of Charleston has a statewide economic impact of \$45B/year
- Supports 300,000 jobs overall
 - 50,700 jobs in the Charleston Region
- Most efficient deepwater port in the nation
- The region's exports are valued at \$3.9B/year
- Ranked top 10 in value of int'l shipments (>\$50B)



Sources: SC Maritime Association; Charleston Regional Development Alliance



South Carolina Sea Grant Consortium



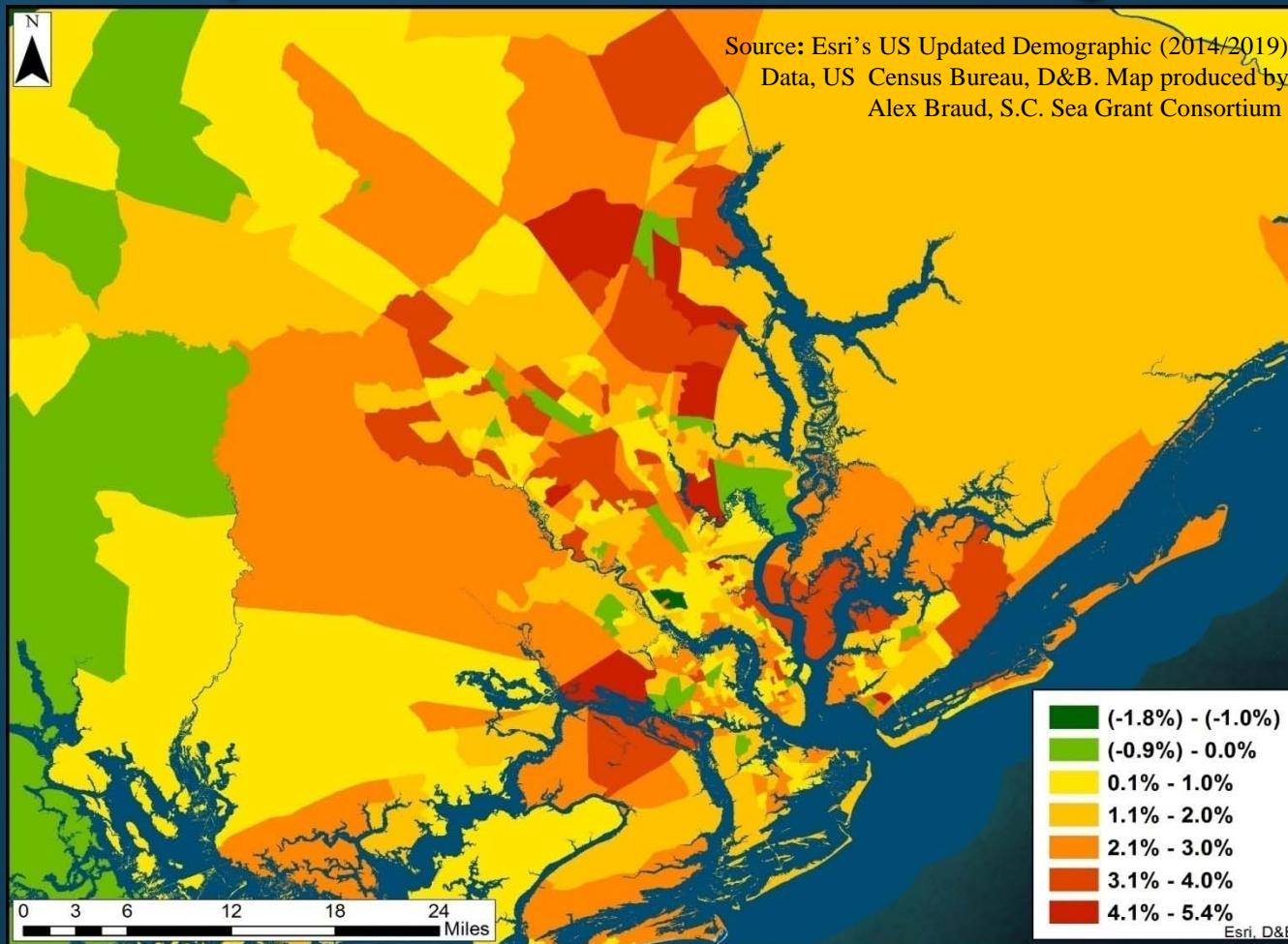
Charleston Region - Population

Metropolitan Statistical Area (MSA)/County	2000 Census Population	2010 Census Population	% Change in Population
<i>Charleston-North Charleston MSA</i>	<i>549,033</i>	<i>664,607</i>	<i>21.1</i>
Berkeley	142,651	177,843	24.7
Charleston	309,969	350,209	13.0
Dorchester	96,413	136,555	41.6

Source: U.S. Census Bureau, U.S. Census Bureau, Census 2000 and Census 2010; S.C. Department of Health and Environmental Control - Vital Records Department. Population projections calculated by S.C. Budget and Control Board, Office of Research and Statistics



Predicted Population Growth Charleston Region, 2014-19



Considerations...for Community Resiliency

- Refine the science and information to address decision-making at the scale it occurs, temporally and spatially
- Think a bit further into the future when making decisions
- Make decisions that are a bit more cautious than we have before
- Charleston has benefitted from the work of many institutions and organizations on resiliency issues; we need to take advantage of the multitude of resources that are at our disposal
- Resiliency is not new to the Charleston region; we have a foundation to build upon



**Rick DeVoe
Executive Director
SC Sea Grant Consortium
rick.devoe@scseagrant.org
843-953-2078**

...with special thanks to Andrea Sassard, Dr. Liz Fly and Alex Braud,
and my colleagues with the CRN



South Carolina Sea Grant Consortium

