### South Carolina



#### **Planning Education Advisory Committee**

Committee Members:

December 4, 2015

Stephen G. Riley, Chairman Representing MASC Term Expires: 2017

Phillip L. Lindler Representing SCAC

Cliff Ellis Representing Clemson University Term expires: 2016

**Dennis Lambries** Representing USC Term expires: 2016

Wayne Shuler Representing SCAPA Term expires: 2018

Philip Slayter, AICP **Planning Director** Colleton County 31 Klein Street Walterboro, SC 29488

Dear Mr. Slayter:

Re: Climate Change and Sea Level Rise w/Local Impacts

On November 19, 2015, I received the Program Materials you submitted for accreditation of the Continuing Education Course detailed above. Upon receipt of your application, I sent an email to confirm receipt by all Committee members and set a deadline for comments.

Under the "no objection policy" adopted on July 8, 2009, your request is considered approved. Your signed "Notice of Decision" is attached. Formal, after-the-fact approval will be handled as part of a Consent Agenda at a regular quarterly meeting of the Committee, which will is scheduled for January 20, 2016 at 1:30 p.m.

Thank you for your efforts to help make this program a success.

Sincerely,

Stephen G. Riley, ICMA ~ CM Chairman

Phillip Lindler, Cliff Ellis, Dennis Lambries and Wayne Shuler cc:

South Carolina Planning Education Advisory Committee (SCPEAC)

#### NOTICE OF DECISION

#### **Colleton County – Climate Change and Sea Level Rise w/Local Impacts**

#### **12.** The following action has been taken by the SCPEAC on this application:

ACCEPTED WITHOUT OBJECTION Date: December 4, 2015

REVIEWED BY FULL COMMITTEE Date:

- a) <u>X</u> ACCREDITED for <u>1.5</u> CE credits
- b) \_\_\_\_\_ DENIED ACCREDITATION
  - i. Reason:
- c) \_\_\_\_\_ RETURNED for more information

#### **13.** If accredited:

- a) Authorized Course No.: <u>2015-12</u>
- b) Date of accreditation: <u>12-04-2015</u>

Signature of SCPEAC Representative:

For further information, contact Mr. Stephen Riley, Chairman, 843-341-4701 or <u>stever@hiltonheadislandsc.gov</u>

South Carolina Planning Education Advisory Committee (SCPEAC)

#### LOCAL OFFICIAL'S CERTIFICATION OF NEED FOR CONTINUING EDUCATION PROGRAM

**NOTE:** The Planning Director of a jurisdiction, or the COG Director serving a jurisdiction, may certify to the SCPEAC that a particular continuing education program is appropriate to meet the needs of that jurisdiction.

This certification form, together with the required information referenced therein, shall be submitted to the Committee. If no objections are raised by a member of the SCPEAC within 10 working days of receipt, the continuing education program shall be considered accepted. If an objection is raised, a teleconference meeting shall be scheduled, with appropriate public notice, as soon as reasonably possible, to review the application.

Applications are due no later than 30 days prior to the first scheduled presentation of a program or class. The Committee will consider extenuating circumstances where the 30 day deadline cannot be met.

#### 1. Certifying Official's Information:

2.

a. Name: Thilip S. Skyter, AICP
b. Title: Pknning Dilector
c. Jurisdiction for which certification is being made: Collabor County
d. Address of Jurisdiction: 31 Klein Street
e. City: Welterboro
Zip Code 29488
f. Telephone: 343 549 1709
g. Email: pskytere colleton conf.org
h. For COG Directors:
i. Name of COG:
ii. Address of COG:
iii. City:
Zip Code:
iv. Telephone:
v. Email:
Information on Educational Program:
a. Title of Program: Climate Change and See level Rige w/ wal importe
b. Name of Organization that is providing or sponsoring the Program:
i. Organization: NOAA Office for Cosstal Managent

ii. Street Address: 2234 Hobson Avenue				
iii. City: <u>Charlestan</u>				
State: SC				
Zip Code: 29405				
iv. Contact Person: Doug March				
v. Title: Constal Hazards Specialist				
vi. Telephone: 843 740 1334				
vii. Email: doug. marcy @ no99.901				
c. Date(s) and Location(s) of Program:				
Between Dec. 14-23, 2015 Colleton camp Comil Chembers				
d. Briefly describe the program and why it is relevant to your jurisdiction:				
Sea level rise attects lead use in Colleton compas a coastel plain com	Ky			
3. Method of presentation (check all that apply. All sessions must have a Coordinator present):				
a. Presentor(s) in room with participants	9			
b. Live presentation via close circuit TV, video conferencing, or similar; Coordinator present				
c. Videotape or CD/DVD presentation; Facilitator present				
d. Webinar or similar; Coordinator present				
e. Other (describe)				

#### 4. Description of materials to be distributed (check/fill in all that apply):

a. Powerpoint handout:	D	number of slides: 35
b. Other handouts:		total pages:
c. CD/DVD:		
d. Other (describe)		
e. None:		
5. When are materials distributed?		
a. Sent before the program:	B	
b. Handed out at the program:		
c. Other (describe)		

#### 6. Required attachments (5 copies distributed as described below):

a. Course description and outline including estimated time per section

- b. Brochure, if available
- c. Course Presenter(s) and credentials (include brief resumes and qualifications)
- d. Copies of all handouts and course materials
- e. Evaluation Form and method of evaluation (each program must be evaluated)

#### 7. Instruction Time:

a. Indicate the total minutes of instruction time:

1.5 home

Note: Breaks, meals and introductions should not be counted. A reasonable period of Q and A should be included and counted.

#### 8. Local contact person (if other than Certifying Official):

a. Name:	
b. Title:	
c. Jurisdi	ction:
d. Teleph	ione:
e. Email:	

#### 9. Certification. By Submitting this application, the applicant agrees to:

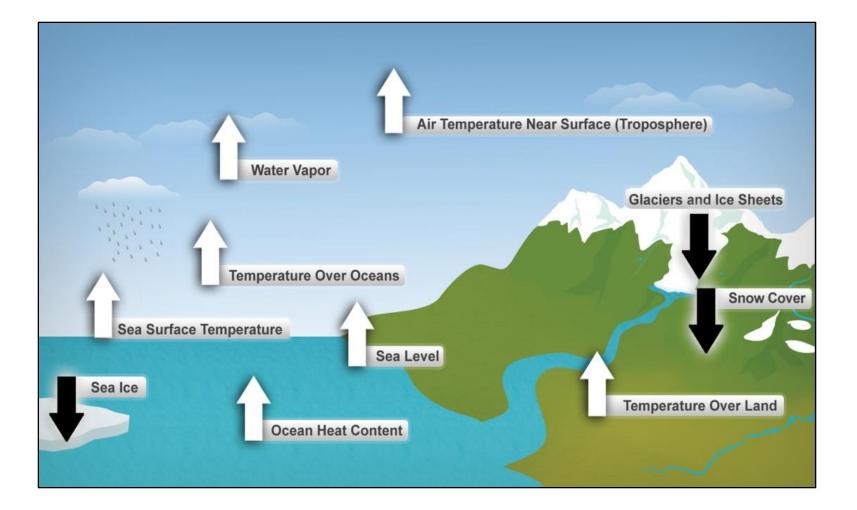
- a. Allow in-person observation, without charge, of the Program by the SCPEAC Committee members. Any food, travel or lodging costs will be the responsibility of the Committee member(s).
- b. The Certifying Official acknowledges that its approval for this Program may be withdrawn for violations of the regulations or failure to comply with the agreements and representations contained herein and as may be required by the SCPEAC.
- c. I do hereby certify that this program satisfies the current continuing education needs of this community.

i. Name:	Think Starter Arci?	
ii. Title:	Planmy Drich	
iii. Signature		
iv. Date:	11-16-15	

# Climate Change and Sea Level Rise with a Focus on Local Impacts

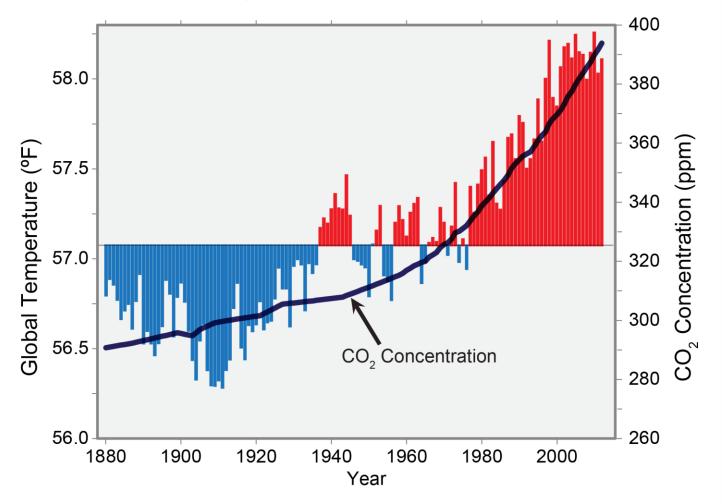
Doug Marcy Coastal Hazards Specialist NOAA Office for Coastal Management

# 10 Indicators of a warming world

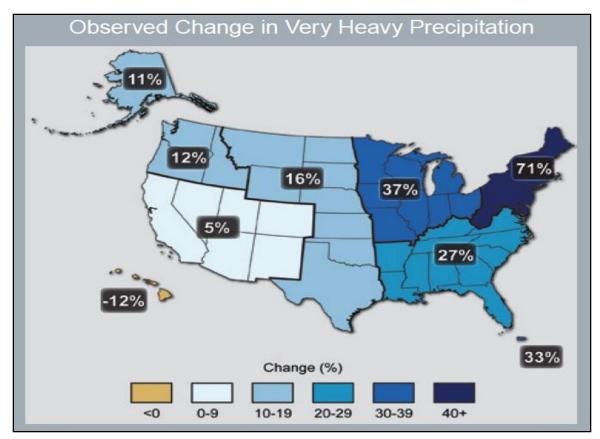


### Increase in Global Temperature

**Global Temperature and Carbon Dioxide** 

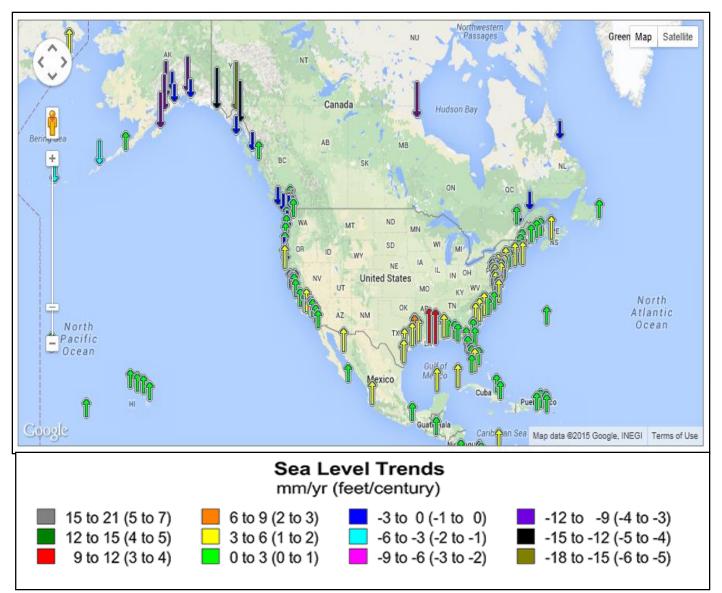


### **Increase in Very Heavy Precipitation**



Percent change from 1958 to 2012 in the amount of precipitation falling in very heavy events (the heaviest 1%).

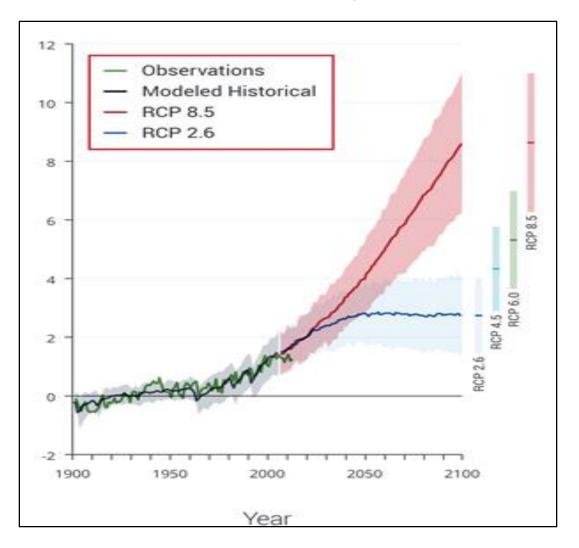
# Sea Level Trends



# Storm Trends

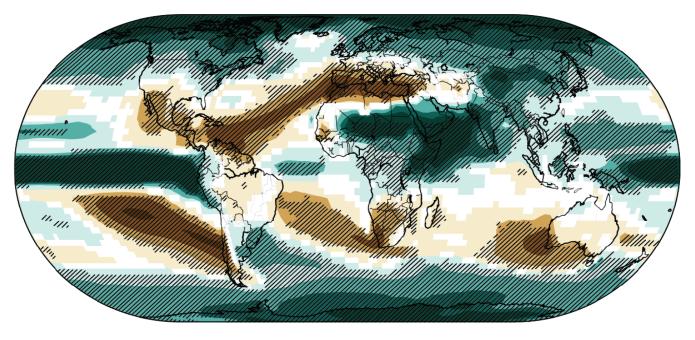
• Not yet possible to identify robust trends in tropical cyclone activity for the Atlantic.

### **Future Temperature**



# **Precipitation Projections**

Continued Emissions Increases (RCP 8.5)

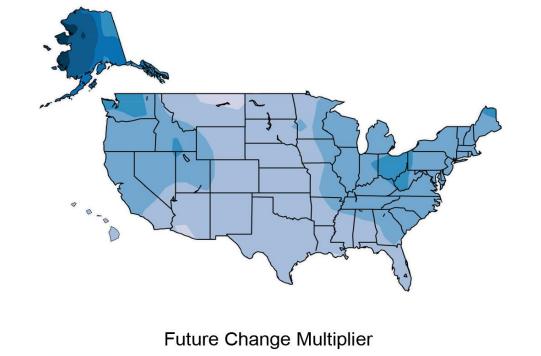


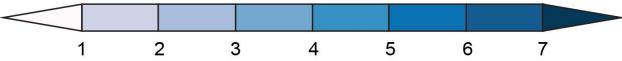
#### Precipitation Change (%)

-30	-20	-10	0	10	20	30

### **Increased Heavy Precipitation Events**

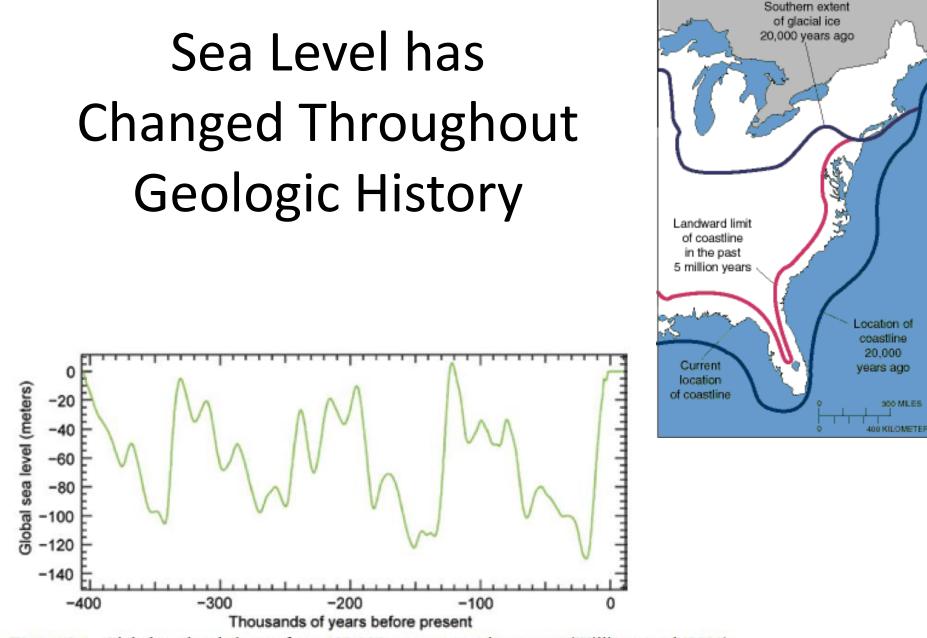
Continued Emissions Increases (RCP 8.5)





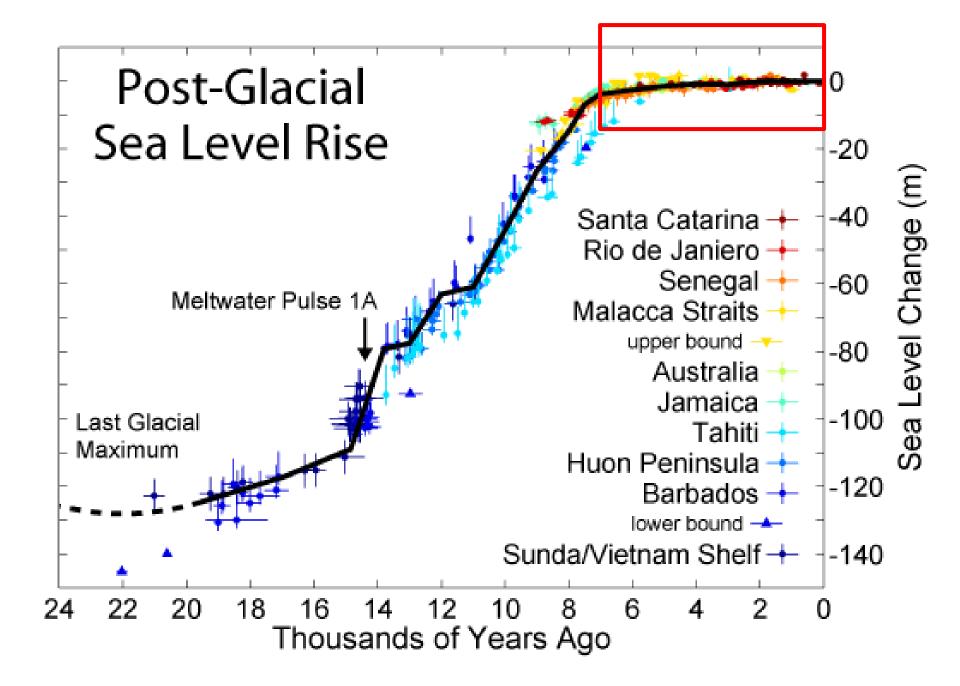
# Hurricane and Severe Storms

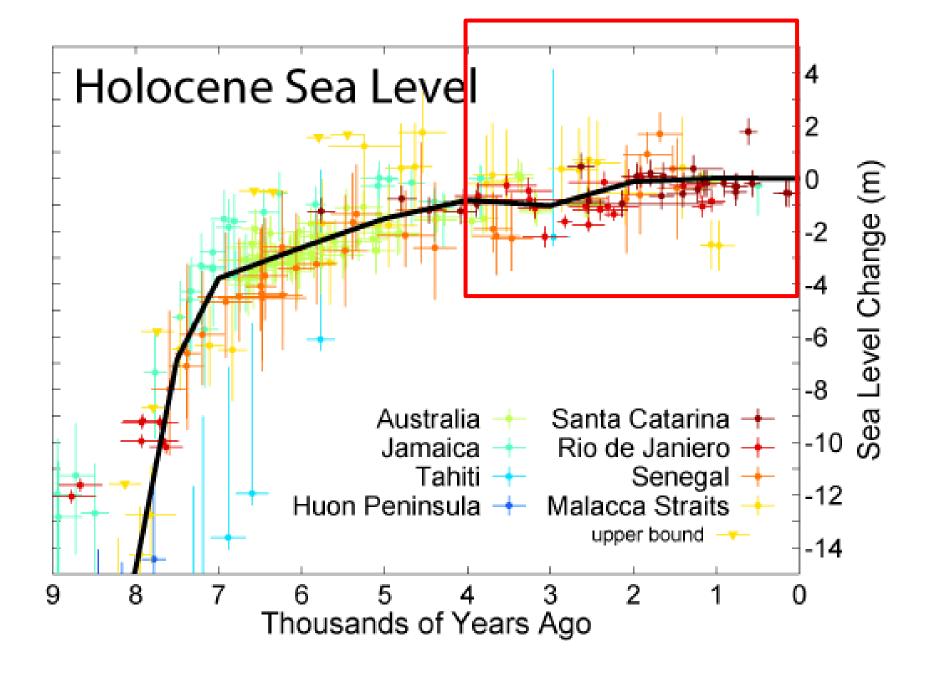
- By late this century, models, on average, project a slight decrease in the annual number of tropical cyclones, but an increase in the number of the strongest (Category 4 and 5) hurricanes.
- Recent research has yielded insights into the connections between global warming and the factors that cause tornadoes and severe thunderstorms (such as atmospheric instability and increases in wind speed with altitude). Although these relationships are still being explored, a recent study suggests a projected increase in the frequency of conditions favorable for severe thunderstorms.

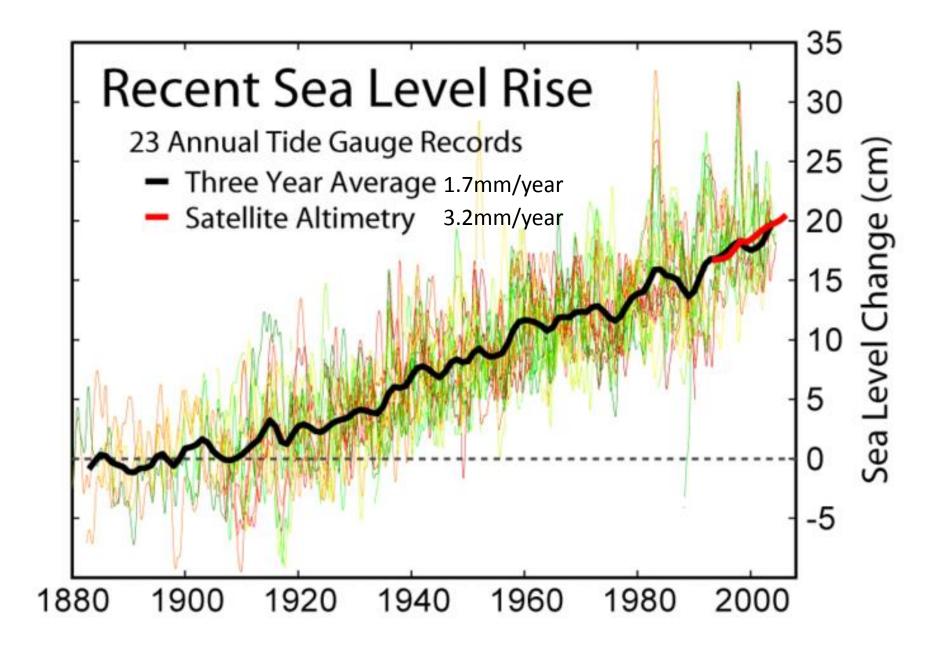


300 MILES

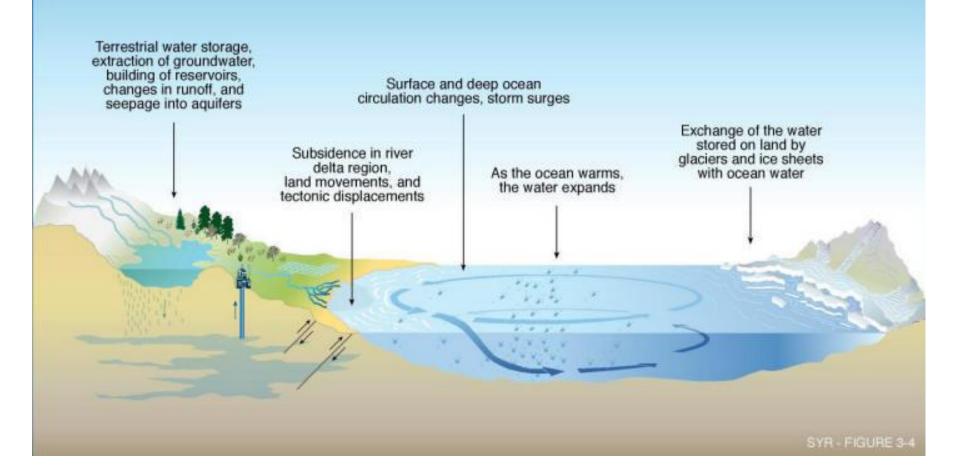
Figure 2.1. Global sea level change from 400,000 years ago to the present (Williams et al. 2009).



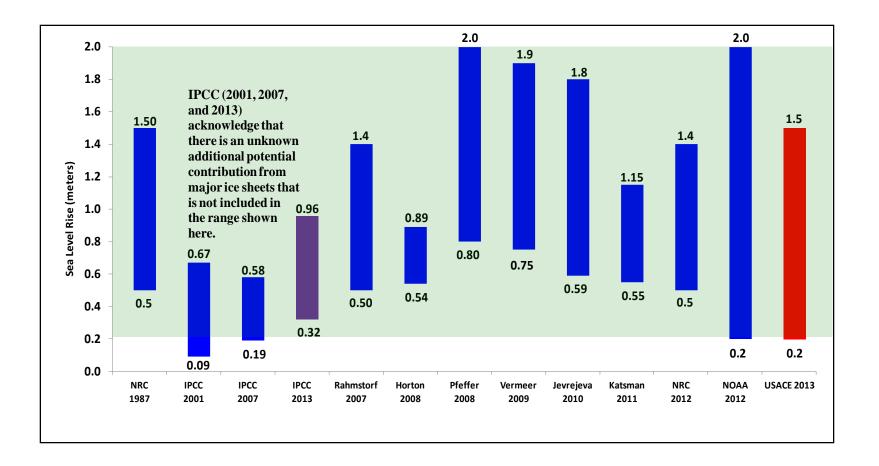




#### What causes the sea level to change?

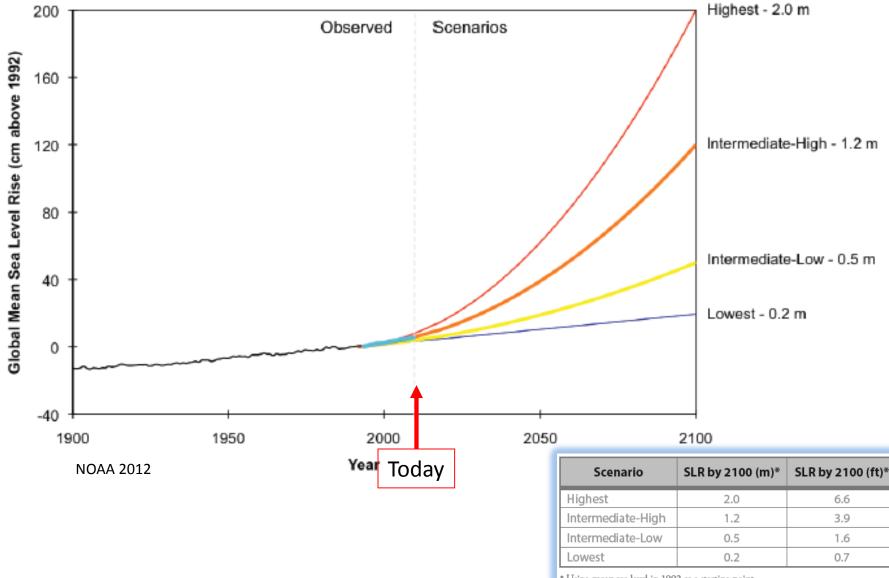


### Literature Review



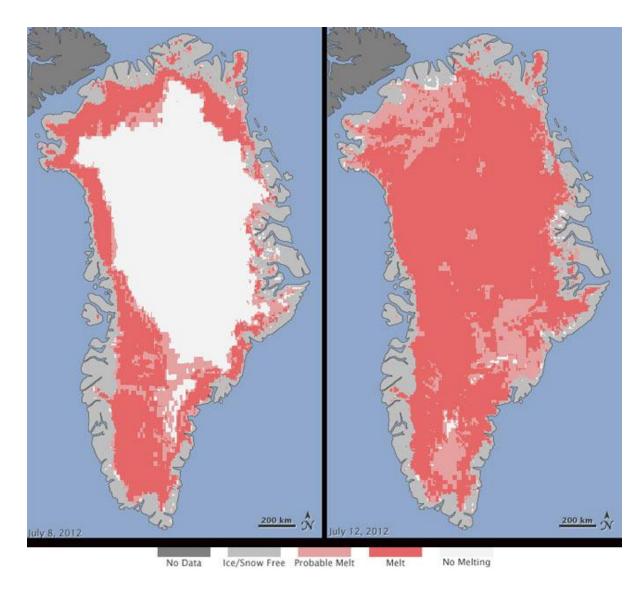


#### Global mean sea level rise scenarios



\* Using mean sea level in 1992 as a starting point.

### Greatest source of uncertainty?



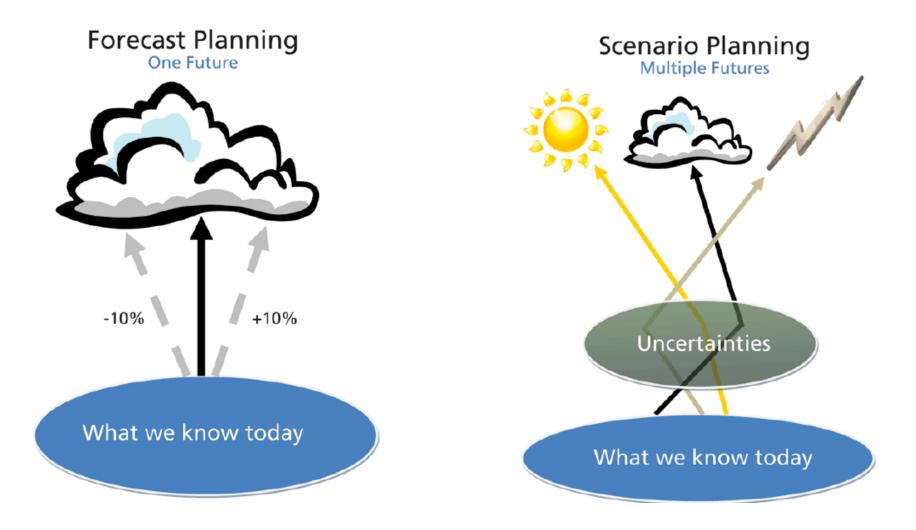
### SCENARIOS...

...<u>ARE</u> trajectories of environmental change for the purpose of risk and vulnerability assessment to inform the development of robust adaptation options

...<u>ARE NOT</u> predictions or projections of what will happen

...<u>ARE NOT</u> formed under the assumption of reducing uncertainty

### Why use multiple scenarios?



### A Decision Analogy

Tomorrow there is a chance of rain, but what do you have planned for tomorrow?



### Why such a large scenario range?



Higher risk tolerance:

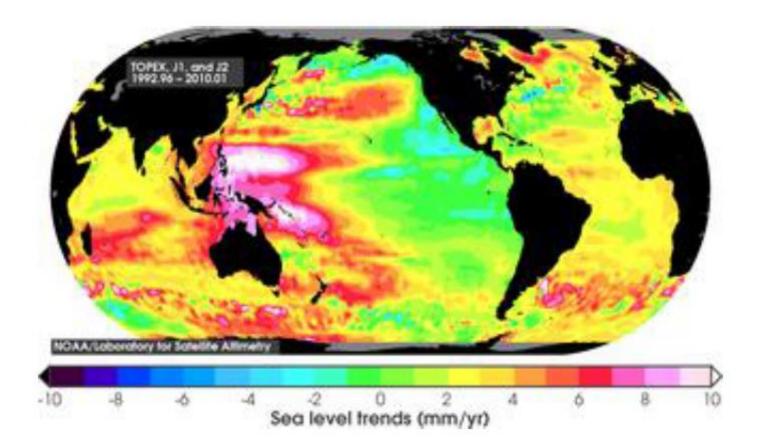
- Greater flexibility to accommodate flooding
- Lower consequence
- Ability to change in near term



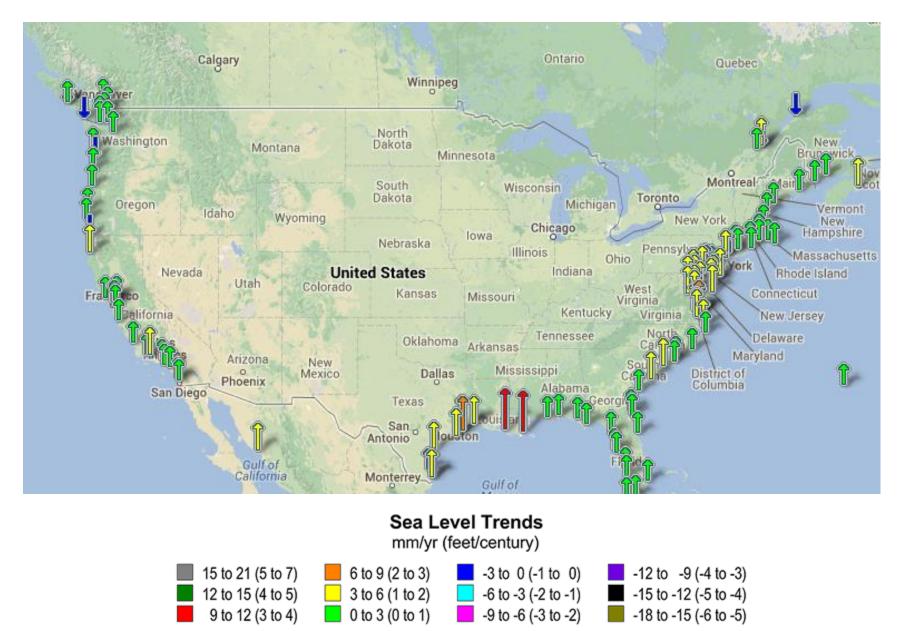
Lower risk tolerance:

- Little flexibility to accommodate flooding
- Higher consequence
- Inability to change in near term

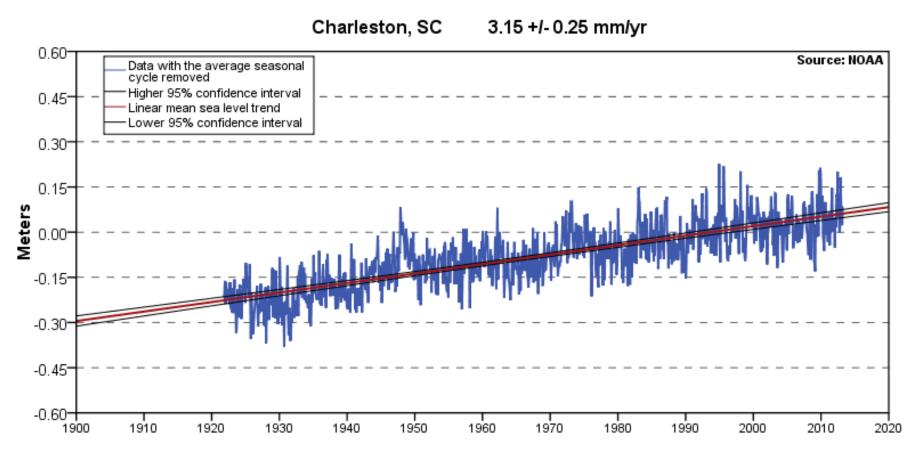
#### Sea Level is Not Rising at the Same Rate Everywhere



### Land Motion Plays a Big Part Too

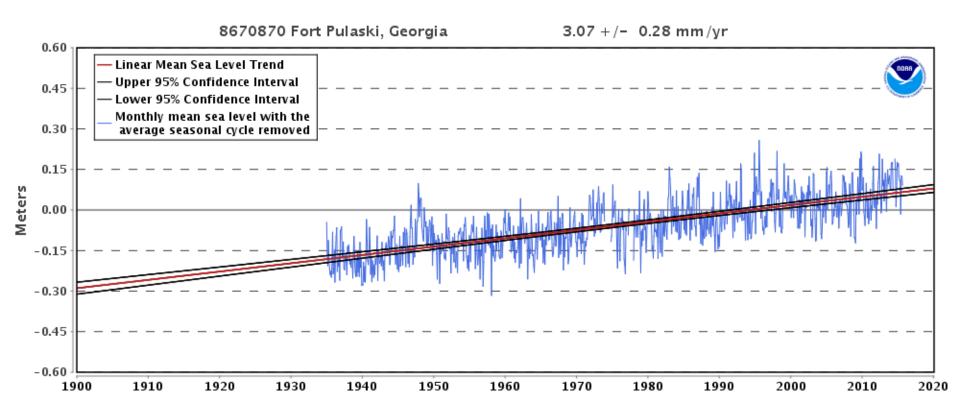


# Local Sea Level Rise



The mean sea level trend is 3.15 millimeters/year with a 95% confidence interval of +/- 0.25 mm/yr based on monthly mean sea level data from 1921 to 2006 which is equivalent to a change of 1.03 feet in 100 years.

## Local Sea Level Rise

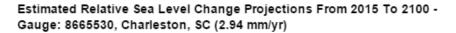


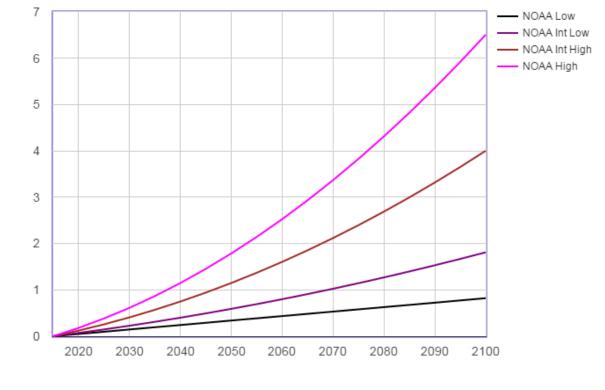
The mean sea level trend is 3.07 millimeters/year with a 95% confidence interval of +/- 0.28 mm/yr based on monthly mean sea level data from 1935 to 2014 which is equivalent to a change of 1.01 feet in 100 years.

### Local Projections - Charleston

Estimated Relative Sea Level Change from 2015 To 2100Colleton 8665530, Charleston, SC					
NOAA's Regional Rate: 0.00965 feet/yr All values are expressed in feet					
Year	NOAA Low	NOAA		NOAA High	
2015	0.00	0.00	0.00	0.00	
2020	0.05	0.07	0.12	0.18	
2025	0.10	0.15	0.26	0.38	
2030	0.14	0.23	0.41	0.61	
2035	0.19	0.31	0.57	0.87	
2040	0.24	0.40	0.75	1.15	
2045	0.29	0.49	0.94	1.45	
2050	0.34	0.59	1.15	1.79	
2055	0.39	0.69	1.37	2.14	
2060	0.43	0.80	1.60	2.53	
2065	0.48	0.91	1.85	2.93	
2070	0.53	1.02	2.12	3.37	
2075	0.58	1.14	2.40	3.83	
2080	0.63	1.27	2.69	4.31	
2085	0.68	1.40	3.00	4.82	
2090	0.72	1.53	3.32	5.36	
2095	0.77	1.67	3.65	5.92	
2100	0.82	1.81	4.00	6.51	
Print Table					

RSLC in feet





Year

### Local Projections - Savannah

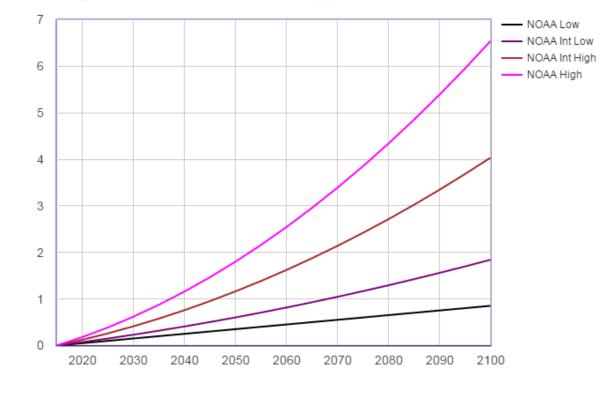
#### 8670870, Fort Pulaski, GA NOAA's Regional Rate: 0.01004 feet/yr All values are expressed in feet NOAA NOAA NOAA NOAA Year Int Low Int High High Low 0.00 0.00 2015 0.00 0.00 2020 0.05 0 07 0.12 0 18 2025 0.10 0.15 0.26 0.39 2030 0.15 0.23 0.41 0.62 0.58 2035 0.20 0.32 0.88 2040 0.25 0.41 0.76 1.16 2045 0.30 0.50 0.95 1.47 2050 0.35 0.60 1.16 1.80 2055 0.40 0.71 1.39 2.16 2060 0.45 0.82 1.62 2 54 0.93 1.87 2.95 2065 0.50 2070 1.05 2.14 3.39 0.55 2075 0.60 1.17 2.42 3.85 2.71 2080 0.65 1.29 4.34 2085 0.70 1.43 3.02 4.85 0.75 3.35 5.39 2090 1.56 2095 0.80 1 70 3 68 5.95 2100 0.85 1.84 4.04 6.54 Print Table

Estimated Relative Sea Level Change

from 2015 To 2100Colleton

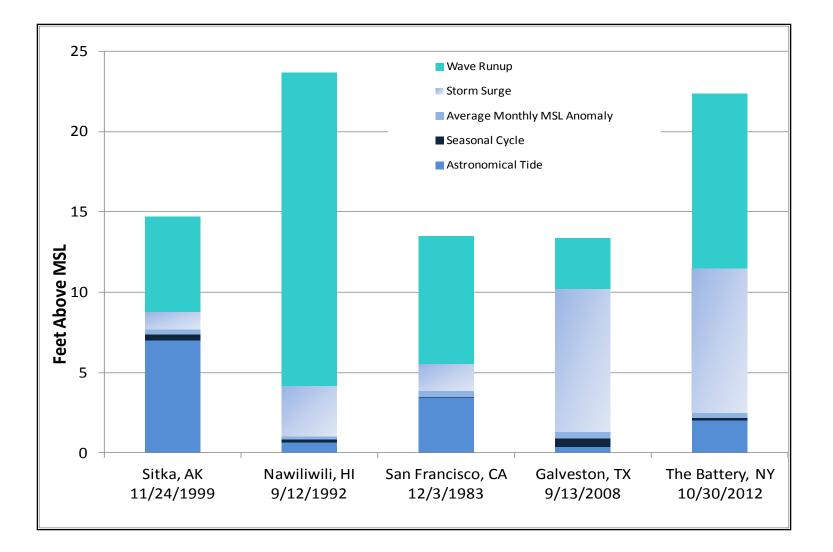
RSLC in feet

Estimated Relative Sea Level Change Projections From 2015 To 2100 -Gauge: 8670870, Fort Pulaski, GA (3.06 mm/yr)

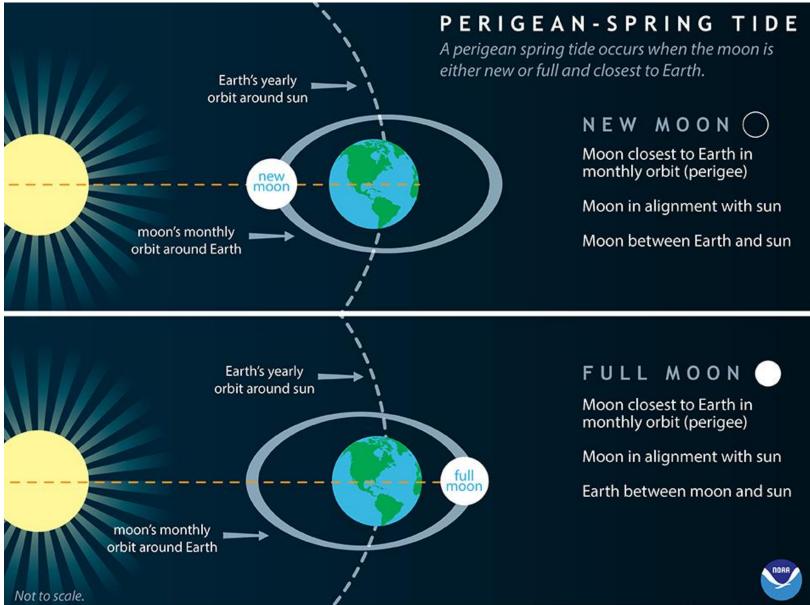


Year

# **Components of Total Water Level**



# **Recent High Tide Events**





# **King Tides**

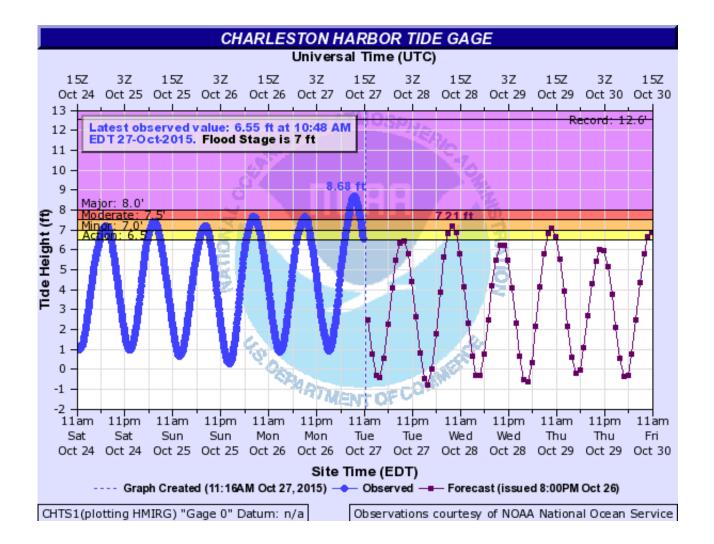
http://mycoast.org/sc

https://sites.google.com/site/tybeekingtide/

**MyCoast: South Carolina** 

http://noaa.maps.arcgis.com/apps/MapJournal/index.html?appid =dddff4fa30bb4a91bfd1d9e758a56929

# **Nuisance Flooding**

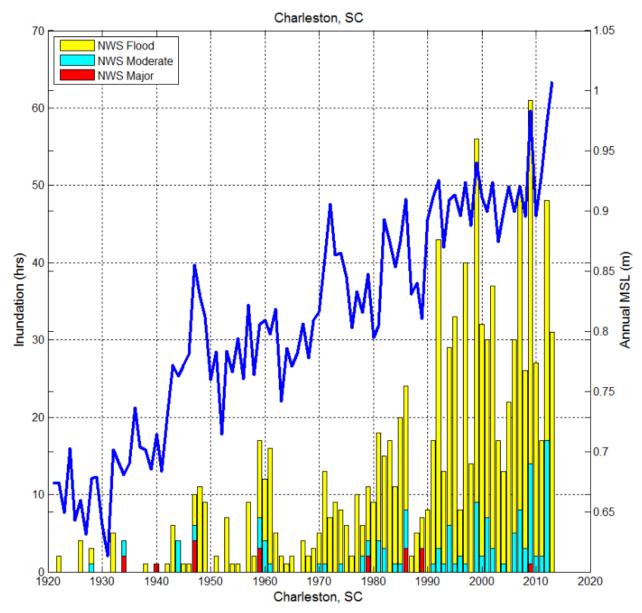


# Anomaly In October

#### 8665530 CHARLESTON, COOPER RIVER ENTRANCE SC



# **Increase in Events**



# Demonstrations

Sea Level Calculations for Charleston and Fort Pulaski gages for different scenarios <u>http://www.corpsclimate.us/ccaceslcurves.cfm</u>

SLR and Coastal Flooding Impacts Viewer demo for Colleton County <u>http://coast.noaa.gov/digitalcoast/tools/slr</u>

Coastal Food Exposure Mapper demo for Colleton County http://coast.noaa.gov/digitalcoast/tools/flood-exposure

Coastal County Snapshot for Colleton County http://coast.noaa.gov/digitalcoast/tools/snapshots

Climate Central Surging Seas Risk Profile for Colleton County (Economic Impact) <u>http://ss2.climatecentral.org/#12/32.7141/-</u> 80.5466?show=satellite&level=5&pois=hide

<u>http://ssrf.climatecentral.org/#location=SC\_County\_45029&state=South+Carolina&le</u> <u>vel=5&geo=County&pt=t&target=&p=L&protection=tidelthresh&folder=Population</u>

### Climate Change and Sea Level Rise with a Focus on Local Impacts

Doug Marcy, Coastal Hazards Specialist, NOAA Office for Coastal Management 09/29/2015

I.Climate Change Overview (source <u>3<sup>rd</sup> National Climate Assessment</u>)

- A. Observed Climate Change
  - 1. Temperature Trends
  - 2. Precipitation Trends
  - 3. Sea Level Trends
  - 4. Storm Trends
- B. Future Climate Change (source <u>3<sup>rd</sup> National Climate Assessment</u>)
  - 1. Emission scenarios and future temperature
  - 2. Projected precipitation trends
  - **3.** Projected storm trends
    - a) Hurricanes
    - b) Severe Storms
  - 4. Projected sea level trends

II.Sea Level Rise (source <u>3rd National Climate Assessment</u>, and NOAA)

- A. Sea Level Measurement from Tide Gauges
- B. Sea Level Measurement from Satellite Altimetry

- C. What causes Sea Level Change?
- D. Past Sea Level History
- E. Sea Level Rise and Future Projections
  - 1. Global
  - 2. Local
  - 3. Risk-Based Framing and Using Scenarios
- F. Components of total water level (SLR is just one)
  - 1. Average monthly sea level
  - 2. Astronomical Tide
  - 3. Seasonal cycle
  - 4. Storm surge
  - 5. Wave runup
- G. Nuisance flooding King Tides / Recent Flood Event

#### **III.Local Impacts and Mapping (tools/data)**

A. Sea Level Calculations for Charleston and Fort Pulaski gages for different scenarios http://www.corpsclimate.us/ccaceslcurves.cfm

B. SLR and Coastal Flooding Impacts Viewer demo for Colleton County http://coast.noaa.gov/digitalcoast/tools/slr

C. Coastal Food Exposure Mapper demo for Colleton County <u>http://coast.noaa.gov/digitalcoast/tools/flood-exposure</u>

D. Coastal County Snapshot for Colleton County http://coast.noaa.gov/digitalcoast/tools/snapshots

E. Climate Central Surging Seas Risk Profile for Colleton County (Economic Impact)

http://ssrf.climatecentral.org/#location=SC\_County\_45029&state=South+Carol ina&level=5&geo=County&pt=t&target=&p=L&protection=tidelthresh&folder =Population

## Heyward Lynah Horton

EDUCATION:				
1978-1982	The College of Charleston	Charleston, S.C.		
	Attended the College of Charleston with em electives in Business and Art. Member of th Officer on Student Union Board, V.P. of Big			
1974-1978	Christ School	Arden, N.C.		
	Graduated in top third of class with emphasis in Biology. Senior year was selected Prefect, Officer on Judicial Council, dorm head. Varsity letters in football and wrestling. Selected All-State in football and was responsible for correspondence with team members' families. Was selected as the junior year John Orr Scholar and was assistant librarian. Member of the Geology and Outing Clubs.			
WORK HISTORY:				
2011-Present	Colleton County Economic Alliance, Walterboro, SC			
	Executive Director – Responsible for coordinating the economic development activities of Colleton County.			
	ONGOING ACTIVITIES: Maintain expert knowledge of available sites, buildings and infrastructure. Maintain current knowledge of state & regional business costs and applicable state & local incentives. Skilled ability to articulate the value proposition. Have working knowledge of environmental constraints and permitting processes. Active in project intelligence network. Maintain project-tracking files, information reporting to board of directors, allies & staff, expense management & reporting, develop custom sales presentations, develop maps and collateral materials for presentations. Coordinate product development including speculative buildings, industrial sites, parks and infrastructure. Develop budget for marketing trips & collaborate in overall budgeting. Coordinate public announcements for new & expanding companies. Mentor to other staff members. Organize marketing trips. Graduate of Economic Development Institute, University of Oklahoma.			

RESUME Page 2.			
1995-2011	Charleston Regional Development Alliance	Charleston, S.C.	
	Global Business Attraction – responsible for the three-county, Charleston region. Develo for all CRDA projects.		
1987-1995	Trident Economic Development Authority	Charleston, S.C.	
	Project Manager - responsible for industry r county, Charleston region. Participated in h relief.		
1985-1987	Charleston Trident Chamber of Commerce	Charleston, S.C.	
	Special Representative, Membership & Marketing – responsible for membership development and relationship management. Major emphasis in prospecting for, recruiting and retaining Chamber members and to building an ongoing financial base and volunteer pool.		
1985	Wild Dunes, Incorporated	Isle of Palms, S.C.	
	Front Office Staff Member - worked in receiving guests to the resort in a manner expected of a Four Star operation. Main duties included check-in and check-out of guests, coordination of housekeeping and maintenance in troubleshooting guest related problems. Responsible for cross-referencing cash register receipts and computer input on a daily basis.		
1983-1985	Kiawah Island Company	Kiawah Island, S.C.	
	Tennis and Golf staff member. Moved through a series of positions to assistant in in-shop merchandising, along with course and court scheduling, coordinating with group sales to organize & run tournaments for groups and conventions.		
1981-1985	Delivery / Relocation Service	Charleston, S.C	

	Self employed. Contracted special deliveries – especially antique furniture. Also relocated apartments and small businesses & provided courier services.				
1981-1985	Coles & Company (antiques)	Charleston, S.C.			
	Part-time employee. Assisted with containe arrangement and antique maintenance.	me employee. Assisted with container unloading, showroom gement and antique maintenance.			
1980-1981	John Gibson Company, Incorporated	Charleston, S.C.			
	Assistant Manager in charge of sales, inventory and correspondence with other dealers. Assisted in production of antique shows.				
1976-1978	Blair Mills, Incorporated (textiles)				
	Maintenance assistant. General maintenance of grounds, boiler, solid waste reduction pools, air transfer system, etc. Was trained to operate heavy equipment including forklift, front-end loader & bush hog.				
PERSONAL BACKGROUND:					

Grew up & attended public schools in Belton, S.C., until 1974. Interests include: hunting, fishing, genealogy, sailing, church. Current president of the Heyward Family Association.

Married; 1 son

Member of St. Michael's Episcopal Church: Former Chair, Sanctuary Committee, Building & Grounds Commission. Former Vestry Member. Current Tower Bell Ringer & Small Group Leader.

### ECONOMIC DEVELOPMENT HIGHLIGHTS:

Have assisted over 75 companies with their decision to locate in the Charleston region since the formation of the Alliance. Capital investment for those companies is well over \$3.0 billion & announced employment is over 12,000.

Major announcements have included:

Nucor Steel - \$500 million Nucor Expansion – 150 million Mikasa - 60 million Giant Cement Exp. – 120 million Vought & Global Aeronautica –\$560million Google - 650 million DuPont/Kevlar – 500 million Boeing – 750 million

### **PROFESSIONAL AFFILIATIONS:**

South Carolina Economic Developers Association & Industrial Relations Committee.

References Upon Request.

### **Training Evaluation Form**

Date: \_\_\_\_\_

Title and location of training: \_\_\_\_\_

Trainer: \_\_\_\_\_

Instructions: Please indicate your level of agreement with the statements listed below in #1-11.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The objectives of the training were clearly defined.	0	0	0	0	0
2. Participation and interaction were encouraged.	0	0	0	0	0
3. The topics covered were relevant to me.	0	0	0	0	0
4. The content was organized and easy to follow.	0	0	0	0	0
5. The materials distributed were helpful.	0	0	0	0	0
6. This training experience will be useful in my work.	0	0	0	0	0
7. The trainer was knowledgeable about the training topics.	0	0	0	0	0
8. The trainer was well prepared.	0	0	0	0	0
9. The training objectives were met.	0	0	0	0	0
10. The time allotted for the training was sufficient.	0	0	0	0	0
11. The meeting room and facilities were adequate and comfortable.	0	0	0	0	0

(More questions on back  $\rightarrow$ )

12. What did you like most about this training?

13. What aspects of the training could be improved?

14. How do you hope to change your practice as a result of this training?

Please share other comments or expand on previous responses here:

Thank you for your feedback!