Living with Water

April Turner and Amanda Guthrie
South Carolina Sea Grant Consortium

May 8, 2024
CTAR
Introductions

• Name
• Real Estate Agency
• Favorite Coastal Activity
Calling the Coast Home

Course Series:

Living with Water

The Land Water Connection

Tidelands, Water, and Beach: Regulations and Rebuilding

Coastal Lifestyle for Clean Water
South Carolina Coastal Information Network
https://www.sccoastalinfo.org/

Instruction and Information Provided by:

- ACE Basin National Estuarine Research Reserve
- Clemson University
- Coastal Carolina University
- North Inlet-Winyah Bay National Estuarine Research Reserve
- S.C. Sea Grant Consortium
- S.C. Dept. of Health and Environmental Control
- S.C. Dept. of Natural Resources
- University of South Carolina
Objectives and Agenda

- What does it mean to “Live with Water”?
- Our Coastal Landscape
- Tides, Storms, and Flooding
  - What questions are you asked about water, flooding, and storms?
- Break – 10 minutes
- Flood Maps
- Resources
- Questions and Wrap-Up
Poll

• How many years have you been working in real estate in coastal SC?
About Our Coast

• 190 linear miles of beaches
• 40 barrier islands and sea islands
• 350,000 acres salt marshes
• Over 20 million tourists per year
• > 30% of SC’s 5.1 million residents live in the 8 coastal counties
Greater Charleston Area

- McClellanville
- Awendaw
- Mt. Pleasant
- Charleston
- North Charleston
- Summerville
- Moncks Corner
Beach Access and Water Quality

https://gis.dhec.sc.gov/beachaccess/
S.C. has more than 20% of the East Coast salt marshes

Estuaries and Tidal Creeks

Tidal Creeks

Preface

“Many have the attitude toward smoking that we once had toward smoking: sure it’s bad, but it won’t be a problem for me.”

Anna Quindlen’s article, *Put ‘Em in a Tree Museum*, 2004

Tidal creeks are the primary aquatic link between stormwater runoff from the land and estuaries. Small tidal creeks begin in upland areas and drain into larger creeks, forming a network. The creeks increase in size until they join a tidal river, sound, bay, or harbor that ultimately connects to the coastal ocean. The upper regions or headwaters of tidal creeks are “first responders” to stormwater runoff and are an important habitat for evaluating the impacts of coastal development on aquatic ecosystems.

Coastal development has a negative impact on tidal creeks and ultimately impacts public health and the quality of coastal living. When the amount of impervious cover from development, including roads, parking lots, and roofs, in coastal watersheds exceeds 10–30 percent, the physical, chemical, and biological processes in tidal creeks are impaired and potential human uses of these important habitats decrease. Properties along the shores of developed tidal creeks become more vulnerable to flooding as impervious cover levels increase.

This booklet is based on a synthesis of over 15 years of research in tidal creek systems. It is designed to inform local and state decision-makers and citizens about the consequences of rapid, poorly planned coastal development on tidal creeks and coastal communities.
Greater Charleston Area
Natural Resources
Part 2: Tides, Storms, & Flooding
Poll

• What effects have you experienced from extreme weather?
  • Standing water on your street
  • Commute delays due to street flooding
  • Minor flooding in your home
  • Major structural damage to your home
  • Car damage from floodwaters
  • Wind damage
  • Evacuated ahead of a storm
  • Real estate sale affected
What causes sea level to change

Ocean-atmosphere Interaction

Ice Melting

Terrestrial Water Storage

Ocean Circulation

Density Changes

Vertical Land Motion

Source: Watson, recreated from Milne, 2009
Septic Tanks
Tide Levels

Water Level

5.7 ft above MLLW

NOAA/NOS/CO-OPS
Water Levels at 8665530, Charleston, SC
From 05/02/2024 00:00 LST/LDT to 05/03/2024 23:59 LST/LDT

NOAA/NOS/Center for Operational Oceanographic Products and Services

Credits: NOAA/NOS

https://tidesandcurrents.noaa.gov/
Datums for 8665530, Charleston, Cooper River Entrance, SC
All figures in feet relative to MLLW

- MHHW: 5.76
- MHW: 5.4
- DHQ: 0.36
- NAVD88: 3.14
- MLS: 2.92
- DTL: 2.88
- MTL: 2.79
- MN: 5.22
- GT: 5.76
- MLW: 0.18
- MLLW: 0
- DLQ: 0.19

NOAA/NOS/CO-OPS
Charleston Area Tides

https://water.weather.gov/ahps/
Select Charleston harbor station

https://water.weather.gov/ahps2/hydrograph.php?wfo=chs&gage=cht1
Tidal Flooding

2024 Predicted King Tides

Based on NOAA Astronomical Tide Predictions for the Charleston Harbor Tide Station

- April 8 – 10
- May 6 – 8
- August 19 – 20
- September 16 – 22
- October 16 – 21
- November 14 – 18

For details, see DHEC's Tide Tables page.

09/30/2023 | 10:38 am

Tidal Overview

1 hour 14 minutes after high tide

Data from CHARLESTON (CUSTOMHOUSE WHARF) (8.7 miles away)

- Water Level (at time of report): 10:38 am, 7.1'
- High Tide (Predicted): 9:15 am, 6.9'
- High Tide (Observed): 9:24 am, 7.8'

Summary of April 2024 South Carolina King Tides

Start Date: Apr 07 2024
End Date: Apr 13 2024
Highest Predicted Tide (astronomical): 6.7'
Highest Observed Tide: 7.2'
Predicted King Tides: 2
Observed King Tides: 5

(Click here for full tide details from NOAA Tides & Currents)
April 2024 King Tides

Water levels in feet relative to MLLW at Charleston Harbor Tide Station (8665530). Data from NOAA’s Tides and Currents.
https://gis.charleston-sc.gov/tideeye/
Adapting to Flooding in Charleston
Find local resources to help you adapt to flooding in the Lowcountry.

https://chucktownfloods.cofc.edu/
Observed and Projected Annual Number of Tidal Floods for Charleston, SC

Source: NCA State Summaries, NOS/NOAA
Beach Profiles

Credits: The Dune Book
Beach Profiles

- Dune scarp
- Prestorm profile
- Storm surge
- Dune and berm erosion
- Offshore bar builds from eroded dune and berm

Storm Profile

- Bermuda rebuilding

Post-Storm Recovery

Berm moves landward

Credits: The Dune Book
Beach Profiles

Berm widens

Vegetation emerges, dune recovery begins

Dune Rebuilds

Dune Growth with Time

Year 1
Year 2
Year 3
Year 4

Credits: The Dune Book
Folly Beach: Preserving the Edge of America

Storm History

- Oct. 2015 flood
- Oct. 2016 Matthew
- Sept. 2017 Irma
- Sept. 2018 Florence
- Sept. 2019 Dorian
- Sept. 2022 Ian
- August 2023 Idalia
https://gis.charleston-sc.gov/road-closures-regional/
Rain Bombs

Projected Change in Annual Precipitation

Change in Annual Precipitation (%)

-20  -15  -10  -5  0  5  10  >15
Storm Surge

[video]

https://www.nhc.noaa.gov/surge/
Business Operation
Public Safety
Tourism
More Frequent Heavy Rainfall
‘Wetter’ Hurricanes
Challenges to commutes
Activity and Break

What questions are you asked about water, flooding, and storms?

10 Minute Break
Poll

How comfortable are you with using flood maps?

- Comfortable
- Somewhat comfortable
- Not comfortable
Home Insurance

Grand Strand home insurance rates soar; why a perfect storm of factors are to blame
by Andrew James | Sun, March 12th, 2023, 10:56 PM EDT

MYRTLE BEACH
Grand Strand residents concerned about large increases in homeowners insurance
by Maya Lockett
Posted: Jul 13, 2023 / 07:00 PM EDT
Updated: Jul 14, 2023 / 09:24 AM EDT

Florida's insurance industry is in flux as Idalia cleanup begins
Homeowners face uncertainty amid the upheaval that has emerged in Florida's insurance industry in recent years.
Flood Insurance

- National Flood Insurance Program (NFIP) managed by FEMA
- All rates are ‘equal’ for a unique property, do not need to shop around
- Required to purchase in high-risk flood areas
- May be required by mortgage lender even if outside high-risk area
- Flood insurance will pay claims regardless of whether there is a Presidential Disaster Declaration
- Community discounts available based on Community Rating System classification
- With house purchase policy effective immediately, otherwise 30 day waiting period
- Floodsmart.gov
Flood Risk and Flood Insurance

Determine your flood risk. Everyone has a risk.

Low Risk
- Zone X (Unshaded)

Moderate Risk
- Zone X (Shaded)
- 0.2 % Annual Chance flooding

High Risk
- Special Flood Hazard Area (SFHA)
- Zone A, AE, AH, AO, or VE
### Flood Zones

<table>
<thead>
<tr>
<th>Flood Zones as Labeled on FIRM</th>
<th>V Zone</th>
<th>A Zone</th>
<th>X Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zone VE EL 16</td>
<td>Wave Height ≥ 3 feet</td>
<td>MoWA Wave Height = 3.0-1.5 feet</td>
<td>Limit of Base Flooding and Waves</td>
</tr>
<tr>
<td>Zone AE EL 13</td>
<td></td>
<td>MIWA Wave Height &lt; 1.5 feet</td>
<td></td>
</tr>
<tr>
<td>Zone AE EL 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zone AE EL 8</td>
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</tr>
</tbody>
</table>

#### Extent of V Zone
- Boundary where wave height becomes less than 3 feet
- LIUWA Boundary where wave height is zero and where stillwater elevation (also known as surge elevation) reaches the ground

#### Extent of A Zone
- Boundary where wave height becomes less than 1.5 feet

FEMA Risk Rating 2.0:

- [FEMA Risk Rating 2.0 main website](#)
- Deliver FAIRER rates, use replacement cost data
- Effective for new policies Oct. 1, 2021
- Effective for renewals April 1, 2022
- Elevation Certificates are no longer required to purchase insurance coverage
Risk Rating 2.0 in South Carolina

Immediate Decreases
53,215 Policies

26%

On Average, $0 - $10 Per Month
($0 - $120 Per Year) Increases
137,604 Policies

65%

On Average, $10 - $20 Per Month
($120 - $240 Per Year) Increases
12,469 Policies

6%

On Average, Greater Than $20 Per Month ($240 Per Year) Increases
5,276 Policies

3%
more
Flood Maps

Flood Insurance Rate Map (FIRM)

Flood maps ONLY show risk for storm surge, not flooding from heavy rain.

https://msc.fema.gov/portal/home

There are a lot of houses that have flooded in the Charleston region that are not in a mapped floodplain.

When in doubt ask your County/City for help interpreting maps.
https://msc.fema.gov/portal/home
SC FLOOD Inundation and Mapping for Action

https://scfloodimpact.com/Index
Coastal Resources Guide

Topics Covered:

- Community Rating System (CRS)
- Evacuation Routes
- Emergency Preparedness & Remediation Resources

State → County → Municipality
### Resources by County

<table>
<thead>
<tr>
<th>County</th>
<th>Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Charleston County</strong></td>
<td>• Community Rating System&lt;br&gt;• Evacuation Routes&lt;br&gt;• Remediation Resources&lt;br&gt;• Hurricane Preparedness&lt;br&gt;• Charleston Regional Hazard Mitigation Plan&lt;br&gt;• BCD-Council of Government&lt;br&gt;• Office Contacts</td>
</tr>
<tr>
<td><strong>Berkeley County</strong></td>
<td>• Community Rating System&lt;br&gt;• Evacuation Routes&lt;br&gt;• FAQs, useful links&lt;br&gt;• Hurricane Information&lt;br&gt;• Office Contacts</td>
</tr>
<tr>
<td><strong>Dorchester County</strong></td>
<td>• SCDOT evacuation routes&lt;br&gt;• Emergency services&lt;br&gt;• Hurricane information&lt;br&gt;• Flood Zones&lt;br&gt;• BCD-Council of Governments&lt;br&gt;• Office Contacts</td>
</tr>
</tbody>
</table>
Community Rating System

- A voluntary incentive program through FEMA that recognizes and encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) requirements.

Common practices:
- Open Space Preservation
- Floodplain Mapping
- Stormwater Management

More Listed in their Brochure
**Evacuation Resources**

1. All SCDOT Evacuation Routes and Map Information

Welcome to SCDOT's interactive Evacuation map.

****LANE REVERSALS have been discontinued. I-26 and US 501 have returned to normal operation with traffic moving in both directions.****

**The black crosses symbolize open evacuation shelters. These shelters are not maintained by SCDOT.**

To visit the SCDOT Storm Resources Page click here.

To navigate through this map on your mobile device swipe to the left. If you are on a computer click on the tabs labeled 2-8.

To navigate to a specific address or street: click on the magnifying glass icon to the right and type in the address where you are located. Be sure to include city and state.

If you are using a GPS enabled device, you can locate yourself using the circle with the hash marks located above the magnifying glass.

For detailed evacuation instructions click on the push pins that appear when zoomed in to the metro level.

To download the entire file, please click here.

2. North Myrtle Beach

3. Myrtle Beach, Surfside, Garden City
Know Your Zone
Charleston Zone

Use these maps and links below to determine your vulnerability to storm surge.

Entered Location
300 Meeting St, Charleston, SC 29401, USA

Zone B

Charleston, Berkeley County
Emergency Preparedness and Remediation Resources
SOUTH CAROLINA HURRICANE GUIDE


https://hurricane.sc/
More resources
Poll

• What resources will you share with your clients?
South Carolina Coastal Information Network  
https://www.sccoastalinfo.org/

Instructors:

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Please let us know how we can improve this course and the series.

Calling the Coast Home

Course Series:
• Living with Water
• The Land Water Connection
• Tidelands, Water, and Beach: Regulations and Rebuilding
• Coastal Lifestyle for Clean Water

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ACE Basin National Estuarine Estuarine Research Reserve
Research Reserve S.C. Department of Health and
Clemson University Environmental Control

Complete the course evaluation here

www.sccoastalinfo.org