NOAA Water Initiative

Goal: Transform water information service delivery to better meet and support evolving societal needs

Objectives:

Build Strategic Partnerships for Water Information Services

Strengthen Water Decision Support Tools and Networks

Revolutionize Water Modeling, Forecasting, and Precipitation Prediction

Enhance and Sustain Water-Related Observations

Accelerate Water Information Research and Development and Research Transitions
OCM Water Decision Support Tool Needs Assessment Feedback

Help using existing tools, methods >> new tools
Training is the most voiced reason for not using existing tools
Lack of data standardization and local-scale data
Need to better study interaction between different types of flooding
Address “pain point” in understanding location, timing, and impacts of combined coastal and rainfall-runoff flooding

Need to incorporate water considerations into scenario planning
Help understanding how to modify stormwater infrastructure standards (e.g., sizing, performance)
Help get a two-fer – tackle water quantity problems in the context of their water quality/NPDES activities
Help communities earn CRS credits (and meet Class 4 prereq.) under Activity 450 - Stormwater Master Plan, which calls for considering SLR

Office for Coastal Management
Case in Point: October 2015 Flood – Charleston, SC

Extreme Rainfall

High Tide

Onshore Winds

Office for Coastal Management
User-Driven Product Design

✔ Address combined flooding
✔ Content relevant to multiple audiences
✔ “Not another tool”
✔ Go beyond helping user assess the issue
✔ Provide “hooks” for future resources
Adapting Stormwater Management for Coastal Floods

- Provides information, tools, methods to examine:
  - flooding from coastal inundation
  - impacts on community-level stormwater issues
  - when and where users might expect to see impacts
  - what communities can do about it
Understand the Issue

Office for Coastal Management
Quick Flood Assessment Tool

Assess Flood Risks

The Quick Flood Assessment Tool automates what used to be a time-consuming task—calculating current and future coastal flood frequency and impacts at user-defined thresholds.

You will need to specify three inputs as you go through the tool. Guidance will be provided.

1. The closest NOAA tide gauge (selected via map)
2. A coastal flood threshold (critical threshold)
3. Tolerable number of days of coastal flooding

The tool provides information on:

- A user-defined coastal flood threshold
- Changing water-level return periods
- Sea level rise effects on the user’s threshold
- The number of high-tide flooding days and how it might change in the future
- How often significant flood events might occur in the future

The resulting outputs will be useful for decision-making, sharing your message with others, and working through the Detailed Impact Analysis methodology of this website.
Quick Flood Assessment Tool

Select a Location

1. Start by selecting a state or territory.
   South Carolina

2. After the map zooms to your selection, click a location marker closest to your area of interest.
   In some cases, your area may be far from a marker. If so, use the closest location as a proxy for your area. Local factors, such as tidal ranges and subsidence, may reduce the accuracy of the proxy values.

Charleston, SC
Quick Flood Assessment Tool

Specify Your Coastal Flood Threshold

Now that you've selected a location marker:

- Use the map to zoom in to your location.
- Drag the slider to see the potential impact of rising water levels. Any of the levels could be a critical threshold – the point at which impacts start to occur.
- After identifying your coastal flooding threshold, set it using the slider or enter it manually. Units are feet above mean higher high water (MHHW).

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Already Know Your Threshold?

If you know your exact threshold, use the Advanced View for more options.

USE ADVANCED VIEW
Quick Flood Assessment Tool

Specify High-Tide Flooding Days Threshold

High-tide flooding mostly affects low-lying areas and exposed infrastructure, such as roads, water systems, and private or commercial properties. Currently, high-tide flooding may not occur for your area, or if it does, it might have minimal impact and may be bearable. With sea level rise, high-tide flooding will occur more frequently and become more of a problem. Enter the number of days per year when it may become a problem.

If you're unsure, start by entering 24 days, which is an average of two times per month. You can always come back and change the value.

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Quick Flood Assessment Tool

Defining the Threshold

Charleston, SC has a critical flood threshold of 3ft Mean Higher High Water (MHHW), which represents the water level at which flooding becomes a problem. Another way to refer to this threshold is 5.62ft North American Vertical Datum of 1988 (NAVD88), which is the datum for elevation data, surveying, and data like first floor elevations. In addition, these numbers, in meters, are 0.91m MHHW and 1.71m NAVD88.

Changing Return Periods

The current return period for this water level, based on the period of record for Charleston, SC, is 20 years, which has a 5% chance of occurring or being exceeded once in any given year. In the future, it will take 1.16ft (0.35m) of water level increase from sea level rise to change the current 20 year return period (or 5% per year) to a 2 year (50% per year) return period.

The Threshold Becomes the Norm

As sea level rises, critical thresholds will be reached by the average highest tides (MHHW), causing daily impacts. This will happen sooner under higher sea level rise scenarios.

- Under the Low sea level rise scenario, your critical flood threshold of 3ft above MHHW will still be above the future MHHW in 2100.
- Under the Intermediate-Low sea level rise scenario, your critical flood threshold of 3ft above MHHW will still be above the future MHHW in 2100.
- Under the Intermediate sea level rise scenario, your critical flood threshold of 3ft above MHHW will become the new MHHW in 2081.
- Under the Intermediate-High sea level rise scenario, your critical flood threshold of 3ft above MHHW will become the new MHHW in 2063.
- Under the High sea level rise scenario, your critical flood threshold of 3ft above MHHW will become the new MHHW in 2053.
- Under the Extreme sea level rise scenario, your critical flood threshold of 3ft above MHHW will become the new MHHW in 2048.

NOTE: This analysis is based on sea level rise curves that start in the year 2000. While exact years are given here, the data are more correctly referred to in decadal scales (i.e., “by 2050” instead of “in 2046”). The yearly data were created through a spline interpolation between known decadal data points.
# Analyze Stormwater Systems

- Detailed guidance and methodology provided to assess impact of coastal flooding events on stormwater system
- Three levels of analysis: Basic, Intermediate, and Advanced
- Guidance is provided to identify design scenarios to estimate flood risk

<table>
<thead>
<tr>
<th>Step 1: Compute Coastal Total Water Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 2: Compute Overtopping Flow Rate and Storm Tide Propagation Inland</td>
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<tr>
<td>Step 3: Compute Approximate Precipitation Runoff</td>
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<tr>
<td>Step 4: Compute Discharges from Other Appropriate Flooding Sources</td>
</tr>
<tr>
<td>Step 5: Model Stormwater System and Compare Total Flows to Capacity</td>
</tr>
</tbody>
</table>
Design Scenarios and How Good Is Good Enough?

What questions can intermediate analysis answer?

- Hour-by-hour tidal flows into the stormwater system
- Volume of water flowing on-land during overtopping events
- Times when each pipe in the system is in surcharge (pressure flow)
- Total rainfall during design scenarios
- If manholes will flood, but only if you know the manhole invert levels
- Depth and duration of flooding at each manhole in the system
- Coastal total water level for various design scenarios
- Whether flows will exceed system capacity with sea level rise during design scenarios
- Maximum total flowrate through system during design scenario
- Flowrate in each pipe in the system
Case Study: Charleston, SC

- Current condition
- 25-year design life, 25 years of SLR (Intermediate scenario), a 10-year precip. event, and a tidal backflow preventer
- 25-year design life, 25 years of SLR (Intermediate scenario), highest astronomical tide
- A storm surge condition coupled with sea level rise and seasonally related high-tide conditions
Take Action
Area 1 – Planning

Community plans that can benefit from the application of total water level data
Take Action Area 2
Regulations, Standards, and Guidance

Existing regulations that can be leveraged to address multiple goals
Take Action
Area 3 – On-the-Ground Measures

On-the-ground measures and best management practices
Take Action
Area 4 – Funding

Funding strategies and linkages to existing tools and programs that can be leveraged to fund mitigation
Case Studies – Pulling It All Together

Massachusetts Coastal Zone Management - Climate Impacts on Best Management Practices

City of Wilmington, North Carolina - Community Resilience Pilot

City of Olympia, Washington - Engineered Response to Sea Level Rise
Create Your Own Stormwater Report

**Assessment Parameters:**
- **Location:** Charleston, SC
- **Threshold:** 3ft (MHHW)
- **Tolerance:** 24 days

The information below is based on your inputs and presents the results of the Quick Flood Assessment Tool as a narrative and data table. The narrative can help you put the data in its proper context and communicate it to your audience. The table provides additional numbers and captures all of the outputs in one location.

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For More Information

Please Visit:
https://coast.noaa.gov/stormwater-floods/

Or Contact:

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