



# KING TIDES & SEA LEVEL RISE KEY DATA

## KING TIDES - What are they?

Sunny day floods that occurs during the highest of high tides. They are independent of floods caused from the ocean by storm surges or floods caused by rainfall, but King Tides can make flooding from storms and rain more severe. King Tides are predicted and expected over the course of the year.

Resources:

[SCDHEC King Tides Initiative](#)

[SCDHEC Tide Tables](#)

[EPA King Tides & Climate Change](#)

## KING TIDES - What's happening?

Sunny day flooding increased from approximately 2 days per year in 1970 to 11 days per year in 2014 and is projected to increase to 180 days per year in 2045 (see Figure 1). King Tides give us a glimpse into the future of what our tides will be like as the sea level rises over the coming years.

Resources:

[King Tides Project: Snap the Shore, See the Future](#)

[Union of Concerned Scientist - Encroaching Tides](#)

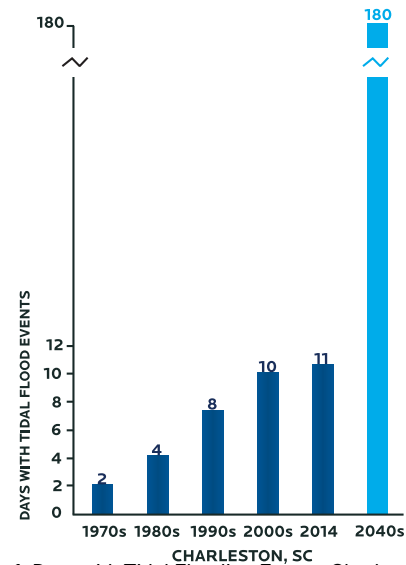
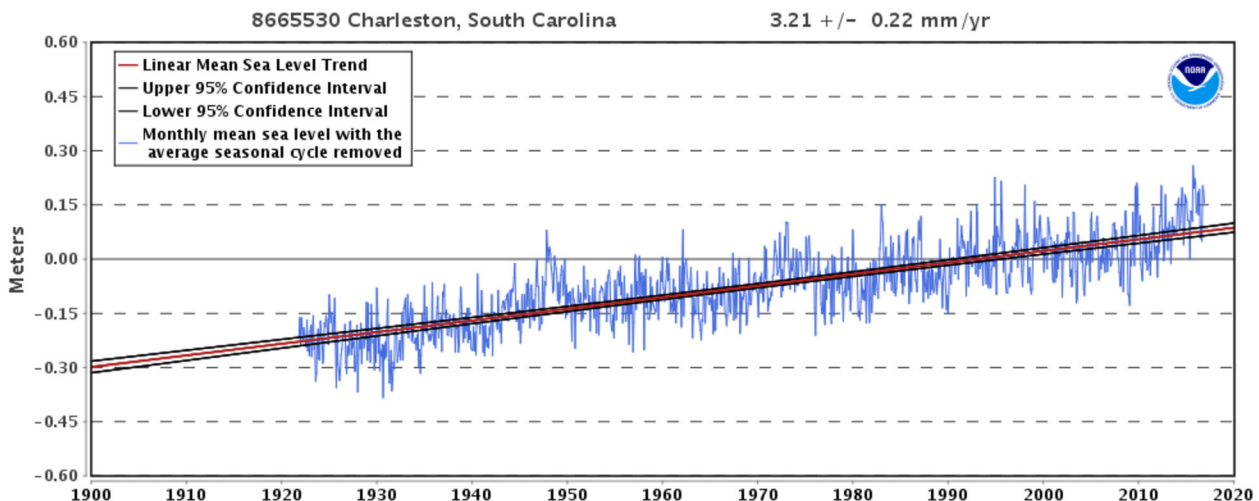


Figure 1: Days with Tidal Flooding Events, Charleston, SC

## SEA LEVEL RISE - What's happening?

Charleston has experienced 1 foot of rising seas over the past century based on trends from 1921 to 2013 (see Figure 2). Mean Sea Level always varies between months, but the recent trend in Charleston is a rise of about 1/8 of an inch each year. One hundred years ago, the mean monthly sea level in Charleston was about 1 foot lower than it is today. This rise has contributed to the frequency and severity of King Tide flooding.

Resources: [NOAA Tides & Currents - Sea Level Trends](#)



The mean sea level trend is 3.11 mm/year with a 95% confidence interval of 0.22 mm/year based on monthly mean sea level data from 1921 - 2013, which is equivalent to a change of 1.02 feet in 100 years.

Figure 2: Mean Sea Level Trend 1922 - 2013, Charleston, SC

### AWAKENING V: KING TIDE DATA STEERING COMMITTEE:

**Dan Burger** - Director, Coastal Services Division - OCRM & Chair Charleston Resilience Network

**Jared Bramblett, PE** - Civil Engineer, Davis & Floyd

**Mary Culver, PhD** - NOAA Office of Coastal Management

**Bobbie Lyon, PhD** - Adjunct Professor, College of Charleston Grice Marine Lab & Co-Founder, Cultivate - Community Art & Science

**Jessica Hardesty Norris, PhD** - Conservation Ecologist, Biohabitats & President Audubon Society

**Joshua Robinson, PE** - Robinson Design Engineers

**Carolee Williams** - Project Manager, City of Charleston Department of Planning, Preservation, & Sustainability

### SEA LEVEL RISE - What's next?

The curves in Figure 3 represent changes in sea-level height by the 2100 relative to mean sea-level. The lowest curve represents the increase (approximately 2') in sea level if the production rate of heat trapping gases in the atmosphere (caused by fossil fuel burning, methane production, deforestation, etc) does not continue to increase over time. The middle curve represents the increase (approximately 4') in sea level if continued production of heat trapping gases results in some glacial ice melt. The highest curve represents the increase (approximately 7') in sea level if the rate of heat trapping gas production increases and glacial ice melts more quickly.

Resources:

[NOAA Sea Level Rise Viewer](#)

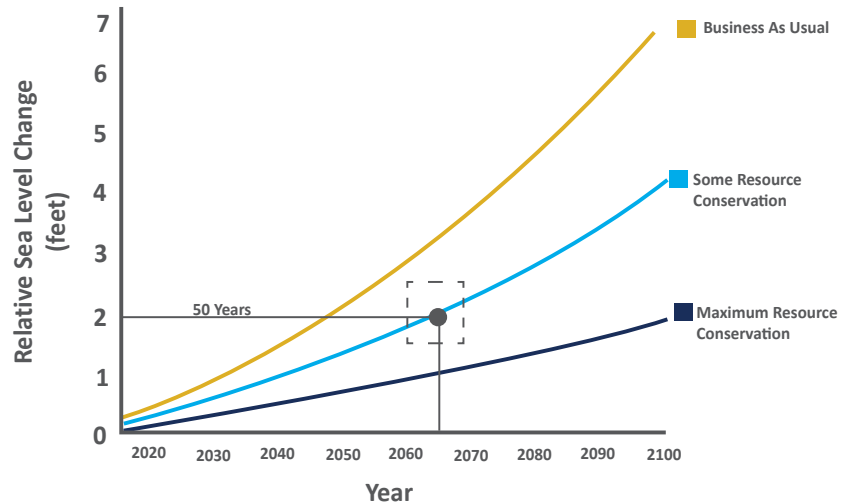


Figure 3: Charleston Sea Level Rise Projections

### IMPACTS - What are they?

- Frequent tidal flooding
- Increased flooding during rains
- Increased storm surge during tropical storms
- Economic losses (damage to residential and business properties, time, access to businesses)
- Environmental concerns (marsh loss, saltwater intrusion)
- Risk to historic & cultural resources

### What's next? What can we do?

Mitigate: Protect, Adapt, & Retreat

Protect: Keep the water away from valuable assets (people, places, & things). Examples include large engineering projects to pump water, build levees and walls to keep water out, & beach renourishing projects.

Adapt: Plan to live with water rather than fight it. Purchase flood insurance to protect properties and businesses, store water in the landscape, design green spaces for flood control, use living shorelines to maintain beach and marsh habitat, prevent building within floodplains, elevate structures (buildings, homes, and roads), maintain storm drainage systems and keep them clean, & develop and implement more robust stormwater regulations.

Retreat: Relocate valuable resources to high ground.

Mitigate: Be stewards of energy resources and reduce coal & oil-based energy consumption.