STATE OF HIGH TIDE FLOODING AND ANNUAL OUTLOOK

Center for Operational Oceanographic Products and Services
National Oceanic and Atmospheric Administration

2022

NOAA's State of High Tide Flooding and Annual Outlook is released annually in an interactive, web-based format. In 2023, NOAA began adapting the previous year's State of High Tide Flooding and Annual Outlook into the following portable document format (PDF) to provide interested users with a free, downloadable historical archive. Data from previous years are also available to download for free from our Derived Product API (DPAPI) on tidesandcurrents.noaa.gov.

State of High Tide Flooding and 2022 Annual Outlook

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Overview

High tide flooding, often referred to as “king tides,” “nuisance,” or “sunny day” flooding, is becoming increasingly common due to years of sea level rise. High Tide Flooding (HTF) is defined as the overflow or excess accumulation of ocean water at high tide that covers low-lying areas, and typically occurs when tides reach anywhere from 1.75 to 2 feet above the daily average high tide and start spilling onto streets or bubbling up from storm drains. As sea level rise continues, damaging floods that happened decades ago only during a storm now happen more regularly, like during a full-moon or with a change in prevailing winds or currents.

Coastal communities across the U.S. continue to experience more frequent high-tide flooding, forcing residents and visitors to deal with flooded shorelines, streets and basements. Similar to 2022 meteorological conditions, many regional HTF frequencies were lower, likely related to continued effects of La Nina; a periodic meteorological event affecting coastal storm tracks and bringing cooler than normal ocean surface temperature and lower than normal sea surface heights along parts of the Pacific Ocean, including the western U.S.

As science advances, so does our ability to predict high tide flooding. This year’s Outlook is enhanced by methods outlined in the U.S. Federal Sea Level Rise and Coastal Flood Hazard Task Force’s 2022 Sea Level Rise Technical Report; an inter-agency effort to update sea level rise scenarios to emphasize the amount of expected rise by 2050 to inform community planning initiatives.

National Outlook

Regions:

Northeast
Southeast
Eastern Gulf
Western Gulf
Southwest
Northwest
Caribbean
Pacific Islands

3 to 7 days likely

High tide flooding is anticipated to continue with frequency over the next meteorological year (May 2022 – April 2023).

Overview:

- The frequency of high tide flooding across the country continues to increase. This year, due to lingering effects from La Nina and Earth's location in the perigean cycle, coastal areas aren't predicted to experience a record number of flood events compared to last year.
- This year, eastern U.S. and Gulf state communities will continue to experience an over 150% increase in HTF compared to the year 2000, limited only by periodic weather and climate events.
- From May 2021 to April 2022, 3 locations monitored by NOAA tied or broke their records for the number of HTF days along the U.S. Southeast Atlantic and Gulf coastlines. On the Atlantic coast, Reedy Point, DE broke its previous record with 6 events, and Springmaid Pier, SC, near Myrtle Beach tied its 2021 record with 11 high tide flooding events. In the Pacific, Kwajalein Island observed 4 high tide flooding day, also one more event than in 2021.
- Regional locations like the Northeast Atlantic, Western Gulf, Southeast Atlantic and Eastern Gulf coasts may see some of the highest levels. Lingering effects of La Nina will minimize the amount of HTF expected along Pacific and U.S. Island coastlines. These stats do not include the potential for flooding due to wave action and/or weather-related events.
- By 2050, high tide flooding on a national scale is expected to be between 45 – 70 days/year on average. These long term projections are based on the range of expected relative sea level rise by 2050 using information from the 2022 Sea Level Rise Technical Report.
- Coastal flood warnings for significant risks to life and property, will become much more commonplace as we approach mid-century.

Northeast Outlook

States:

- Maine
- New Hampshire
- Massachusetts
- Rhode Island
- Connecticut
- New York
- New Jersey
- Pennsylvania
- Delaware
- Maryland
- Virginia
- North Carolina

Region Overview:

The northeast is one of the areas most impacted by high tide flooding in the U.S. This year's outlook predicts a fewer number of high tide flooding days due to Earth's place at the furthest proximity from the moon in a Perigean cycle. However, when comparing this year's projections to the average number of high tide flooding days in the year 2000, the northeast has seen a nearly 200% increase in high tide flooding days.

6 to 11 high tide flood events are predicted.

Caption: *Flooded Battery Park Tunnel after Hurricane Sandy.*

Photo credit: *Timothy Krause, October 31, 2012.*

Location: *The Battery, Manhattan, New York*

Southeast Outlook

States:

- South Carolina
- Georgia
- Florida (east coast)

Region Overview:

This region of the U.S. is composed of many low-lying areas prone to minor flooding. Coupled with land subsidence and sea level rise, high tide flooding events are becoming more common. Last year, Springmaid Pier (Myrtle Beach, SC) observed 11 flood days, tying its 2021 record. This year's outlook predicts fewer flood events due to Earth's place at the furthest proximity from the moon in a Perigean cycle. Though this year's outlook is moderate, this region has seen an almost 300% increase in high tide flooding events since the year 2000.

3 to 7 high tide flood events are predicted.

Caption: *Flooding at high tide.*

Photo credit: *Anonymous, @nc_kingtides on Flickr*

Location: *9th & Bay St. Martha's Mission Cupboard, Morehead City, North Carolina*

Eastern Gulf Outlook

States:

- Forida (west coast)
- Alabama
- Mississippi

Region Overview:

This region of the coastline is routinely impacted by severe weather that often contributes to flood events. Coupled with land subsidence and sea level rise, high tide flooding events are more frequent. This year's outlook predicts fewer flood events due to Earth's place at the furthest proximity from the moon in the Perigean cycle. Though this year's outlook is moderate, the Eastern Gulf region has seen an almost 200% increase in high tide flooding events since the year 2000.

2 to 7 high tide flood events are predicted.

Caption: *Owners tie down and secure their boats in the Pass Christian Harbor as the storm surge from Tropical Storm Cristobal floods the harbor.*

Photo credit: *Lukas Flippo, Biloxi Sun Herald, June 7, 2020.*

Location: *Pass Christian Harbor, Mississippi*

Western Gulf Outlook

States:

- Louisiana
- Texas

Region Overview:

The Western Gulf of Mexico is predicted to experience the most high tide flooding events compared to the rest of the U.S., largely because of sea level rise and land subsidence in the most western reaches of the Gulf. When compared to values from the year 2000, this region has seen an almost 300% increase in flood events.

6 to 14 high tide flood events are predicted.

Caption: *Flooding from Hurricane Ike washes local sailboat inland.*

Photo credit: *Documentary Filmmaker, Flickr – September 13, 2008*

Location: *Nassau Bay, Houston, TX*

Southwest Outlook

States:

- California

Region Overview:

The Pacific Coast is not as frequently impacted by high tide flooding more often it's the epicenter for many other climatological and meteorological events. This year, the Southwest will see a similar number of flood events to 2021 due to lingering effects of La Nina; a periodic meteorological event affecting coastal storm tracks and bringing cooler than normal ocean surface temperature and lower than normal sea surface heights along parts of the Pacific Ocean.

0 to 2 high tide flood events are predicted.

Caption: *30 minutes before high tide.*

Photo credit: *Public Domain, kingtides@coastal.ca.gov*

Location: *Point Loma, San Diego, California*

Northwest Outlook

States:

- Washington
- Oregon
- California (northern)

Region Overview:

Much like the Southwest, the Pacific Northwest is more often impacted by extreme weather, but high tide flooding events still occur in low-lying areas. This year, the Northwest will see a similar number of flood events to 2021 due to lingering effects of La Nina; a periodic meteorological event affecting coastal storm tracks and bringing cooler than normal sea surface heights along parts of the Pacific Ocean.

0 to 7 high tide flood events are predicted.

Caption: *High tide flooding in Westport.*

Photo credit: *Kevin Goodrich, mycoast.org*

Location: *Westport, Washington*

Caribbean Outlook

Locations:

- Puerto Rico
- U.S. Virgin Islands

Region Overview:

The Caribbean Islands are not expected to experience significant high tide flooding events, in part because of higher minor flooding thresholds. However, this does not preclude flooding that might occur at slightly lower height, or flooding driven by waves and weather events that may create impacts.

No high tide flooding related events are predicted.

Caption: *Flooding in St. Croix driven by extreme rainfall, November 10, 2010.*

Photo credit: *Bill Kossler – Weather.Gov*

Location: *St. Croix, U.S. Virgin Islands*

Pacific Islands Outlook

Locations:

- Hawaii
- Guam
- American Samoa
- Wake Island
- Kwajalein, Marshall Islands

Region Overview:

Kwajalein Island observed more high tide flooding events than last year, but the region on a whole, including the Hawaiian Islands, won't see additional significant tidal flooding events compared to 2021. This does not preclude flooding that might occur at slightly lower height, or flooding driven by waves and weather events that may create impacts.

No high tide flooding related events are predicted.

Caption: *Wading through high tide flooding in American Samoa.*

Photo credit: *Kelley Anderson Tagarino, University of Hawaii*

Location: *American Samoa, June 17, 2022*