



National Ocean Service
Center for Operational Oceanographic
Products and Services

QUICK START GUIDE

Using the **Coastal Inundation Dashboard**

Coastal Inundation

Coastal inundation occurs when **normally dry land is flooded by high water levels**, driven by factors like abnormally high tides, storm surge, strong winds, waves, or heavy rainfall. The Coastal Inundation Dashboard is **an interactive tool that provides real-time and forecasted coastal water levels**, along with historical flood data, at water level stations across the U.S. and its territories. It helps users monitor water levels, assess short-term flood risks, and explore past flood events.

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About the Dashboard

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This Quick Start Guide will help you **familiarize yourself with** the Coastal Inundation Dashboard.

The Coastal Inundation Dashboard is an interactive tool designed to help users make informed decisions about coastal flooding. It provides real-time and forecasted coastal water levels, along with historical flood data, at National Ocean Service (NOS) water level stations across the U.S. and its territories. Whether exploring the map or viewing specific station details, users can quickly access flooding information for different locations.

The Dashboard uses [Mean Higher High Water \(MHHW\)](#) as the default reference level, which helps you quickly identify locations where water levels have risen above normal high tide. By comparing these levels to National Weather Service (NWS) flood thresholds, this product indicates whether minor, moderate, or major flooding may be occurring or is possible within the next 48 hours.

This Quick Start guide provides an overview of key features, including NOS stations, datums, hydrographs, and flood thresholds. For more details, please refer to the full [Coastal Inundation Dashboard User Manual](#).

Dashboard can help you:

1

Monitor water levels during floods: Track water levels at specific locations to stay updated during hurricanes, nor'easters, or other coastal storms.

2

Forecast flood risks: Access 48-hour water level forecast guidance and daily flood likelihoods to assess short-term flood risks.

3

Explore historical flood data: View past flood occurrences and the highest recorded water levels at stations to understand flood frequency and trends, especially with changing sea levels.

4

Access other data: View coastal flood watches, warnings and tropical cyclone information from the National Weather Service as well as access observations from community stations, including federal, state, and local partners.

**For definitions of common terms, visit our glossary on p. 13-15 of this guide.*

Navigating the Map

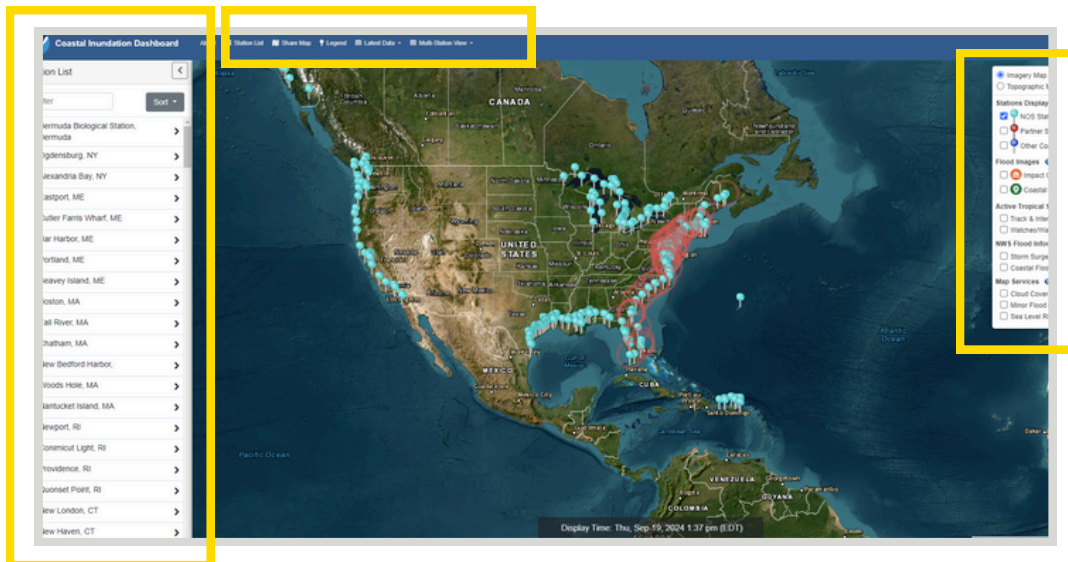
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The Coastal Inundation Dashboard is initially displayed using a **web map interface**.

By default, the map view displays the continental U.S. with only National Ocean Service stations toggled on, represented by round light blue pins.

As shown highlighted in the image below, the Dashboard will also display a:

- Station list (*on the left side*)
- Legend (*on the right side*)
- Control panel bar (*along the top*)



To move around the map, click and hold the left mouse button, then drag the map to your desired location.

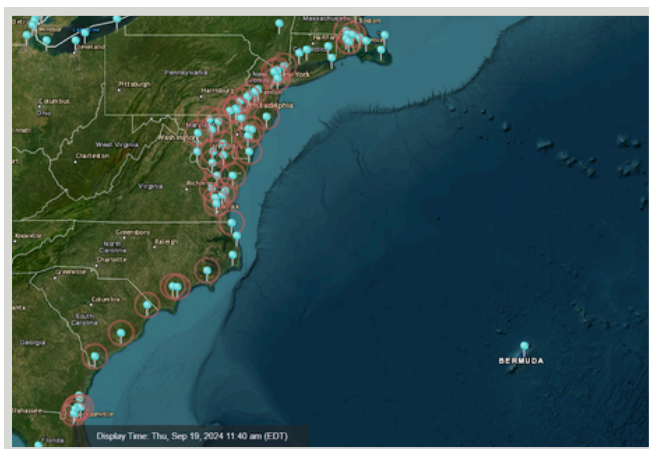
You can **zoom in and out of the map** using either your mouse's scroll wheel or the + and - zoom buttons in the lower right corner. **As you zoom, the station list on the left will automatically update** to show only the stations visible on the map.

To get more information about a specific water level station, simply select it from the 'Station List' or click the pin on the map.

Blinking Pins

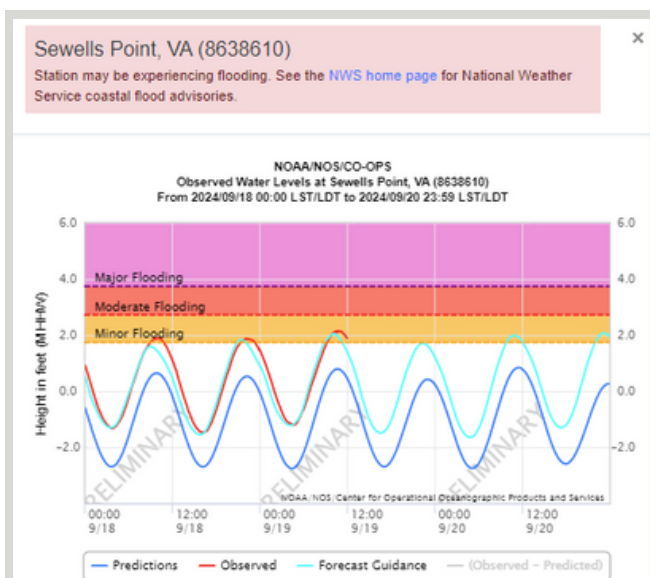
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Pins blinking on the map **indicate that flooding may be occurring or is forecast to occur** at an NOS station over the next 48 hours based on the station's specific flood thresholds.



The specific cause for a flood alert is displayed in a pop-up window after clicking a station marker.

- A **pink banner** will appear when the **observed** water levels have exceeded the minor threshold within the past 13 hours and indicate that flooding may be occurring.
- A **yellow banner** indicates that the **forecast** water level exceeds the minor flood threshold and indicates that flooding may be possible over the next 48 hours.



If a station does not have flood thresholds (either because none have been established or the location never has experienced coastal flooding), then that station's pin will never blink.

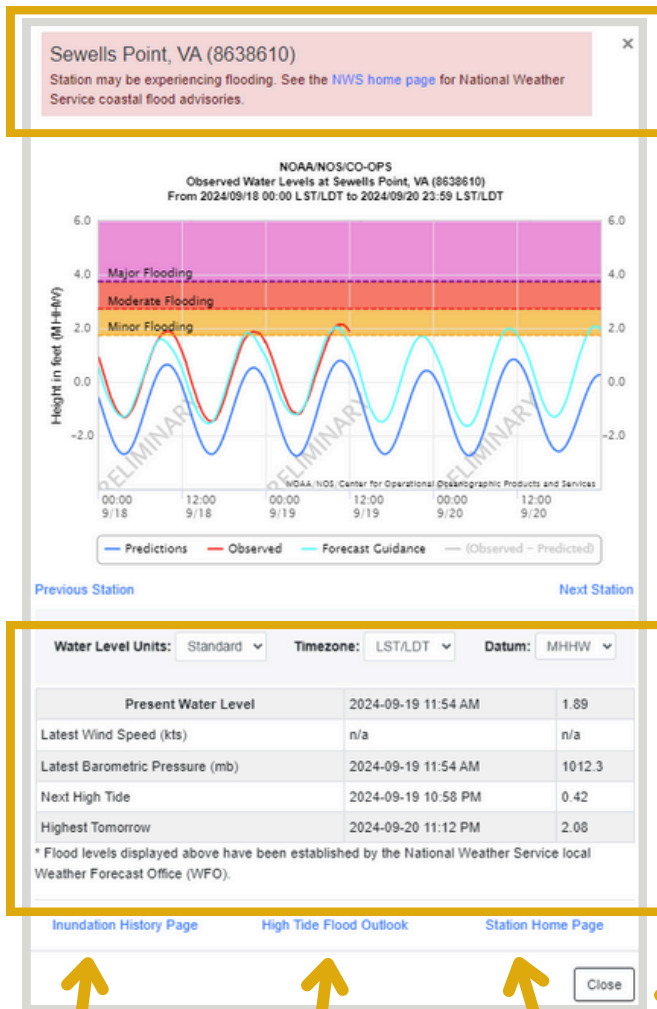
Station Pop-ups

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NOS Stations

You can **view water level information for National Ocean Service (NOS) stations**, other coastal and partner stations by toggling those layers on in the legend and clicking on the station pins.

Active station alerts



HYDROGRAPH

Weather & high tide data

NOS water level stations, shown as light blue pins in this product, display locations with real-time and historical flood information. Most of these stations are part of the [National Water Level Observation Network](#), and many additional stations that are part of the [Physical Oceanographic Real-time System \(PORTS\)](#) are also included. All stations offer comprehensive data, including real-time water level observations and detailed historical records, overlaid on flood thresholds.

Clicking a light blue pin opens a pop-up with multiple features.

If you see the text "n/a," this means that data is not available or a sensor is not installed at this station.

Navigate to historical flood days and more

Predicted high tide flooding

Station page on Tides and Currents website

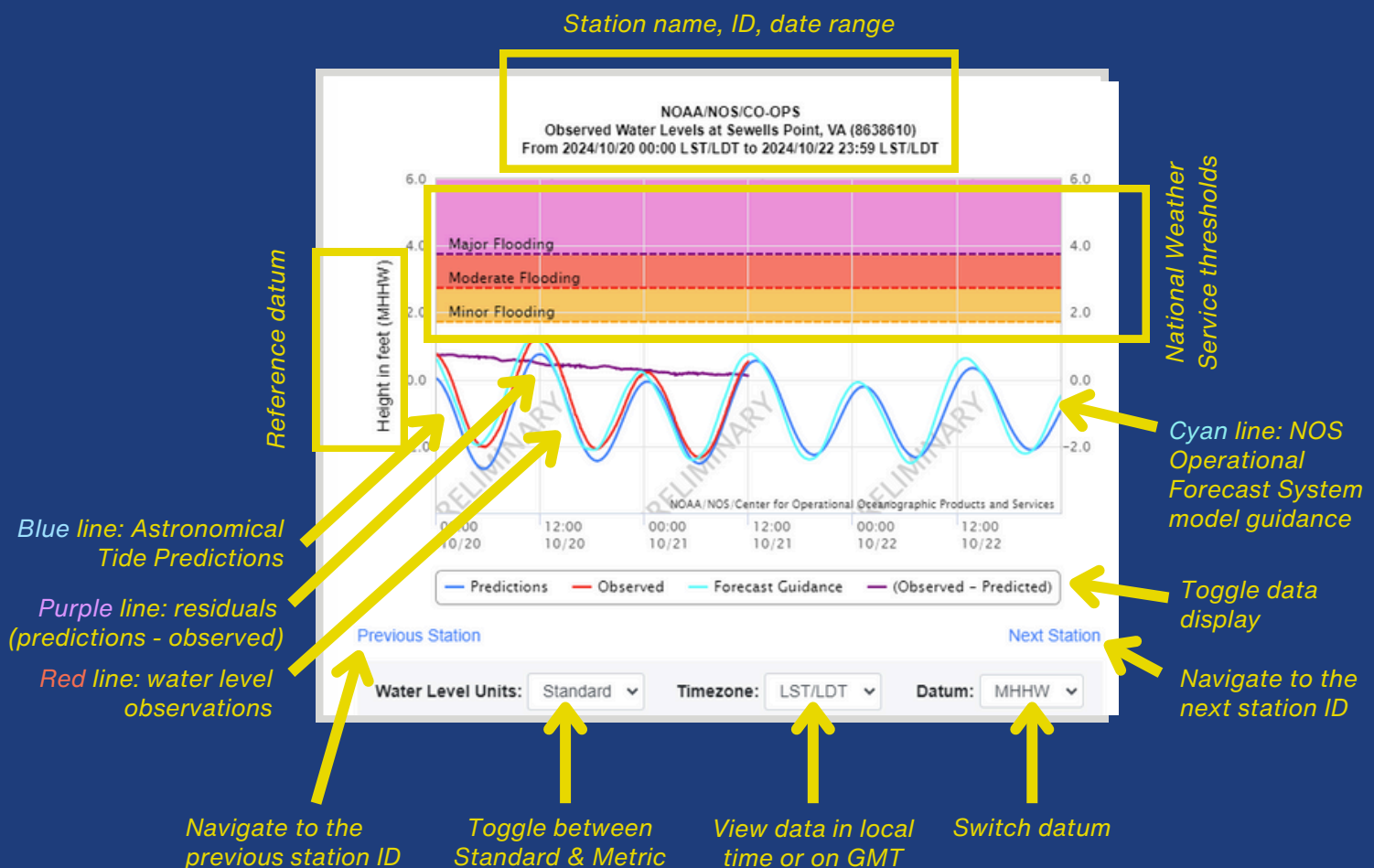
Return to map view

Understanding the Hydrograph

The Coastal Inundation Dashboard uses a **hydrograph, or a chart that displays water levels over time at a specific location**, to help you track changes in observed, predicted, and forecasted water levels all relative to a reference **datum**. This makes it easy to see when water levels exceed normal high tide conditions or reach critical flood stages.

The hydrographs on the Coastal Inundation Dashboard are **different from other hydrographs** found on the CO-OPS website in two ways:

1. The inclusion of **flood thresholds** and
2. The use of Mean Higher High Water as the **default datum**

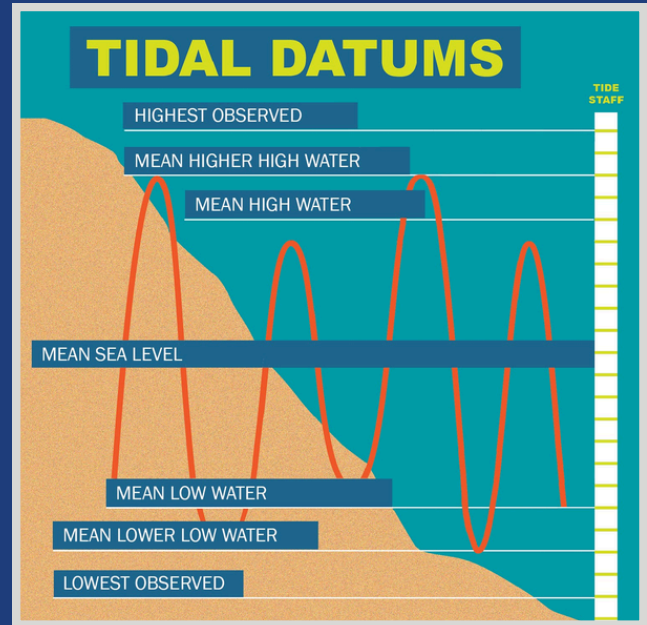


Datums

A vertical datum is a fixed reference point from which heights and depths are measured. There are hundreds of datums used across the world. The Coastal Inundation Dashboard uses vertical *tidal* datums as a reference, meaning the datum is defined by phases of the tide.

Mean Higher High Water (MHHW)

MHHW represents the average of the highest tides over a period of time (19 years). Anything landward from MHHW is often not flooded or inundated during normal tides meaning that you can expect this land to stay dry on average.



Other Datum Options

Since Mean Higher High Water is a good approximation of “ground level” right at the water level station, the Coastal Inundation Dashboard uses it as the default datum on its NOS station hydrographs.

Water Level Units:	Standard	Timezone:	LST/LDT	Datum:	MHHW
Present Water Level	2024-04-16 08:54 AM				
Latest Wind Speed (kts)	n/a				
Latest Barometric Pressure (mb)	2024-04-16 08:48 AM				
Next High Tide	2024-04-16 04:41 PM				

Sometimes, a different datum may better suit your needs, or you want to quickly convert between datums.

Data within the Coastal Inundation Dashboard can be viewed in other datums to accommodate these applications. To change a datum, click on the drop-down next to “Datum:” and choose your preferred datum. For a list of other datum options, see the [Acronyms page](#).

Datums Continued...

CO-OPS periodically updates its datums. These updates impact all tidal datums values shown in the Coastal Inundation Dashboard. For more information on current updates, please visit the [National Tidal Datum Epoch](#) page on our website. For more information about tidal datums, see [Tides and Currents About Tidal Datums](#).

Great Lakes Datums

While the Great Lakes are not tidally driven, their **water levels do fluctuate due to precipitation, snowmelt, and storms**. Without tides, tidal datums cannot be used. Instead **the Great Lakes use two water level datums (i.e., reference levels) known as the International Great Lakes Datum and Low Water Datum**.

Hydrographs from this region display observed water levels and model forecasts relative to Low Water Datum, by default, with an option to use the International Great Lakes Datum.

The screenshot shows a web interface with the following elements:

- Buttons for "Previous Station" and "Next Station".
- Form fields for "Water Level Units" (Metric), "Timezone" (GMT), and "Datum" (LWD).
- A table with the following data:

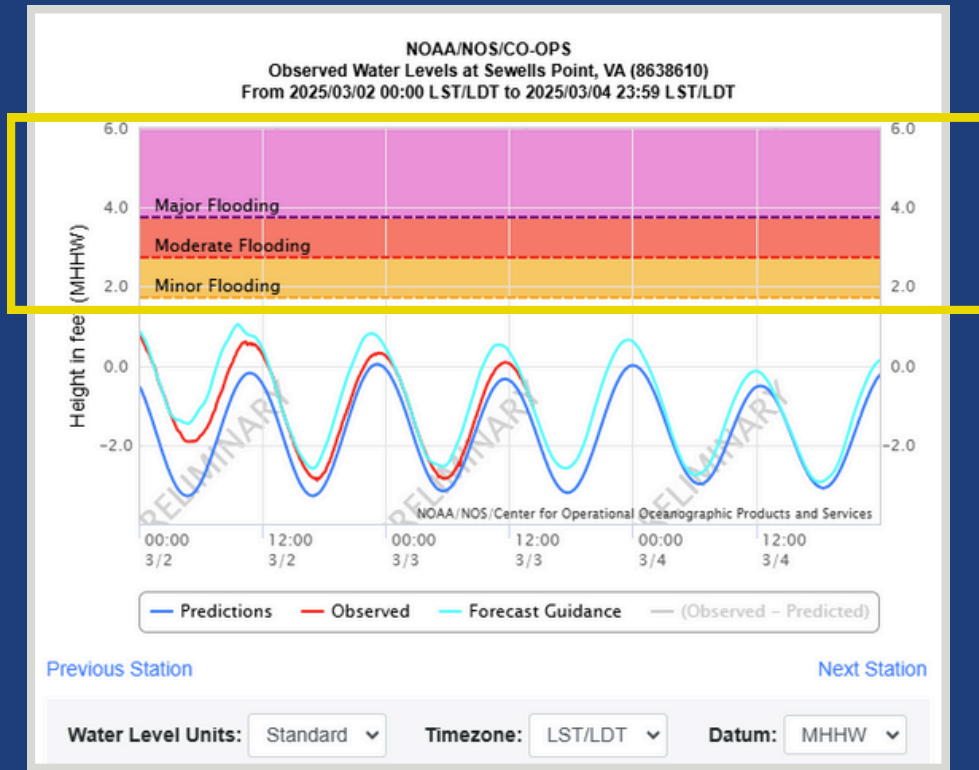
Present Water Level	2024-05-17 01:00 PM	
Latest Wind Speed (kts)	2024-05-17 10:54 AM	3.9
Latest Barometric Pressure (mb)	2024-05-17 10:54 AM	1008.5

* Flood levels displayed above have been established by the National Weather Service local Weather Forecast Office (WFO).

Low Water Datum (LWD) is a lake-specific reference set low enough that water levels rarely drop below it, making it a reliable reference for water levels in the region. LWD is used as a reference point for navigational charts in each of the Great Lakes. Data is shown in inches and centimeters.

International Great Lakes Datum (IGLD) is a uniform system for measuring water levels in the Great Lakes, connecting waterways, and St. Lawrence River, supporting navigation, management, and planning. Data is shown in feet and meters.

Flood Thresholds



NWS-derived flood thresholds can be purple, red, or orange

On the Coastal Inundation Dashboard, water level information is shown compared to known flood impact thresholds for a given area.

Flood Threshold - specific water level that indicates when impactful flooding starts in a particular place. When water levels exceed this threshold, it means flooding is likely happening somewhere in the vicinity of the water level station.

Some stations may not have flood thresholds. This could be due to:

- Ongoing evaluation, or
- The area around the station rarely experiencing flooding, rendering thresholds unnecessary

Threshold Sources

Coastal Inundation Dashboard uses flood thresholds derived from:

- The [National Weather Service](#) (NWS)
- The [National Ocean Service](#) (NOS)

NWS Thresholds

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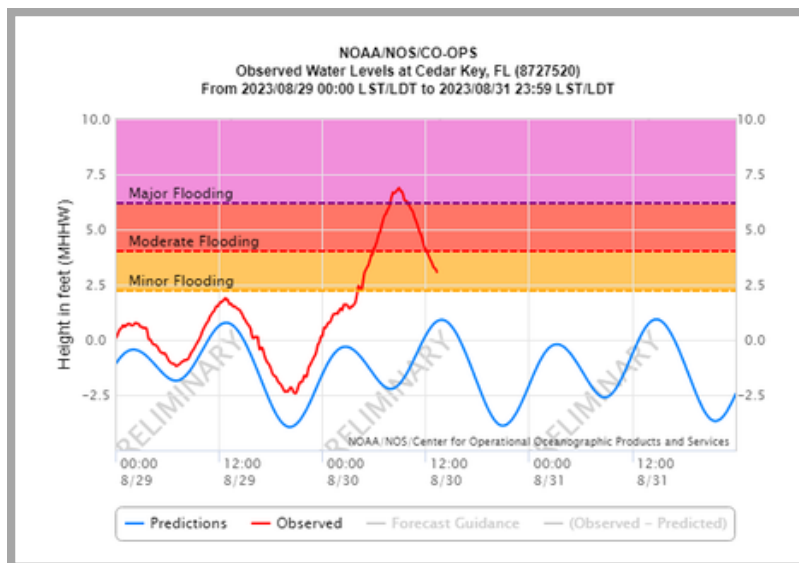
*In most instances, the **thresholds displayed on the Dashboard are established by local National Weather Service (NWS) forecast offices.***

Local emergency managers and other decision makers collected data over many years and helped determine these thresholds by considering when floods typically start to affect the area. They take into account factors like **local land cover, the shape of the land, buildings, and flood prevention measures.**

Flooding can vary in severity so many **NWS thresholds** are classified in three levels:

- **Minor:** Low threat of property damage and no direct threat to life
- **Moderate:** Elevated threat of property damage and some risk to life if one places themselves in unnecessary danger
- **Major:** Significant threat to life and property

For your specific area definitions, refer to your local **NWS Weather Forecast Office.**



Here is a hydrograph with flood thresholds from Cedar Key, FL during Hurricane Idalia (2023). Cedar Key starts to experience flooding once water levels reach 2.2 feet above Mean Higher High Water (MHHW), and flooding will worsen as water levels rise into the moderate and major flooding ranges.

NOS Thresholds

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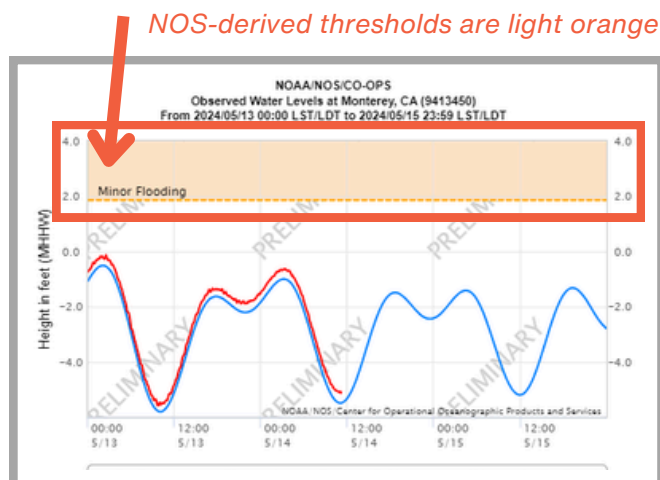
Some stations do not have NWS assigned thresholds.

In some cases, Dashboard may use a derived National Ocean Service (NOS) minor threshold to determine if flooding may be happening or is about to happen. These flood thresholds were created by NOS **based on an analysis relating NWS minor flood thresholds to a station's tidal range**. For stations without NOS or National Weather Service (NWS) thresholds, no threshold will be displayed.

The NOS minor threshold typically ranges 1.5-2 feet above normal high tide (MHHW) across the continental U.S. and 1 foot above normal high tide (MHHW) across the Pacific Islands. Oftentimes NOS and NWS flood thresholds **will** differ, because:

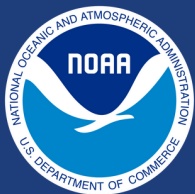
- **NOS thresholds aim to be more regionalized** so they are consistent between stations along the coast. As NOS minor thresholds are more uniform, they are used to compare flooding over large regions and to analyze historical water level data to count past flooding events.
- **NWS thresholds consider local factors** like seawalls and geography. These thresholds are used more for short-term coastal flood watches and warnings.

If a station has **both NOS and NWS thresholds**, a hydrograph on the Coastal Inundation Dashboard will display the NWS threshold by default.



For more information, see:

- [NOAA Technical Report: Patterns & Projections of High Tide Flooding](#), or
- [Methodology Update: NOAA High Tide Flooding Outlooks for Pacific thresholds](#)



Explore More Features

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Now that you know the basics, ***you're ready to start using the Coastal Inundation Dashboard*** to track flooding and water levels in your community.

But this is just the beginning—the Dashboard offers many other powerful features to help you plan for and respond to coastal flooding. **Some key tools include:**

- **Impact Graphics:** visually highlight flood risks by showing photos of past flooding
- **Web Cams:** provides real-time views of coastal conditions at select locations
- **Storm Surge Watches/Warnings & Coastal Flood Advisories:** from the National Weather Service to keep you informed during coastal storm events
- **NWS Tropical Advisories:** for up-to-date information on active tropical systems
- **Multi-station Views:** to track water levels at stations across a region
- **Custom Storm Dashboards:** to monitor conditions during specific storm events

You can also explore the Inundation History for NOS Stations. Here, you'll find:

- Historical flood days and Top-10 water levels events, allowing you to explore past flooding trends and events at your location.
- Sea Level Trends and exceedance probabilities, allowing you to better understand long-term sea level changes and the impacts of flood frequency.
- High Tide Flooding Outlook information showing possible flood days over the next 1-2 months and projected frequency of annual and decadal high tide flood days.
- To dive deeper into these features and learn how the Dashboard can support your monitoring, planning, and response efforts, please see the full Coastal Inundation Dashboard User Manual.

Scan this QR Code
to visit the product.



Glossary of Terms

Find these and more terms in our online [glossary](#).

Datum: A base elevation used as a reference from which to reckon heights or depths. (Source: [CO-OPS Glossary](#))

Flooding: The overflow, or excess accumulation of water that covers typically dry land. (Source: [NOAA Sea Level Calculator](#))

High Tide Flooding: Occurs when sea level rise combines with local factors to elevate water levels above the normal high tide mark. Changes in prevailing winds, shifts in ocean currents, and strong tidal forces (which occur during full or new moons) can all cause high tide flooding, inundating streets and other infrastructure even on sunny days. (Source: [NOAA Sea Level Calculator](#))

International Great Lakes Datum: The International Great Lakes Datum (IGLD) is the vertical height reference datum used in the Great Lakes and St. Lawrence River System for engineering, charting, channel dredging, navigation safety, power generation, and water resource management. It is a coordinated datum between the United States and Canada that ensures both countries are using the same reference for projects in the Great Lakes basin. (Source: [CO-OPS Glossary](#))

Inundation: Inundation is the amount of water that occurs above normally dry ground as a result of flooding. Along the coast, there are a few common sources of inundation including abnormally high tides, storm surge, persistent onshore winds and waves. In rivers and tidal estuaries, runoff from excessive rainfall can provide another source of inundation. (Source: [CO-OPS Glossary](#))

Low Water Datum (LWD): The geopotential elevation (geopotential difference) for each of the Great Lakes and Lake St. Clair and the corresponding sloping surfaces of the St. Marys, St. Clair, Detroit, Niagara, and St. Lawrence Rivers to which are referred the depths shown on the navigational charts and the authorized depths for navigation improvement projects. (Source: [CO-OPS Glossary](#))

Mean Higher High Water (MHHW): A tidal datum. The average of the higher high water height of each tidal day observed over the National Tidal Datum Epoch. (Source: [CO-OPS Tidal Datums](#))

Glossary of Terms *continued...*

Mean High Water (MHW): A tidal datum. The average of all the high water heights observed over the National Tidal Datum Epoch. (Source: [CO-OPS Tidal Datums](#))

Mean Lower Low Water (MLLW): A tidal datum. The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch. (Source: [CO-OPS Tidal Datums](#))

Mean Low Water (MLW): A tidal datum. The average of all the low water heights observed over the National Tidal Datum Epoch. (Source: [CO-OPS Tidal Datums](#))

Storm Surge: The local change in the elevation of the ocean along a shore due to a storm. The storm surge is measured by subtracting the astronomic tidal elevation from the total elevation. It typically has a duration of a few hours. Since wind generated waves ride on top of the storm surge (and are not included in the definition), the total instantaneous elevation may greatly exceed the predicted storm surge plus astronomic tide. It is potentially catastrophic, especially on low lying coasts with gently sloping offshore topography. (Source: [NWS](#))

- **Storm Surge Watch:** The POSSIBILITY of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within 48 hours, in association with an ongoing or potential tropical cyclones, a subtropical cyclone or a post-tropical cyclone. The watch may be issued earlier when other conditions, such as the onset of tropical-storm-force winds are expected to limit the time available to take protective actions for surge (e.g., evacuations). The warning may also be issued for locations not expected to receive life-threatening inundation but which could potentially be isolated by inundation in adjacent areas. (Source: [NWS](#))
- **Storm Surge Warning:** The DANGER of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within 36 hours, in association with an ongoing or potential tropical cyclones, a subtropical cyclone or a post-tropical cyclone. The warning may be issued earlier when other conditions, such as the onset of tropical storm force winds are expected to limit the time available to take protective actions for surge (e.g., evacuations). The warning may also be issued for locations not expected to receive life-threatening inundation but which could potentially be isolated by inundation in adjacent areas. (Source: [NWS](#))

Glossary of Terms *continued...*

Threshold (flood threshold, flooding impacts): The coastal water level height where flood impacts (e.g. water reaching places it normally doesn't) begin to be observed. Flood thresholds are categorized as minor, moderate or major based on severity of impacts to local infrastructure. ([Source: NOAA Sea Level Calculator](#))

Tidal datum: For marine applications, a base elevation used as a reference from which to reckon heights or depths. It is called a tidal datum when defined in terms of a certain phase of the tide. ([Source: CO-OPS Glossary](#))

Acronyms

- **CO-OPS:** Center for Operational Oceanographic Products and Services
- **IGLD:** International Great Lakes Datum (of 1985)
- **LWD:** Low Water Datum
- **MHHW:** Mean Higher High Water
- **MHW:** Mean High Water
- **MLLW:** Mean Lower Low Water
- **MLW:** Mean Low Water
- **MSL:** Mean Sea Level
- **MTL:** Mean Tide Level
- **NAVD:** North American Vertical Datum of 1988
- **NOAA:** National Oceanic and Atmospheric Administration
- **NOS:** National Ocean Service
- **NWLON:** National Water Level Observation Network
- **NWS:** National Weather Service
- **PORTS:** Physical Oceanographic Real-time Systems
- **STND:** Station Datum