



## HURREVAC Quick Reference Guide

### SUMMARY

HURREVAC is a hurricane decision support tool for government emergency managers. It is a product of the National Hurricane Program, a partnership between the Federal Emergency Management Agency (FEMA), the U.S. Army Corps of Engineers (USACE), and the National Oceanic and Atmospheric Administration (NOAA) dedicated to helping protect communities and residents from hurricane hazards through various projects and activities.

This quick reference guide contains abbreviated instructions for using the 2024 season version of HURREVAC. For detailed demonstrations of the tools, refer to the recorded webinars in the **LEARNING RESOURCES** section of [hurrevac.com](https://hurrevac.com) or the in-program **User Guide**. *(Updated June 10, 2024)*

### GETTING STARTED

- Open a web browser (Firefox, Chrome, or Edge) and go to [hurrevac.com](https://hurrevac.com).
- Click **Launch HURREVAC Application** on the homepage.
- On the login page, enter your **username or email** and **password**. If you don't already have a user account, click [register](#).

When opened, the program automatically plots the latest available Tropical Weather Outlook and zooms to the track of any active Atlantic tropical cyclones. In the **Storms** tab, uncheck any active storm(s) that you do not want to appear on the map.

### WORKSPACE OVERVIEW

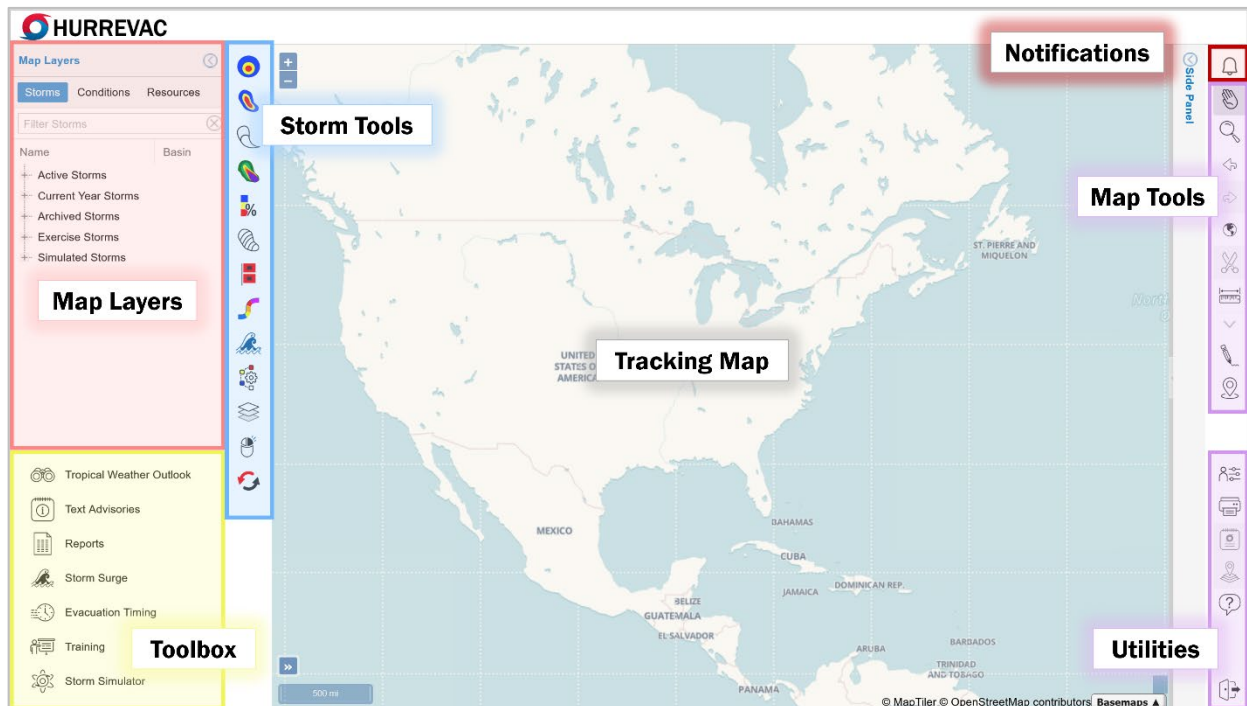
HURREVAC's workspace features a prominent **tracking map**.

The toolbar to the right of the map contains **Map Tools** and **Utilities**. The toolbar immediately to the left contains **Storm Tools**.

The **Map Layers** panel (at upper left) is where you can select which **storms** to show, maps of current weather **conditions** and other **resources**.

The **Toolbox** (at lower left) contains features that either expand in the right-docked **Side Panel** or appear over the tracking map in a dedicated window.

Several tools are available from the **Context Menu**, which appears with a right-click. *This icon is used to indicate tools accessed by right-click.*



## NOTIFICATIONS

System-generated dialogs appear in the upper right corner of the tracking map.

Updates from the HURREVAC team are sent to all users via the **Notification Center**. These can include news about new program functionalities, announcements from the NHC, or important developments during active storms.



## TRACKING MAP

Select your preferred **Basemap** from the menu at the lower right corner of the tracking map. There are several options.



A map **scale** is displayed in the lower left corner of the map. Click the nearby double arrows to expand an **overview map** inset.



The icons in the upper left corner of the map control incremental **zooming**.

## MAP TOOLS

The vertical strip of icons located to the upper right of the tracking map contains tools for map manipulation.



The **Navigation** icon is enabled by default. This indicates that the map view pans around when you click and drag the pointer.



The **Zoom Box** icon lets you zoom in to a custom area by drawing a box on the tracking map. This allows for one zoom, then resets to **Navigation**.

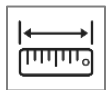
***TIP:** You can also use the mouse wheel for zooming in and out of the tracking map. On touch screens, use pinch gestures to control the map view.*



These three buttons let you quickly navigate map views: **Go to Previous Map Extent**, **Go to Next Map Extent**, and **Zoom to Full Map Extent**. The full map extent can be customized in **User Preferences > Map Settings**.



The **Clip Layers** tool lets you clip certain map layers to only display data within the outline of the United States or an individual state.



The **Measure Distance** tool lets you click on the map to find custom dimensions. Click the icon again to clear all measurements.

- The **Measure Distance** option shows a readout between clicks. Single click to make more segments or double-click to finalize.
- The **Measure Area** option creates a polygon for area calculation.





**Drawing Tools** let you add shapes, lines, markers and text over the map. These are useful for annotating briefing products. The menu contains an **Erase** button to remove drawings.



The **Map Tools** folder contains four location-related tools:

- **Geocode Location** finds the coordinates for an entered address or landmark. It can also find a location if you enter specific coordinates.
- **Census** queries demographic data for a user-drawn map region and is based on an external EPA tool. The report opens in a new browser tab.
- **Weather** fetches the latest NWS forecast for a selected map point.
- **Points of Interest** list (details in a separate section below).

## UTILITIES

The vertical strip of icons located to the lower right of the map contains a variety of basic program actions, user settings and export options.



The **User Preferences** icon opens a window where you set and store defaults for units of speed, units of distance, time zone, **Display Mode**, and several other aspects of the map view. This is also where **Base Location** and **Points of Interest** style settings can be managed.



The **Print/Export Map** tool has options to send the current map view to be printed or downloaded as a PNG file.



The **Storm Summary** tool creates a printable briefing document in a new tab. The report includes a screen capture of the current map, plus the text of the Public Advisory and Forecast Discussion.



The **GIS Export** tool downloads several storm track and wind-related advisory products in GeoJSON format, which can be mapped in GIS software.



Click **Help** to open the complete **HURREVAC User Guide** in a new tab.



Click **Logout** to exit HURREVAC.



## BASE LOCATION

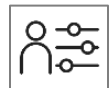
Set a base location to mark your primary place of interest. The base location is saved to your user profile so that you can easily tailor reports, evacuation scenarios and storm surge maps to an area you frequently monitor.



**Right-click** on any location (on land and in an evacuation zone) and click **Set Base Location**. The alternative is to click the **Map Location Context Menu** icon and drag the blue dot to your desired location.



A flag confirms where your base location is set. The User Preferences window opens and displays more information about the coordinates. (This can be checked anytime by clicking **User Preferences**.)



***TIP:** To make sure you are placing your base location in an evacuation zone, go to the **Resources** tab to map evacuation zones for the area of interest.*

## POINTS OF INTEREST

Points of Interest (POI) are user-defined places that can be shown on the map and used to analyze data. There are multiple ways to add points. POI can be sorted into types, which lets you assign a custom look to markers and labels.



**Right-click** at a specific map location and **Create Point of Interest**. This prompts you to assign a name and type for those coordinates.

You can also look up an address with **Geocode Location** and click **Add as POI**.

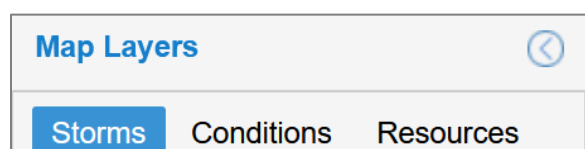
To view the POI list, open the **Map Tools** folder. Points can be edited, sorted, or deleted via this window. POIs can also be imported from or exported to a spreadsheet (.xlsx file) or GeoJSON format.



**POI Style Settings** are a tab in **User Preferences**. There, you can manage POI types, change the look of the markers and labels, and control initial display level.

## MAP LAYERS

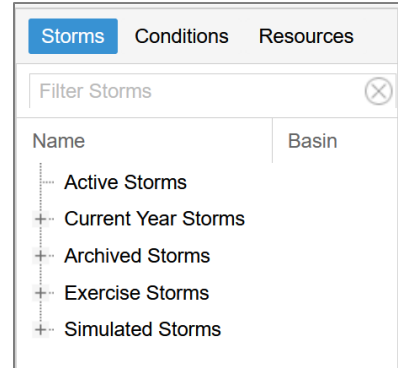
Map layers in HURREVAC are organized into three tabs located in the upper left section of the workspace: **Storms**, **Conditions** and **Resources**.



## STORMS

The **Storms** tab is where you can select current and archived storms to display on the tracking map.

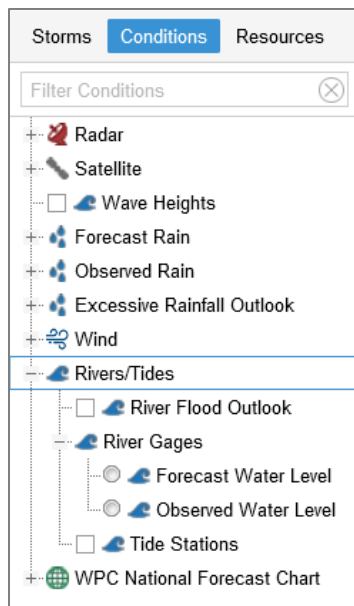
- Headings include **Active Storms**, **Current Year Storms**, **Archived Storms** (since 2005), **Exercise Storms** and **Simulated Storms**.
- Active Atlantic storms are mapped by default. Multiple storms can be selected. The most recently selected storm is prominently displayed as the working storm. The working storm determines the data used for most of HURREVAC's other map layers, text products and reports.
- The **Filter Storms** bar is the fastest way to find a historic storm by name.



***TIP:** When learning HURREVAC, look at Atlantic storms that occurred in 2022 or 2023 because they have data for most of the program's tools and features.*

## CONDITIONS

The **Conditions** tab contains map layers for current weather observations and forecasts.



***NOTE:** No archived or historical data is available for these layers, even when a previous storm advisory is selected.*

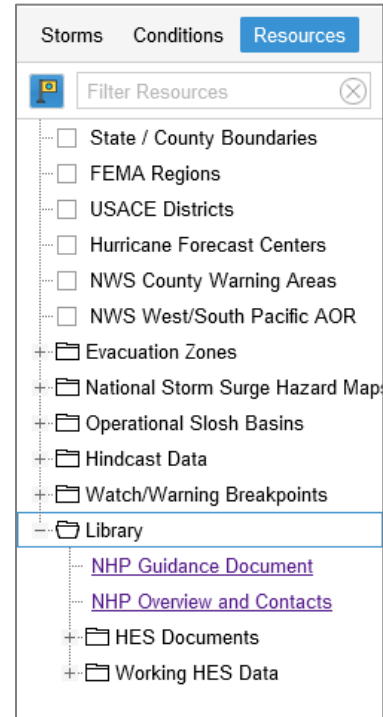
- Available products include Radar, Satellite, Wave Heights, Forecast Rain (Days 1-7), Observed Rain (for 6 time periods), Excessive Rainfall Outlook (Days 1-5), Wind Speeds and Gusts, River Flood Outlook, River Gages, Tide Stations and WPC charts of fronts and precipitation.
- For most layers, the **Legend** at the bottom of the map describes the colors and valid product time in more detail.
- Layers are always shown on top of previous layers as they are added. Adjust display order and opacity in **Quick Layers Options**.



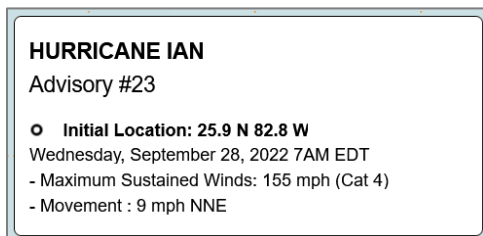
## RESOURCES

The **Resources** tab provides a variety of non-weather map layers and reference documents.

- Headings include State/County Boundaries, FEMA Regions, USACE Districts, Hurricane Forecast Centers, NWS County Warning Areas, Evacuation Zones, National Storm Surge Hazard Maps, Operational Slosh Basins, Hindcast Data, Watch/Warning Breakpoints and Library.
- **Evacuation zones** are organized by state, and multiple localities can be mapped. Due to local variations, evacuation zones are color-coded but not described in the map legend. Click a zone to display its name on the map.
- Further information about evacuation zones, clearance times and storm surge vulnerability are available within Hurricane Evacuation Study (HES) Documents in the **Library** folder.



## STORM INFO BOX and MAP LEGEND



The legend contains explanatory information about the selected storm, its track and most of HURREVAC's map layers. The legend is located at the bottom of the tracking map, and automatically updates as layers are turned on or off.

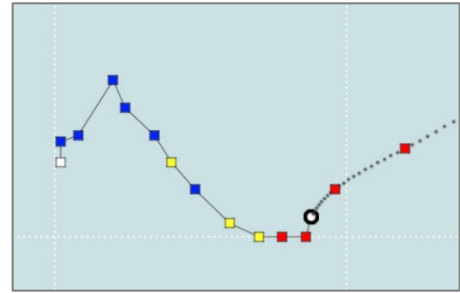


To display storm details in a standalone box over the map (instead of the legend), right-click on the map and select **Storm Info Box Here**. Right-click again to return the info box to the legend.

To minimize the legend, click the small arrow centered along its upper edge. Click the arrow again to restore the legend.

## STORM TRACKS

The storm's center location is shown on the map as a white circle with a black outline. This icon always shows the position—past, present, or future—that corresponds to the displayed date and time.



The past track is a thin, solid black line with color-coded squares at the locations of all previous advisories.

Colors represent the strength of the sustained winds (or equivalent winds, in the case of potential tropical cyclones, remnants, and post-tropical cyclones):

- Tropical depression (less than 34 kt / 39 mph) in white.
- Tropical storm (greater than or equal to 34 kt / 39 mph) in blue.
- Strong tropical storm (greater than or equal to 50 kt / 58 mph) in yellow.
- Hurricane (greater than or equal to 64 kt / 74 mph) in red.

***NOTE:** This color-coding theme applies to most of HURREVAC's wind-related map layers and reports, except watches and warnings.*

The forecast track consists of color-coded squares at official forecast positions, connected by a dotted black line that represents hourly positions. Track labels can be moved and customized in **Track and Swath Options**.

## STORM ADVISORIES

The National Hurricane Center and Central Pacific Hurricane Center issue numbered advisories for each storm on a 6-hour schedule. Issuance times are 0300Z, 0900Z, 1500Z and 2100Z (UTC), or 5 AM, 11 AM, 5 PM, and 11 PM EDT. Forecast products and most map layers are only updated at these full advisories.

When watches or warnings are in effect, intermediate advisories (indicated by an "A" after the advisory number) are issued every 3 hours. These contain position or watch/warning updates and are available at 2 AM, 8 AM, 2 PM, and 8 PM EDT. Occasionally, special advisories are issued outside of this schedule due to significant changes to a storm or its forecast products.



Hurricane Ian

Advisory 23 ◀ ▶ ▶▶

+0h ⬆ ⬇ ▶▶

7am, Wed, Sep 28, 2022 EDT

Use the **Storm Status Bar**, located along the upper edge of the workspace, to navigate through time. The storm's position and track change to reflect the new valid time. Most storm-focused map layers also update based on this selection.

- The storm status bar indicates the working storm name, advisory number, forecast hour, and valid time of the currently displayed storm.
- If multiple storms are selected, the user can switch to another working storm by clicking on the current storm name and selecting from the list.
- Use the lists or arrows to change to a prior advisory or later forecast hour.
- When no storm is selected, the storm status bar area is blank.

***TIP:** Use the keyboard arrow keys as a shortcut for the storm status bar. Press the left arrow (←) to display the previous advisory or right arrow (→) for the next advisory, if available. Press the up arrow (↑) to advance the forecast hour beyond the advisory, or the down arrow (↓) to go backward.*

## ADVISORY POINTS

Click on a previous advisory point to open a window that shows the storm's statistics when it was at that position. Click **Toggle Forecast** to see the forecast track from the selected past advisory. (You can place multiple past forecasts tracks on the map using **Track and Swath Options**.) A forecast point can also be clicked on to show more details and navigation options.

## TROPICAL WEATHER OUTLOOK

The Tropical Weather Outlook (TWO) shows areas of potential formation within a 7-day period, both on the tracking map and in a text summary.



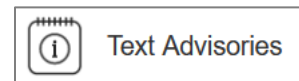
Tropical Weather Outlook

- Click **Tropical Weather Outlook** in the toolbox. When expanded, the TWO window has four tabs that organize outlook text by region (Atlantic, East Pacific, Central Pacific, West/South Pacific and Indian Ocean).
- The date and time of the TWO are matched to the time of whatever storm advisory is currently displayed. Use the menus if you want to view an earlier outlook. If no storm is plotted, then the most recent TWO appears.

- Both the 2-day and 7-day potential for storm formation are plotted on the tracking map.
  - The **X icons** show where disturbances are being monitored and are color-coded by their probability of formation in the next 2 days.
  - The **shaded regions** show where storm formation could occur in the 2-day to 7-day range and are color-coded by probability.
- Shaded regions and X symbols on the map can be clicked to show details for that feature and its probability of formation to the nearest 10%.
- The TWO is updated at 0000Z, 0600Z, 1200Z and 1800Z (UTC), or 2 AM, 8 AM, 2 PM and 8 PM EDT between May 15 and Nov. 30.

## TEXT ADVISORIES

Read text advisories to learn more about the hazards, watches and warnings and forecast rationale associated with the selected storm.



Click **Text Advisories** in the toolbox. The Text Advisories window contains four tabs for the following products: Public Advisory, Forecast Discussion, Wind Speed Probabilities and Forecast Advisory.

All products are issued at 6-hour intervals with regular advisories.

- **Public Advisory:**
  - Meant to be an easily read, plain language summary.
  - Includes current storm information, watches and warnings, brief discussion and outlook, summary of hazards and observations (if applicable) and time of the next advisory.
  - Also issued every 3 hours for intermediate advisories (when watches or warnings are in effect).
- **Forecast Discussion:**
  - Explains the latest analysis and reasoning for the forecast, and contains key messages from the forecasters.
- **Wind Speed Probabilities:**
  - Provides a text listing of location-based wind speed probabilities, which corresponds to HURREVAC's map layers.
- **Forecast Advisory:**
  - Details of current and forecast storm positions, intensity, and wind field dimensions in nautical miles.

## STORM TOOLS

The vertical strip of icons located immediately to the left of the tracking map contains storm-specific map layers and display options.



### Forecast Wind Field (also called Wind Rings)

- Colors represent HURREVAC's three main wind thresholds.
- It can be plotted along the forecast track, or on past advisories.
- Shapes are based on the maximum extent of that threshold within an entire quadrant (NE, SE, SW, and NW). For a quadrant that straddles both land and water, the portion over land may be an overestimation.



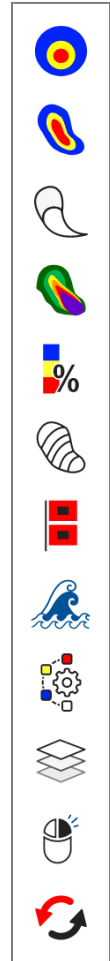
### Wind Swath

- **Forecast – Deterministic**
  - Shows the forecast wind impact area over the next 3 days.
  - Based on the official forecast and does not account for any uncertainty or error.
- **Forecast – Probabilistic**
  - Shows the larger region that has at least a 10% chance of experiencing those wind speeds in the next 3 days. Not all of this area will be impacted, but there is at least some chance at all shaded locations.
- **Past – Actual**
  - An estimated wind history made by merging the initial (issuance hour) wind fields from all previous advisories.



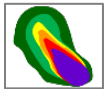
### Potential Track Area

- **Error Cone**
  - The *center* of the storm is most likely to track within the white cone for the first 3 days of the forecast period and the gray cone within the extended 5-day period.
  - Cone size increases for later forecast periods because it is based on error statistics from the past five seasons. **The cone does not depict where hazards will (or won't) strike, and it does not show real-time uncertainty. Wind, rain, and surge can extend well beyond the cone.**



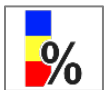
- **Error Cone Plus Fringe Winds**

- Depicts a larger area with potential impacts from tropical-storm-force winds (or greater) in the next 3 days. The size of the fringe winds area is determined by the adding the Forecast Wind Field to the outer cone edges.



- **Graphical Wind Probabilities**

- Contains three map layer options, one for each sustained wind threshold: tropical storm, strong tropical storm and hurricane.
- Colors (see legend) depict the cumulative chance of winds exceeding those thresholds within the 5-day forecast period.
- This layer is not storm-specific, so the map shows any probabilities associated with active storms across most of the Northern Hemisphere.



- **Location-Based Wind Probabilities**

- Color-coded boxes show the chance that key locations will reach or exceed tropical storm, strong tropical storm, and hurricane wind thresholds within the 5-day forecast period.
- It matches the last column of the Wind Speed Probabilities text product.

***NOTE:** Location display is zoom-dependent. On a wide map view, multiple sites are clustered and only the highest chances are shown. Zoom in to reveal details.*



- **Tropical-Storm-Force Wind Timing Graphic (TOA)**

- **Most Likely Arrival**
  - Map lines identify the time before or after which the onset of sustained tropical-storm-force winds is equally likely (50%).
  - This graphic is more appropriate for users who are willing to risk not having completed all preparations before the wind arrives.
- **Earliest Reasonable Arrival**
  - Map lines identify the time before which there is no more than a 10% chance of tropical-storm-force wind onset.
  - Preparations should ideally be completed before this time for those with a low tolerance for risk.

- **Wind Timing Flags**

- With either the Earliest Reasonable or Most Likely TOA graphic turned on, right-click on the map to **Place Wind Timing Flag**.
- Flags can be used to label locations between the timing lines, and update when you switch between the TOA map layer options.



## **Watches and Warnings**

Colors are explained in the legend.

- **Wind Watches/Warnings**

Plots coastal watches and warnings that are described in the text advisory text products. The lead times are tied to the anticipated arrival of tropical-storm-force winds.

- ***Hurricane (or Tropical Storm) Watch*** – Conditions are possible within the watch area within 48 hours.
- ***Hurricane (or Tropical Storm) Warning*** – Conditions are expected somewhere within the warning area within 36 hours.

- **Surge Watches/Warnings**

Plotted on the map in a gridded pattern that can extend into estuaries and rivers. This does not account for wave action or flooding from rainfall.

- ***Storm Surge Watch*** – There is a possibility of life-threatening inundation, generally within 48 hours.
- ***Storm Surge Warning*** – There is a danger of life-threatening inundation, generally within 36 hours.

*TIP: Watches and warnings often overlap. To label their extents, select **Watch/Warning Breakpoints** in the **Resources** tab and zoom to a local view.*



## **Peak Storm Surge**

Maps show forecast peak inundation ranges (in feet) along the immediate coastline, and visualize data listed in the **Public Advisory**. This product has been issued operationally since 2023 when storm surge watches or warnings are in effect for the mainland United States, Puerto Rico, or U.S. Virgin Islands. It is typically available within 10 minutes of the valid advisory time.

- **With Surge Communication Points**
- **Without Surge Communication Points**



## Potential Storm Surge Flooding

Maps depict a reasonable worst-case scenario for storm surge based on probabilistic SLOSH modelling. This product takes tides into account, along with uncertainty related to storm track, size and intensity.

Inundation is shown as water height above ground level in feet. Products are issued when storm surge watches or warnings are in effect for the mainland U.S., (also PR, VI), and typically available 45-60 minutes after the valid advisory time.

- **Potential Flooding with Tidal Mask** – A gray mask covers coastal areas that are already subject to flooding at high tide. This emphasizes *unusual* storm surge inundation on land.
- **Potential Flooding without Tidal Mask** – This shows all storm surge inundation, including places that routinely flood during high tides.



## Track and Swath Options

This is where you can customize and store settings for how HURREVAC displays storm tracks, advisory labels, wind field, wind swaths and error cones.



## Quick Layers Options

Global Opacity:



Here, you can manage the display order and opacity of map layers. Opacity can be controlled for individual layers or all layers. A layer can be pinned so that it appears the next time you open HURREVAC.



## Map Location Context Menu

When using HURREVAC on a device that does not have right-click functionality, this opens the context menu. Drag a blue dot to the part of the tracking map where you would like to perform the action. Options include set base location, create point of interest, surge viewer, surge flags, show range marks, storm info box, wind flags, create wind timing report and wind probability report.

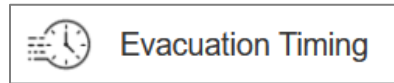


## Reset

Clears all the graphics on the map.

## EVACUATION TIMING

HURREVAC's evacuation decision support tools assist with timing of protective actions. For example, if 10 hours are needed to evacuate the vulnerable population from a coastal area (the clearance time) and wind hazards are predicted to begin at 8 PM, then the evacuation must start no later than 10 AM that same day.



Click **Evacuation Timing** in the toolbox. The Evacuation Timing window has three tabs: **Evacuation Scenarios**, **Timeline Actions** and **Timing Arcs**.

### Evacuation Scenarios

- Contains the clearance times from each state's Hurricane Evacuation Study (HES), broken down by county or parish.
- Filters guide the user down to a specific scenario and clearance time. Narrow down the range of clearance times using pre-defined parameters.
- Any number of specific scenarios can be saved within your user profile, which can then be used for Evacuation Timing Reports and Timing Arcs.

### Timeline Actions

- User-created records of actions to be taken relative to the arrival time of tropical-storm-force winds. Check with your agency for appropriate items to enter. Timeline actions complement evacuation scenarios, but can be created for more areas.
- Actions are manually input by specifying a location (county or point of interest), adding a description, then entering the time offset.
- Stored entries can be used as Timing Arcs or in Evacuation Timing Reports

### Timing Arcs

- Timing arcs are graphical depictions of when protective action should be taken in advance of an approaching storm.
- The size (radius) of each arc is determined by multiplying the number of hours needed for that action (from Evacuation Scenarios or Timeline Actions) by the average forward speed of the storm in the hours before wind hazards arrive.
- A decision about the action should be made by the time the tropical-storm-force wind field touches or enters the arc.
- Note: arc size often varies between advisories due to changes in storm speed and/or size, and this method does not fully account for uncertainty.

## SINGLE LOCATION REPORTS

Right-click on the map to create two wind-related reports specific to that location.



**Wind Timing Report** provides probabilistic time of arrival, time of departure and cumulative wind probabilities for a single point on the map or locality (county or U.S. county equivalent). Deterministic wind arrival and departure times are provided when available.

Only 34 kt and 50 kt thresholds are included. This report format can also be created by clicking a county or POI listed in the other wind timing reports (below).

**Wind Probability Report** provides individual and cumulative wind onset probabilities in 6-hour increments throughout the 120-hour forecast period. The 34 kt, 50 kt and 64 kt thresholds are available.

## MULTIPLE LOCATION REPORTS



Click **Reports** in the toolbox. The **Reports** tab opens in the **Side Panel**. Make sure a storm is selected and that you are using the latest advisory. Then, select an option from **Create Report**.

***NOTE:** Times in reports are based on Time Zone settings in your **User Preferences**. Keep this in mind to avoid discrepancies.*



- Use the **Scope** menu to filter the listed locations by region, or limit results to your **Base Location**.
- These reports are generally county-based. Points of Interest can also be analyzed by selecting that option from the **Include** menu.

***TIP:** Points of Interest can be used to populate reports for regions outside of U.S. states and territories.*

- Click **Export to Excel** to save the report to your download directory.
- Click **Export** to open the results in a new browser tab for easy copying.
- Use **Update** to generate the report again for a new advisory.



**Storm Statistics** lists all available past advisory observations along the track of a storm, then forecast data for the next 5 days. Statistics include position, forward motion, pressure (past only), maximum sustained winds and maximum gusts. This report is not location-specific and cannot be filtered.

**Closest Approach** shows the expected distance between the center of the storm and locations in the database, along with the date, time, and relative direction of the closest approach. This uses the deterministic forecast and does not account for uncertainty.

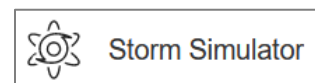
**Probabilistic Wind Timing** shows when a storm's sustained winds are expected to begin at multiple locations. The report lists earliest reasonable and most likely start times for two thresholds: 34 kt and 50 kt. This corresponds to the Wind Timing Graphics, which extend up to 5 days from the advisory.

**Deterministic Wind Timing** shows when (and for how long) the 34 kt, 50 kt and 64 kt thresholds are expected to be exceeded at locations in the forecast path of the storm. Timing is based on the deterministic wind swath, which extends 3 days from the advisory but does not account for uncertainty.

**Evacuation Timing** shows the earliest and latest times for initiating protective actions. This combines the probabilistic time of arrival information for tropical-storm-force winds with user-selected evacuation scenarios and timeline actions. The report can be configured to focus on multiple scenarios for one locality or evaluate scenarios across many separate localities.

**Wind History** is similar in format to the Deterministic Wind Timing report, but analysis is based on the past wind swath. From that, you can analyze the locations potentially exposed to winds and for how long.

## STORM SIMULATOR



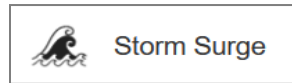
Create custom hurricane scenarios to support training and exercises.

***NOTE:** Refer to the final section of the User Guide to learn how to build and apply simulated storms.*



## STORM SURGE (SLOSH) EXPLORER

The storm surge explorer is a tool for viewing and interacting with hypothetical inundation scenarios created by the SLOSH model. This is primarily a planning tool because it is not driven by any current storms.



There are two products: **MOMs** and **MEOWs**. All model output is reported as height of water above ground level in feet and assumes high tide.

Click **Storm Surge** in the toolbox. The tool opens in the **Side Panel**.

***NOTE:** Refer to the User Guide to learn more about storm surge concepts and how to leverage the many options in this tool.*



**National MOMs (Maximum of MEOWs)** – These map layers provide a general worst-case surge threat for a given category, because they factor in the most scenarios. The only option for MOMs is choosing a category.

**Blended or Single MEOWs (Maximum Envelope of Water)** – These map layers are customizable and basin-specific composites. MEOWs are more specific than MOMs. The data in each grid cell represents the maximum inundation using hypothetical storms run with the same 1) category (intensity), 2) forward speed, and 3) storm trajectory (direction).

- SLOSH Explorer allows mixing of multiple storm directions for a given storm basin. The user also selects a category and forward speed.

**Surge Hindcasts** – This tool lets you view street-by-street inundation estimates and is usually available in the day or days after a U.S. hurricane landfall. Select from the list of storms at the bottom of the SLOSH Explorer panel. Hindcasts are only intended for use in emergency management response and recovery.

**Surge Flags** – Right-click to label the inundation in surge-related map layers. Surge flags update when you change the displayed data.



**Surge Viewer** – Right-click at the desired location to open this interactive tool in a window. A bar chart shows how different hurricane characteristics could affect the range of inundation at that point. This planning tool uses SLOSH MEOW output. Click the category and forward speed options to filter scenarios.

