Welcome to HURREVAC

HURREVAC (short for Hurricane Evacuation) is a storm tracking and decision support computer software tool for government emergency managers. The program tracks hurricanes, using the National Hurricane Center Forecast/Advisory product, and combines this information with data from the regional Hurricane Evacuation Studies (HES) to assist local emergency managers in determining an evacuation start time. Various National Weather Service (NWS) products are incorporated into the program to provide analysis of timing and severity for storm effects such as wind, storm surge, and inland flooding.

HURREVAC 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). Sea Island Software is the private contractor tasked with development, operation, and maintenance of the HURREVAC program. The USACE Baltimore District office (Hurricane Program Office under the National Center of Expertise for Coastal Storm Damage Reduction) administers the contract with funding and guidance from FEMA.
What's New in the 2017 Season Version

The 2017 Season Version of HURREVAC is 1.7.1, as noted in the title bar of the main program window. This version is based upon a .NET program platform initially released for the 2010 season and dubbed Hurrevac2010. Previous platforms included Hurrevac2000, HurWin95, and the DOS-based state editions dating back to the program’s beginnings in 1988. These previous platforms have now been phased out and are no longer supported with a live feed of forecast data.

This release of HURREVAC contains improved evacuation options for utilizing zone-based scenarios and for entering your own (manual) clearance times to utilize throughout the program in alerts, clearance time arcs, and evacuation timing reports.

The screenshot below highlights some areas of the program where this and other changes have been made.

New features of the 2017 Season Version of HURREVAC include manual-entry and zone-based evacuation options(1), radar and satellite imagery additions(2), a new probabilistic wind timing tool(3), and a change of map projection to Web Mercator(4).

Specific new features and improvements to the program are as follows:
What's New in the 2017 Season Version

1. **Evacuation Options** are now available for evacuation zone scenarios and manually-entered evacuation clearance times. Whereas under Storm Category Scenarios, HURREVAC attempts to select the most appropriate level of evacuation based on storm severity (the maximum forecast SSCat), under the new options the selection is left entirely up to the user. This should improve clarity within the program of exactly what clearance times are being used.

2. The **Doppler radar mosaic** has been expanded to include coverage of Puerto Rico and Hawaii. **Satellite imagery** has also been added from the **visible channel of the GOES-East and GOES-West geostationary satellites**.

3. A new probabilistic wind timing tool has been added to the cumulative wind probabilities graph for assistance in determining the likelihood that winds will begin by specified hours.

4. HURREVAC's basemap has been converted to a **Web-mercator map projection** to more accurately depict storm shape and direction at extreme northern latitudes.

Other changes of note in HURREVAC Version 1.7.1:

- The **river gauge charts** now have a tool similar to the **tide gauge charts'** tool for looking up water height at specified times.
- Beginning this season, HURREVAC will track **potential tropical cyclones** when NHC begins issuing early advisories for systems forming near land.
- Minor updates have been made to watch/warning breakpoints that include a few additional locations in the Central and West Pacific basins, and also changes to the names and break intervals in many other areas of the world.
- Many more **wind probability point locations** will be reported in HURREVAC for storms beginning this season.
- The potential track area (120-hour error cone) for the Atlantic and East Pacific is further narrowed as a result of NHC's improving accuracy in forecasting storm tracks. Central Pacific storms will utilize new CPHC-specific error rates for 2017.

**IMPORTANT NOTE:** Additional new features are in the works for a mid-season update to be distributed following testing on the first live storm with storm surge products. **Future HURREVAC (version 1.7.2) will include mapping and reporting of storm surge watches/warnings, both by breakpoints and by inland (gridded) extent. NHC's potential storm surge flooding map will also be incorporated into HURREVAC's Current view.**
Getting Started

Resources
HURREVAC includes a comprehensive help system that is installed along with the program. The help system’s ‘Using HURREVAC’ walk-through of program basics is a good place for new users to begin. Searchable topics are available for in-depth research. A print-formatted PDF version is located on the support site at http://www.hurrevac.com/guides.htm.

Technical Support
HURREVAC users have year-round access to 24/7 technical support from Sea Island Software, the contractor who develops, operates, and maintains the program.

Users should register for the program and submit questions through the support site at www.hurrevac.com. Routine web site contacts and e-mails to support@hurrevac.com are answered within one business day. Issues related to developing storms and other time-critical user needs are addressed immediately even if outside of normal business hours.

Sea Island Software maintains a toll-free support phone line at (888) 840-4089. Support calls are answered 24/7 during storm events.
Program Distribution

HURREVAC is an important emergency management tool for monitoring hurricane threats and determining evacuation and other operational decision deadlines. The program has approximately 12,000 registered users in federal, state, and local government. In actual practice there are likely two or three times as many users since registration is only required of one contact person per site.

As a federally-funded program, the software, datafeed, and technical support are provided free-of-charge to all individuals in government emergency management who request access. HURREVAC is not distributed beyond the government emergency management community.

For program access, please visit the registration page at http://www.hurrevac.com/register.php. Successful registrants receive an email reply with instructions for downloading the program installation file. It's important that you notify the HURREVAC support team of any change in email address so that you can be kept informed of program updates.
Installation and Configuration

Installation instructions and access to the program install file are emailed to new users who apply for program access through the registration page at http://www.hurrevac.com/register.php. If you are already registered but need to renew access the program install file, please visit http://www.hurrevac.com/resend.php.

Program Requirements

HURREVAC is a stand-alone desktop application for computers running Microsoft Windows Vista, 7, or 8. An Internet connection is required in order for the program to retrieve live forecast data. The only other program requirement is Microsoft .NET Framework 4.5. This application framework is already included with most versions of Windows and may be obtained for older operating systems such as Windows Vista if not already present on your computer. HURREVAC’s installation wizard will alert you if the prerequisite .NET Framework is missing and needs to be downloaded from Microsoft.com.

For full access to HURREVAC’s entire toolbar and tracking map, Windows display settings must be configured for a screen resolution of at least 1024 x 768 pixels. Also, for optimal performance the computer should have at least 1GB of free RAM that is not in use by the operating system or other programs.

Installation

Basic steps for installation and configuration (as detailed within the emailed download instructions) include:

1. Download and run the program install file.
2. Launch HURREVAC from the desktop icon and go to the in-program Setup to import or define user preferences.
Using HURREVAC

The following is a short walk-through of HURREVAC intended for users who are new to the program and for those who wish to refresh their skills.

Topics in This Tour

- Exploring the Workspace
- Tracking Current Storms
- Analyzing Threats
- Evacuation Start Timing
- Other Weather Data
- Working with Archive Storms
Exploring the Workspace

HURREVAC's default view is dominated by a large tracking map. Additional View Tabs are available for viewing other items:

- text of the currently displayed storm advisory;
- text and graphical depictions of the Tropical Weather Outlook; and
- various reports generated upon request.

The program header is reserved for global functions such as configuring the program setup, updating forecast data, and printing. The program footer holds messages concerning recent forecast data downloads, plus record of map coordinates and measurements made by the distance ruler.

Map Tools for commonly-used functions are located on the left edge of the tracking map and are grouped as follows:

- map manipulation (zoom and pan functions)
Using HURREVAC

- forecast hour buttons - HURREVAC's display defaults to the initial position of the very latest advisory. Use these buttons to view forecast information from some portion of the forecast (from 0 to 120-hours)
- storm advisory buttons - HURREVAC's display defaults to the very latest advisory. In order to view storm status and forecast information from a previous advisory use these buttons
- storm forecast features - display the wind field or potential location for a discrete forecast hour, plus the wind swath (for forecast hours 0-72), or error cone (region where the storm in most likely to track). Also forecast and past track position labels, watch and warning locations along the coastline, and wind probabilities
- back, forward, and reset options for restoring map extents and the storm display to previous states.

Data Tabs
Live storms and other forecast data appear in the list at top left on the Current Tab. You can expand list headings and check list items on and off to control their display on the map.

The Archives Tab is used to view ended storms and other types of archived data.

Toolbox
Additional operations of the program appear at the bottom left of the workspace.

- STORM FEATURES displayed on the map for the current advisory
- MAP ANNOTATIONS for map labeling options
- BROWSERS for Hurricane Evacuation Study clearance times, storm surge maps, and historical hurricane tracks
- UTILITIES for storm file editing, import and export
Tracking Current Storms

Real-time monitoring and storm tracking are central to HURREVAC. The program’s primary data sources are the three US government-based forecast centers which together cover tropical cyclone activity worldwide:

1. The National Hurricane Center (NHC) - responsible for the Atlantic basin (including the Caribbean and Gulf of Mexico) and the East Pacific basin that extends westward to 140 degrees longitude.
2. The Central Pacific Hurricane Center (CPHC) - responsible for the Central Pacific basin from 140 to 180 degrees west.
3. The Joint Typhoon Warning Center (JTWC) - with a large area of responsibility that includes the West Pacific and North Indian Ocean, plus the South Pacific and South Indian Ocean.

Whenever there is an active tropical cyclone, the responsible forecast center produces sequentially numbered advisories at 6-hour intervals. Issuance times are 03, 09, 15, and 21 Zulu (which translates to 11pm, 5am, 11am, and 5pm Eastern Daylight Time).

At startup, HURREVAC immediately checks the web to see if there are any active storms and downloads them for presentation on the tracking map. As long as the program is left in auto-
download mode (the default download schedule), you will receive updates with new forecast advisories.

HURREVAC’s Current data tab, at top left of the program interface, organizes activity by the forecast basins. Numbers appear after the name of any basin containing one or more active storms. Click the + symbol next to an active basin to expand the listing to include the active storm name(s) and latest advisory number(s).

As per default basin selections made within HURREVAC’s Setup form, the program automatically plots storms that are active in the Atlantic basin and leaves other basins’ storms unchecked. If boxes for multiple storms are checked, one storm will be prominently displayed (in working mode) while the others show up as simple plots. Storm plots consist of a multi-colored line tracing the past track of the storm and a small red circle marking the location of the storm at the time of the most recent advisory. The Tropical Weather Outlook (accessed from the Outlook View Tab) contains a text summary of activity in each basin.

When you find a storm you wish to investigate further, click on the text of the storm’s name in the list on the Current Data Tab. This will load this storm’s STM file (HURREVAC’s native file format for storing all the forecast advisories from a single storm). With a storm selected for working mode, you can begin to manipulate it using the Map Toolbar, or STORM FEATURES and MAP ANNOTATIONS of the Toolbox. You can also view the text of its advisory package (accessed from the Advisory View Tab) or generate Reports from the Reports [+ ] View Tab.

Storm Presentation
The storm’s *past track* appears as a solid blue line, with colored squares representing the locations of all previous (old) advisories. These are color-coded according to the maximum wind speeds observed at the time of each advisory. The colors indicate:

- Blue - tropical storm-force winds of at least 34kt or 39mph;
- Yellow - strong tropical storm-force winds of at least 50kt or 58mph; and
- Red - hurricane-force winds of at least 64kts or 74mph.

The **Wind Field** illustrates the *initial position* and size of the storm. The **Error Cone** illustrates the area in which the center of the storm is most likely to track. Forecast positions at 12, 24, 36, 48, 72, 96, and 120 hours are indicated by large white-filled squares.
Analyzing Distant Threats

When tracking a still distant hurricane, HURREVAC enables you to answer basic questions about the threat such as:

- Where is the hurricane currently located and how big is it?
- Where is the hurricane expected to make landfall and at what intensity?
- What is the likelihood that the hurricane will impact my location and how soon could that happen?

Storm status is indicated by the Storm Information that initially appears as a Map Legend item across the bottom of the map display. The presentation style for storm information can be changed to the box style shown below by right-clicking on the map and opting to ‘Move Storm Info Box Here.’ To find out how the storm is forecasted to develop over the five-day period, use the (yellow) Move Storm AHEAD and BACK buttons of the Map Toolbar. The Storm Info Box will update as you advance the storm along its forecast track.

An alternate way to gather statistics about the storm is through the Storm Statistics Graph or Report.

You can determine when tropical storm force winds are projected to reach the coast by advancing the storm along its forecast track until the blue ring of the Hourly Wind Field touches the coast. Adding Advisory Labels to the forecast track can also be helpful in illustrating when the storm center is forecasted to be over an area.
You should not focus solely on the forecast track or precise wind timing, however, when a storm is still distant (36 to 120 hours away). Direction of the storm track, movement speed, and storm size is uncertain and one should be focused on probabilistic forecast, rather than deterministic forecast information. If you are in the Error Cone or fringe winds area surrounding the error swath, you should be concerned and following the storm closely. The Forecast Error Cone Report will list all counties/parishes within this potential track area and indicate how early the storm might arrive. This calculation will report an earlier time than the deterministic method (advancing the Hourly Wind Field) because it adds a margin of error.

You can also use Wind Probabilities to gauge the threat. Has the probability of hurricane-force winds at the coastal location nearest you increased or decreased from previous advisories?

If you are an inland county or parish, the MEOW (wind) decay models will tell you a lot about how much wind can be expected to penetrate inland to your area if the storm center comes very near or over you.

Regional planners may wish to use the Closest Approach of Storm Center Report to determine which locations are under the greatest threat.
Evacuation Timing

If a hurricane is determined to be close and threatening, you should begin to focus more specifically on the official forecast track and precise timing calculations derived from it.

The 'close and threatening' time frame is determined to a certain extent by the lead time that your community needs to make its evacuation preparations. In USACE Hurricane Evacuation Studies, this is referred to as the Evacuation Clearance Time, the number of hours needed to move the vulnerable population to safety. Clearance times vary according to both storm and local conditions. In HURREVAC, you can use the Evacuation Clearance Time Browser to review all available scenarios for your county or parish.

Timing Calculations

HURREVAC arrives at an evacuation start time using input from the official hurricane forecast (from NHC, CPHC, or JTWC) and the Hurricane Evacuation Study for the county or parish of interest.

To determine the arrival time of tropical storm force winds, the program takes an Alternate Forecast Track, worst-case scenario of a direct hit in which the forward speed and wind ranges of the official forecast are retained, but the track is straightened and redirected to the county of interest. Typically, the alternate track adjustment for counties in or near the error swath will result in a slightly earlier arrival time for tropical storm force winds than the official track.

Note that because of the alternate track adjustment, it possible to run timing calculations on counties well outside of the error swath where a storm strike is unlikely. HURREVAC
cannot tell you whether or not an evacuation is justified...only when the last possible moment is for starting an evacuation to allow enough time for completion before the hazards. The advantage of waiting as long as possible is that you have the most accurate forecast information and are therefore in a position to make the best decision.

The precise evacuation clearance time (number of hours) used in the calculation will be based upon your selection of Evacuation Options.

Finally to run the evacuation start time calculations, you generate an Evacuation Timing Report from the +tab. These calculations should be updated each time a new forecast advisory is received. This is easily accomplished either with the Refresh button at the bottom of original report or by generating an additional tabbed report.

If configured, an Evacuation Timing Alert will appear when your county or parish is within 12 hours of a potential evacuation start time.

Those familiar with the pre-computer methods for evacuation timing may also wish to use a graphical Clearance Time Arc.
Other Weather Data

In addition to wind effects, storm surge and inland flooding are two critical hazards that also need to be considered when preparing for a hurricane strike. HURREVAC incorporates a number of NOAA/NWS products to assist with the assessment of these threats through the Surge Probabilities, Rain, Rivers, and Tide Gauges headings of the Current data tab. The Doppler Radar, Rain, Rivers, and Tide Gauges information is available year-round, even when no tropical cyclones are active, but is of special interest within 48 hours of storm landfall.

Doppler Radar Observations
This Radar Mosaic shows the current rates of rainfall across the continental US, Puerto Rico, and Hawaii. The layer is a static image that updates every 10 minutes with the latest observations.

GOES Satellite Imagery
Composite satellite imagery is available from the visible channel of GOES-East and GOES-West, geostationary satellites that together cover North America, Central America, and surrounding Atlantic to Pacific Ocean areas.

Coastal Storm Surge and Tide Station Tools
The Surge Probabilities layer shows coastline areas that have at least a 1 in 10 chance of flooding due to storm surge as a result of an approaching storm. The National Hurricane Center publishes this P-Surge information at times when hurricane watches and warnings are in effect for the continental US.

The Tide Gauge charts should be used to consider tidal fluctuations and potential changes in these fluctuations due to storm surge. To access coastal tide stations, select the Tide Gauges heading of the Current data tab. The latest gauge information will be downloaded from the Internet as you turn this on for the first time. Click on a station on the map to display the tide chart of predicted (astronomical) and observed tide levels. Depending on the storm size, location, and other factors, differences between the two tide values can begin to show up well in advance of the approaching storm.

The Tide Gauge charts also contain several SLOSH Display tools for determining potential storm surge under various direct hit scenarios.

Inland Flood Tools
The 3-day Quantitative Rainfall Forecast (activated under the Rain heading of the Current data tab) and River Flood Outlook (located under the Rivers > Flood Outlook heading of the Current data tab) provide generalized guidance on possible inland flooding threats. Reports for both of these forecast products are available under the heading of Rain/River.

In order to display the latest rainfall and flood information in HURREVAC, you must have the program's Download Schedule set to 'Automatic Status Check' or have clicked 'Update Now' within the Program Header. You can confirm the date and time of the currently displayed forecast by checking the contents of the white banner that appears across the bottom of the tracking map.

The River Gauge charts should be used to consider potential flood scenarios surrounding specific rivers gauge locations. To display inland river gauges, select the Rivers > River Gauges heading of the Current data tab. The latest gauge information will be downloaded from the Internet as you turn this on for the first time. With the gauge locations displayed on the map, zoom in and click on a single gauge of interest to view a chart of water levels over time. In addition to observed and forecasted river levels, charts for many gauges contain helpful static information on defined flood levels, historical crests, flood impact statements, and inundation maps.
Working with Archive Storms

Want to simulate live hurricane tracking or review a storm that impacted your area in the past? In addition to its live tracking capabilities, HURREVAC is a useful tool for evaluating historical and hypothetical storms. When viewing and analyzing storms from the Archives Tab, you will have access to all of the same STORM FEATURES, MAP ANNOTATIONS, and REPORTS functions employed as when tracking a live storm.

Your installation of HURREVAC is accompanied by an extensive database of STM files (HURREVAC's native file format for storing all the forecast advisories from a single storm). Complete seasons of STM records extend back to 1996 for the Atlantic basin, 1999 for the East and Central Pacific basins, 2001 for the West Pacific basin, and 2006 for the South Pacific basin.

Archive Organization
STM files of the Archives Tab are cataloged under headings for sequential years (2010, 2009, 2008, etc.). Within each year, STM files are further cataloged by basins - Atlantic, East Pacific, Central Pacific, West Pacific and North Indian Ocean and South Pacific and South Indian Ocean. Checking the box corresponding to a single storm in the list will load the relevant STM file, at which point you can begin to manipulate and analyze the forecasts from that particular storm.

The Favorite Storms heading at top of the Archives Tab is intended as a placeholder for frequently accessed storms. To add a storm to Favorites, browse the year/basin headings and right-click on the desired storm name. Select 'Add to Favorites' from the options that appear next to your cursor. Favorites should also be employed if you wish to show storms from different years on the tracking map simultaneously. Your Favorites selections will be retained upon exit of the program. To remove a storm, simply right-click on its name under the Favorites heading and choose 'Remove from Favorites'.

The Exercise Storms heading is populated with STM files that are located in a special ExerciseSTMFiles data directory. Most often, these are hypothetical storms created using the Exercise Track Wizard. You can also use UTILITIES > Export/Import > Import Plot (.stm) to place a copy of an actual STM file in this directory and then manually alter the parameters of this storm using the Storm Data Entry Utility to create a slightly different storm scenario.

The Other Archived Data option is for viewing an old wind and surge probabilities, rain, river gauge, flood outlook, or tide gauge files saved on your computer. See the HURREVAC Tech
Note 6 for instructions on how to retrieve a dated file from the hurrevac.com server. You can also save these file types from the Current tab for viewing at a later time.
Storm Features

Storm Features are options for how forecast information associated with a particular storm advisory is displayed on the map. Wind ranges, wind swath, and error swath, and many other storm features can be viewed in combination. Additional forecast attributes such as advisory labels, watches and warnings, and wind probability locations also appear under the STORM FEATURES heading of the Toolbox.

Available Storm Features

- **Hourly Wind Ranges**
- **72-Hour Wind Swath**
- **120-Hour Error Swath**
- **Advisory Labels**
- **Watches/Warnings**
- **Wind Probability Locations**
- **Alternate Forecast Track**
- **Previous Forecast Tracks**
- **Hourly Forecast Positions**
- **Actual Track Ahead**
- **Past Track**
- **Center Location**

When a storm is initially loaded, the default map display uses the combination of storm features that are checked in this screenshot. A different combination can be set as the default display for future sessions of the program by right-clicking on the Reset button.
Forecast Wind Field

This display shows storm position and size at a certain hour of the forecast. Concentric rings represent the extent of 1-minute average sustained tropical storm force winds (34kt or 39mph) in blue, 50kt or 58mph winds in yellow, and hurricane force (64kt or 74mph) winds in red.

The Wind Field button at the edge of the map view toggles these rings on and off. A Forecast Wind Field radio button is also available in the Toolbox under STORM FEATURES > Hourly Forecast. Right-clicking this button changes the wind field appearance from filled polygons to open circles.

Forecast Hours

The Wind Field display defaults to the initial position (hour 0) of the latest advisory.

Use the Time+ button at the edge of the map view to advance the storm along its forecast track and the Time- button to return to earlier hours. The wind field disappears from the display once a storm is advanced beyond forecast hour 72. This occurs because the hurricane centers do not make wind extent forecasts beyond the 72-hour point.

Another way to advance the storm’s wind field to a specific forecast hour is by right-clicking on the map and selecting from one of the following ‘Select Forecast Hour’ options.
Potential Location

The white ellipse surrounding the forecast position in this display represents the region in which the storm center is most likely to be somewhere located at that discrete hour. Tropical storm force winds at that hour could potentially reach to the fringe of the grey hatched area.

This button at the edge of the map view toggles the view between potential location only, location + fringe winds, and no display. Left-click to turn the display on and off. Right-click to change the display type. These operations are also duplicated in the Toolbox under STORM FEATURES > Hourly Forecast.

Use the Time+ button at the edge of the map view to advance the position of the storm along its forecast track and the Time- button to return to earlier hours. The white ellipse representing potential location of the storm center will be very small at early hours of the forecast, but will grow gradually larger over the 120-hour forecast period. The hatched wind ellipse disappears from the display once a storm is advanced beyond forecast hour 72. This occurs because the hurricane centers do not make wind extent forecast data available beyond the 72-hour period.

Wind Timing with a Margin of Error

The Potential Location + Winds tool is especially appropriate for use when a storm is distant and forecast uncertainty great. In the example below, the tool indicates that there is a some potential for onset of tropical storm force winds in Hawaii 6 hours prior to what is projected by the deterministic forecast.
You can also use the companion Storm Statistics and Track > Forecast Error Swath report for finding out which counties are affected and when.

Background Information
The size of ellipse in HURREVAC is derived from error rates published by the NHC, CPHC, and JTWC each year for forecast hours 12, 24, 36, 48, 72, 96, and 120. These official error rates are based on a 5-year average of track forecasting success and represent a 66% confidence interval. Error rates have declined significantly in recent years due to improved skill in forecasting the track that a storm will take.
**Forecast Wind Swath**

The Forecast Wind Swath is a composite of the *hourly wind field* along the 72-hour forecast period. The fill colors represent the extent of 1-minute average sustained tropical storm force winds (34kt or 39mph) in blue, 50kt or 58mph winds in yellow, and hurricane force (64kt or 74mph) winds in red.

This storm feature should be utilized only when the storm is close. It is a specific forecast subject to error, and should be given credence only with the last few advisories before landfall. On the mainland US, the NHC will use a specific version of the *MEOW (wind) Decay Model* to prepare this forecast of winds beyond landfall.

See the Wind Overforecasting Disclaimer help topic for discussion of another important caveat of this display.

You can use the companion Wind Timing > All Affected Areas report for finding out which counties are affected and by how much.
Potential Track Area

The white error cone surrounding the forecast track in this display represents the potential track area, or region in which the storm center is most likely track within the next 72 hours (3 days). Tropical storm force winds could potentially reach to the fringe of the grey hatched area. Extending beyond the 72-hour cone, the transparent error cone represents the potential track area for 73 to 120 hours (days 4 & 5).

The Potential Track Area button at the edge of the map view toggles the view between potential track only, track + fringe winds, and no display. Left-click to turn the display on and off. Right-click to change the display type. These operations are also duplicated in the Toolbox under STORM FEATURES > Entire Forecast.

You can use the companion Storm Statistics and Track > Forecast Error Swath report for finding out which counties are affected and by how much.

Background Information

The error cone is a composite of the error ellipse rates published by the NHC, CPHC, and JTWC each year for forecast hours 12, 24, 36, 48, 72, 96, and 120. Even though a specific forecast track is provided, the storm could end up anywhere within the potential track area within the next 72 hours with around a 66% confidence level. Indeed, the storm could end up outside the cone, but the size of the cone is based on a 5-year average of forecast errors and recent developments in forecast models have improved forecast skill. Nevertheless, if your area is in or near to this area, you should be concerned and begin at least some preliminary planning for possible action.
Advisory Labels

Advisory Labels are located within STORM FEATURES.

Advisory labels appear as text tags along the track of a single storm and can be toggled on and off using the 'Advisory Labels' check box under the STORM FEATURES heading of the Toolbox.

Directly below this check box is access to label setup options. The Storm Labels Setup form contains the following options:

- Label Text (Advisory Number, Day of Week, Date, Time, Max Wind, S/S Category, Pressure, Forward Speed)
- Label Which Points? (Forecast Points, Past Advisories)
- Plot Interval (from 6 - 48 Hours)
- Forecast Labels (Masked or NO Mask)
- Font Type (Regular or Bold)

The Advisory Label Button on the Map Toolbar will also toggle labels on/off with a left-click. Right-click for Label Setup.

Working with Advisory Labels

HURREVAC attempts to place labels in sequential order along the storm track. If labels seem overcrowded, try using a larger interval (24 hours or greater) and be selective with the number of items you include in the label text.

Individual label placement can be adjusted by enabling Label Dragging (CTRL-L on the keyboard or right-click on the map and select Advisory Labels > Allow Advisory Label Dragging). A handle appears near the beginning of each label that can be used to hold-click and drag the label to a new position.
Once satisfied with all label positions, press CTRL-L on the keyboard to lock in these locations or right-click on the map and select Advisory Labels > Lock Advisory Label Items. Advisory label auto-positioning can be restored by right-clicking on the map and selecting Advisory Labels > Reset Advisory Labels.
Watches/Warnings

Watches and warnings appear as lines along the coast. Watches and warnings are only visible when you are working with a particular advisory in which they were issued. The Watch/Warning button at the edge of the map view toggle their display on and off. This operation is also duplicated in the Toolbox under the STORM FEATURES > Watches/Warnings.

Background Information

Prior to 2010, the NHC and CPHC issued hurricane warnings (red) when hurricane conditions were expected within 24 hours and hurricane watches (pink) when hurricane conditions were possible within 36 hours. Tropical storm warnings (blue) were issued where tropical storm conditions were expected within 24 hours and tropical storm watches (yellow) when that threat was possible within 36 hours.

Since the start of the 2010 hurricane season, watches and warning are issued 12 hours earlier than in previous years...so 48 hours for watches and 36 hours for warnings.
Wind Probability Locations

These numbers indicate the probability of hurricane, 50kt, and tropical storm-force winds within a 120-hour period. Wind probabilities appear as numbered boxes along the coast and are only visible when you are working with the particular storm advisory in which they were issued.

Three numbers are given at each location. The red box is probability of 64 knot (74mph) winds; yellow boxes contain probability of 50 knot (58mph) winds; and blue boxes contain probability of 34 knot (39mph) winds.

The Wind Probabilities button at the edge of the map view toggles this display on and off with a left-click.

Background Information

The Surface Wind Speed Probabilities text product, which is attached to the bottom of the Forecast Advisory Text product in HURREVAC, provides probabilities, in percent, of sustained wind speeds equal to or exceeding 34-, 50-, and 64-knot wind speed thresholds. These wind speed probabilities are based on the track, intensity, and wind structure forecasts and uncertainties from the National Hurricane Center and Central Pacific Hurricane Center, and are computed for coastal and inland cities as well as offshore locations (e.g., buoys).

For each probability value, the event in question is a sustained (one-minute average) surface (10 meter) wind speed of at least a particular threshold value (34, 50, or 64 kt) at a specific location.

The numbers shown on HURREVAC’s map are the cumulative 120 hour (5-day) probabilities. These values tell you the overall probability the event will occur sometime during the specified cumulative forecast period (0-120 hours) at each specific point.

A broader presentation and more detailed analysis of this type of data is possible using HURREVAC’s gridded Wind Probabilities layer.
Alternate Forecast Track

Alternate track displays are a useful tool for exploring what-if scenarios. After changing the tracking map to display one of the three alternate track options, you can run reports on the new scenario and manipulate the storm features on the tracking map in the usual manner. If you change advisories or receive a live advisory update, this mode is canceled and the original track restored.

**Direct Hit** - This option allows one to see the effects/timing when the storm is moved along a direct hit track to a specified county. The track is then laid out in the direction of the specified county, using the forecast *forward speed* for the 120 hours ahead. This is the track used by HURREVAC to make Evacuation Timing calculations.

**Average Error RIGHT** - This option allows one to see the effects/timing when the storm is moved at an angle to the RIGHT equivalent to average error. Note - this does not necessarily coincide with the average error swath right edge. That could not be used because average error occasionally is circular when the storm is moving slow and the size of the error simply enlarges in place.

**Average Error LEFT** - This option allows one to see the effects/timing when the storm is moved at an angle to the LEFT equivalent to average error. Note - This does not necessarily coincide with the average error swath left edge. That could not be used because average error occasionally is circular when the storm is moving slow and the size of the error simply enlarges in place.
Previous Forecast Tracks

Overlays of the forecast tracks from previous advisories are useful for illustrating shifts in the forecast from one advisory to the next. Under the STORM FEATURES menu, you have the option of turning on either 3 or 6 of the most recent advisories. Intermediate A and B advisories are not included in this display since they maintain the same track as the full advisory before them.
Forecast Positions - Official and Hourly

Official forecast positions are those included in text of the forecast center advisories. Their times of 12, 24, 36, 48, 72, 96, and 120 hours are referenced to model runs which occur 3 hours prior to forecast advisory issuance. The official positions are therefore just 9, 21, 33, 45, 69, 93, and 117 hours from the initial hour of the advisory.

Hourly forecast positions are the black dots and small (6-hour) squares that appear in between the official forecast positions of 0, 12, 24, 36, 48, 72, 96, and 120 hours.

Hourly forecast positions create the illusion of a track line that communicates more forecast certainty than may be desirable. For that reason, you may wish to turn them off so that more focus placed on an entire region of potential landfall (as indicated by the error cone).

![Image](image_url)

A Curved Forecast Track

Prior to the 2013 hurricane season, both HURREVAC and graphics published by NHC used linear interpolation to determine hourly positions in between the 0, 12, 24, 36, 48, 72, 96, and 120-hour official forecast positions. This linear interpolation has now been replaced by an Akima spline formula which can produce noticeably different results in instances where a storm’s track is projected to turn in between widely spaced forecast positions. In the comparison below, note how the spline changes the appearance of a projected landfall location.
Actual Track Ahead

Two storm tracks appear ahead of the storm location whenever you are viewing an earlier advisory. The black-dotted line is the forecast track from the particular advisory you are viewing and the solid blue line is the ‘Actual Track Ahead’. This actual track is comprised of initial positions from all later advisories.

Colored squares represent the locations of all later advisories. These are color-coded according to the maximum wind speeds observed at the time of each advisory. The colors indicate:

- Blue - tropical storm-force winds of at least 34kt or 39mph;
- Yellow - strong tropical storm-force winds of at least 50kt or 58mph; and
- Red - hurricane-force winds of at least 64kts or 74mph.

You may wish to turn off the ‘Actual Track Ahead’ if you are working with forecasts from HURREVAC’s archive storms and find it distracting.
Past Track

The storm’s past track appears as a solid blue line, with colored squares representing the locations of all previous advisories. These are color-coded according to the maximum wind speeds observed at the time of each advisory. The colors indicate:

- Blue - tropical storm-force winds of at least 34kt or 39mph;
- Yellow - strong tropical storm-force winds of at least 50kt or 58mph; and
- Red - hurricane-force winds of at least 64kts or 74mph.

You may wish to turn off the ‘Past Track’ when preparing briefing materials where the forecast track should be the sole focus.
Center Location

The storm’s center position appears on the map as an orange dot with a black center. When turned on, its icon is noted on the legend or in the storm information box.

You may wish to turn off the 'Center Position' if you find it distracting.
Map Annotations

MAP ANNOTATIONS is a collection of map labeling and other annotation options.

Available Annotations

- Map Legend
- Custom Annotation
- Points of Interest
- Cities
- Distance Ruler
- Range Marks
- Clearance Time Arcs
- Wind Tags

When initially loaded, the default map display uses the combination of annotations that are checked in this screenshot. A different combination can be set as the default display for future sessions of the program by right-clicking on the Reset button.

Certain additional map annotation options can also be accessed with a right-click on the map.
Map Annotations

- Zoom to Working Storm (CTRL-Z)
- Select Forecast Hour
- Select Advisory
- Annotate Text Here
- Move Nearest Text Here
- Delete Nearest Text
- Delete ALL Text
- Place WindTag Here (CTRL-W)
- Delete Nearest WindTag
- Delete ALL Wind Tags
- Wind Timing Report This Location
  - Wind Probabilities Report This Location
  - Wind Probabilities Report This Location - Graph
  - Surge Probabilities This Location
  - Surge Probabilities This Location - Graph
- Show Range Marks Here
  - Advisory Labels
  - Move Storm Info Box Here
  - Create Point Of Interest Here

- Tropical storm >= 34kt/39mph Strong tropical storm >= 50kt/58mph
Map Legend

The Map Legend is a collection of explanatory information lines appearing in the white box at the bottom of HURREVAC’s tracking map.

Legend items automatically appear and disappear as needed, but can be configured to stay off entirely if unchecked within the Map Legend portion of the toolbox. Map Legend preferences are saved upon exit of the program and utilized in future sessions.

Storm Information

Storm information is provided by default as a title line in the map legend area. Information included in this banner is:

- storm name and advisory number;
- date and time of the storm’s currently displayed position;
- latitude and longitude of the storm’s currently displayed position;
- maximum winds; and
- forward speed.

An alternate display option for storm information is the floating box style shown below. The box will appear if Storm Information is unchecked in the toolbox, or if the option to ‘Move Storm Info Box Here’ is selected after right-clicking on a map location.
Storm Features
This line of the map legend varies depending on the combination of storm features (wind ranges, wind swath, error cone) showing on the map. Unless unchecked, it will always be present in some form when working with a storm on the map.

Watches/Warnings
This line of the map legend appears only when there are watches and/or warnings associated with an advisory.

Wind Speeds
This line of the map legend serves as a helpful reminder of the three wind speed thresholds represented throughout the program by blue, yellow, and red. Unless unchecked, it will always be present when working with a storm on the map.

Wind Probabilities
These lines of the map legend appear if gridded wind probabilities are displayed.

Surge Probabilities
These lines of the map legend appear if gridded surge probabilities are displayed in one of the following two color scales.
Doppler Radar Observations

These lines of the map legend appear if the NWS Radar Mosaic is displayed on the Current tab.

Rain

These lines of the map legend appear if a QPF Rain Forecast is displayed.

Flood Outlook

These lines of the map legend appear if a River Flood Outlook is displayed.

River Gauges

This line of the map legend appears if River Gauges are displayed.

NHC Disclaimer

Although turned off by default, the following disclaimer can be added to the bottom of the map legend if desired:

National Hurricane Center Disclaimer: 'Wind range contours show the maximum extent of winds expected in each quadrant. Users are cautioned that winds vary greatly within each quadrant. For quadrants extending over land and water, over-water values are used, which may make the extent of inland winds radii appear unrealistically large.

Over-forecasting of wind occurs in certain situations with land-falling and closely paralleling storms due to limitations in the level of detail provided on wind ranges in the forecast advisory. HURREVAC strictly uses the wind ranges specified by NHC, CPHC, or JTWC in its advisory.'
These are given only in 4 quadrants: Northeast (NE in advisory), Southeast (SE), Southwest (SW) and Northwest (NW).

With only these wind ranges as input, and even with smoothing of the range changes between quadrants, the wind forecast must show that most or all of the quadrant has the specified wind range from the advisory. Therefore as stated in the NHC Disclaimer, in certain situations a small area of stronger winds at the edge of a quadrant may exist and the advisory must reflect that wind range for the quadrant as a whole.

This situation most frequently occurs on the left side of storms that are moving forward at a decent pace. It is also noted frequently in closely paralleling storm situations. In these situations, it is normal for there to be a marked decrease in wind ranges on the left side (west side for northward moving storms), especially if the storm is moving forward at a significant speed.

But, since there is usually a pronounced drop-off in wind ranges from the right side to left side of the storm in these situations, stronger winds in a small area just inside the left (weaker) quadrant can result in a greater wind range in the advisory for the entire quadrant than actually exists.

Also, there are certain situations where a small area of stronger winds are located well within a quadrant (perhaps in a small area of heavy showers) but are not reflected in the rest of the quadrant.
Custom Text Annotation

Custom Text Annotations are snippets of text you add to the map display independent of the other labels that HURREVAC automatically generates. Possible uses of these include:

- Prominently labeling a place on the map
- Adding explanatory text to the map

Custom annotations are placed by right-clicking at the desired location and choosing the menu option to 'Annotate Text Here'.

Working with Custom Text Annotation

1. Right-click on the map in a location where you wish to add a text label and select 'Annotate Text Here' from the pop-up menu.
2. In the Text Annotation setup form, select a text size, text color, and bold/regular font. Enter your text in the box and press Annotate.
3. Text can be toggled on and off with the 'Custom Annotation' check box under the MAP ANNOTATIONS heading of the Toolbox. The text will remain in memory for as long as the program is open.
4. Text may be cleared from memory by right-clicking on the map and selecting 'Delete Nearest Text' or 'Delete ALL Text.'
Points of Interest

Points of Interest are user-defined point locations that function both as simple map annotations and as locations available for REPORTS analysis.

Points are placed by right-clicking at the desired location and choosing the menu option to ‘Create Point of Interest Here’. You will then be prompted to add a name for the recorded lat/lon position.

The locations you label will be listed within MAP ANNOTATIONS > Points of Interest. Clicking on the name of any one point within this list recenters the map on that location.

Additional options for adding, editing, and importing points of interest are available under Setup > Points of Interest.
Cities

City labels are a simple MAP ANNOTATIONS layer that can be toggled on and off in the map display. These labels are not editable inside of HURREVAC. Instead, use Points of Interest to save a collection of your own locations for map display. Another option for temporary place labeling is custom text annotation.
Distance Ruler Measurements

The distance ruler is a tool for drawing line segments on the map to measure and illustrate distances from point to point.

To begin drawing line segments, left-click on the ruler button in the map toolbar. The mouse cursor changes to crosshairs and left-clicks on the map are then used to mark a succession of beginning and ending points of line segments. Map zooming and panning is still possible while in measurement mode: click and drag to pan the map; use the zoom-in and zoom-out buttons to adjust map scale.

Line segments are labeled with distance in either miles or nautical miles and the total distance of all line segments is tallied at the bottom of Hurrevac's window next to the latitude and longitude readout. To change the units of measurements from miles to nautical miles, go to Setup > Map Defaults.
Range Marks

Range marks can be a useful way of illustrating how far away the storm is from a location of interest.

The marks are initially placed by right-clicking on the map at the desired center and choosing the pop-up menu option to 'Show Range Marks Here.'

Working with range marks

Range marks are toggled on and off with the 'Range Marks' check box under the MAP ANNOTATIONS heading of the Toolbox.

The default interval for range marks is 100 statute miles. To change either the type of mile measurement (statute or nautical) or the interval of marks, go to the Default Map tab of HURREVAC's Setup form.
Clearance Time Arcs

Clearance Time Arcs are graphical illustrations of evacuation timing. In previous versions of HURREVAC, this tool was referred to as Decision Arcs and located under UTILITIES. The setup and display of these arcs is now located under MAP ANNOTATIONS.

The arcs provide a graphical means of showing your evacuation start time...essentially duplicating the manual decision arc method that was necessary before the advent of hurricane tracking software programs. In this method, paper tracking maps were overlaid with a series of concentric arcs radiating out from the location of interest. With each new forecast advisory, a particular arc would be selected by multiplying the evacuation clearance time by the forward speed of the hurricane and the storm location would be plotted using a special transparent disk representing the storm center and extent of 34kt winds. Start time was indicated when the storm's 34kt wind ring finally intersected the arc.

The decision arc method has been largely replace by HURREVAC's Evacuation Timing Report (for a single location), however many emergency managers who are familiar with the method still use this tool in HURREVAC.

How HURREVAC computes a Clearance Time Arc

1. The user selects up to 10 evacuation scenarios from under 'Arc Setup' of MAP ANNOTATIONS > Clearance Time Arc. The program uses the evacuation clearance time from the available HES and uses the settings (such as Occupancy, Response, Storm Category) set in the Evacuation Options utility.
2. The program computes how long it would take 34 knot winds to reach the location of interest assuming a direct hit, and uses this to sample the forecast forward speed of the storm for that time period.
3. Using the forward speed and clearance time obtained above, a distance is obtained (speed x time = distance). An arc with this radius is drawn around the location of interest. The exact location of the center of the arc (if you zoom in close, you will see a white circle there) is the nearest corner of the county to the present storm's initial position.

How to use the Clearance Time Arc

Move the storm forward along its forecast track until the outermost ring (the 34knot winds) touches the arc.
Note the time and date indicated in the line of the legend. This is your latest evacuation start time for this storm and this advisory. This does not mean that any action must be taken, (your decision may be to do nothing)....but only means a decision should be made by this time or the evacuation (if any) could be rushed. In general if you are in or near the Average Error Swath, you should be concerned and consider the latest evacuation start time as an important time landmark.

If the 34 knot ring is already within the arc, evacuation start time has already passed. This can easily happen suddenly with a new advisory if the new advisory a) increases the wind range, b) speeds up the storm, or c) increases the storm category (max wind) resulting in a longer evacuation clearance time and wider arc. Moral - don’t count on the storm gradually creeping toward the arc, in one advisory the storm could jump toward the arc, or the arc could expand quickly toward the storm (or both could occur).

In reality the forecast is constantly evolving and each new advisory is just a “snapshot” of a fluid, changing atmosphere and its effect on the storm. It is rare indeed to have little or no change from advisory to advisory.

**Adjust Speed** - This option should be used with care, in adjusting the assumed *forward speed* of the storm. By default, the speed is assumed from the forecast using the speeds averaged from the hours before the arrival of 34 knot winds. Speeding up the storm will cause an earlier *evacuation start time* and slowing it down, will delay it. If you use this, it will only be in effect until you change locations or any other item in *Evacuation Option Settings* at which time it will revert to the default forecast speeds.
Wind Tags

Wind Tags are a [MAP ANNOTATIONS] item listed in the Toolbox and configured by right-clicking on the map.

Wind tags display wind direction and speed when overtopped by the storm's [hourly wind ranges]. They are interactive and change as the storm is advanced along its forecast track or an advisory is changed.

Wind direction is implied by the tag's position relative to the storm's center location. An arrow pointing onshore is suggestive of an area being subjected to greater storm surge, while an arrow pointing away from shore can indicate conditions under which winds should lessen or even eliminate storm surge.

The placed tags can be toggled on and off using the Wind Tags check box under the MAP ANNOTATIONS heading of the Toolbox. Wind tag locations are saved on disk between sessions, so you can set them up for an area of concern, and they will be available when you next use the program.
How to Use Wind Tags Ahead of a Land-falling Storm

1. To place a wind tag, right-click on the map at the desired location and choose the pop-up menu option to 'Place Wind Tag Here.' Another convenient way of placing wind tags is by using the keyboard shortcut CTRL-W with the cursor hovering over a desired location.

2. Repeat the first step in other areas within the projected path to add a number of wind tags to the left and right of the forecast track. If needed, you can delete select tags or ALL tags from the right-click map menu.

3. Advance the storm along its forecast track (or actual track, if viewing an old advisory). Wind tag direction is influenced even when the storm is still distant. However, wind tag speed only displays when the storm is directly over head.
Browsers

BROWSERS are special viewers used to investigate collections of specific data. The three browser types listed in HURREVAC’s toolbox open up as data view tabs. The gauge browsers open up as floating windows that overtop the main program window.

Available Browsers

- Evacuation Clearance Times
- Storm Surge Maps
- Historical Hurricane Tracks

Gauge browsers appear when you turn on either the river gauge layer or tide gauge layer. These layers are accessed from both the Current or Archive Data Tabs.

- River Gauge
- Tide Gauge
Evacuation Clearance Times

The Evacuation Clearance Time Browser is accessed from the BROWSERS heading of HURREVAC’s Toolbox. This browser is used to examine storm category-based HES evacuation clearance time data for counties and parishes.

HES data is generally only available for coastal counties of hurricane-prone states. If you don’t see your county in the pick list, it is because no study has been done. Check with your state’s hurricane planner for information on if/when that might change. This person will also know the age of your HES data and when a restudy might be planned.

After selection from the pick list, a county’s clearance times are loaded into one of HURREVAC’s view tabs. You can add as many of these county clearance time tabs as desired by returning to the pick list.
About County Clearance Times

Stronger storms threaten a greater portion of the population and therefore require longer evacuation periods. At least one table (or matrix) exists for each storm category (1-5). High tourist occupancy (holiday weekend, for instance) and slow response (public apathy) will lead to longer evacuation periods as well.

Each county's HES has at least one 'Standard' evacuation scenario, but there may be others as well (In-County versus Out-of-County, for example). The Clearance Time Browser should be used to consider all possible evacuation scenarios, tourist occupancy levels, and response times. Decide which settings will be used in HURREVAC's Evacuation Start Timing based upon a review of the HES documentation and discussions with your emergency management colleagues.
Storm Surge Maps

Storm Surge Maps are accessed from the BROWSERS heading of HURREVAC’s Toolbox.

This browser provides access to PDF-based map documents that have been developed as part of regional Hurricane Evacuation Studies (HES). The maps vary from one region to the next, but typically represent local surge patterns, evacuation zones, routes, etc. The inundation areas shown on the maps reflect the MOM surge height output for each category of hurricane from the Sea, Lake, and Overland Surge from Hurricanes (SLOSH) model.

Map availability is organized by state and county, with some locations offering both basic PDF and layered geospatial PDF formats. The browser manages file retrieval from the server at data.hurrevac.com and document loading.
Basic PDF Files
These are flat (single layer) files that can be loaded in either a HURREVAC tab or an external viewer. They are often multi-page map plates designed for print layout. HURREVAC is equipped with a simple tab-based viewer for paging through the map document, zooming, scrolling, and printing. Additional options for manipulating these map documents may be available when opened in an external viewer such as Adobe Acrobat Reader.

Geospatial PDF Files
These are special PDF documents that contain georeferenced layers of information such as basemap imagery and overlaid (point/line/polygon) vector data. The files can be quite large and require an external viewer such as Adobe Acrobat Reader. The Layers Tab of Acrobat (as shown below) exposes a list of map layers that can then be toggled on and off in the map document. Additional attribute data may be stored within certain individual assets on map
layers—for instance: the name, address, and capacity of a shelter location or the total population living within an evacuation zone.

For further assistance working with the special features of these files, refer to the help documentation of your PDF viewing application. TerraGo, developer of the proprietary GeoPDF format, offers a free plugin to Adobe Acrobat Reader to further expand the utility of the documents' geospatial properties. The TerraGo toolbar can be downloaded from http://www.terragotech.com/products/field-data-collection/terrago-toolbar.
Historical Hurricane Tracks

This BROWSERS item provides access to the NOAA Coastal Services Center web tool for querying historical storm tracks. More than 6,000 storms dating back to 1851 are available for investigation.

Adobe FLASH is required in order for the tool to operate.

NOTE: The HURDAT historical database is maintained by the forecasters and researchers at the National Hurricane Center and represents Best Track and intensity estimates of tropical cyclones as determined in a post-analysis of all available data. Early storm tracks should not be regarded as having the same degree of accuracy as recent ones. Please refer to documentation from the NHC for a discussion of these limitations to the database.
River Gauges

River gauges are an available data layer on the ‘Current’ data tab under the heading ‘Rivers.’

HURREVAC monitors roughly 1100 river gauges in hurricane prone states from Texas to Maine, plus Puerto Rico and Hawaii. The program’s River Gauge display is part of a suite of inland flood tools that also include the National River Flood Outlook and the HPC 3-day Rainfall Forecast. Refer to the Other Weather Data topic for more information on these.

NOAA’s Advanced Hydrologic Prediction Service (AHPS) is the source of this river gauge data. The HURREVAC system (data.hurrevac.com) receives updated gauge observations and forecasts as often as every hour from AHPS’ vast network. Each time you turn on the River Gauge layer under the Rivers heading of the ‘Current’ data tab, HURREVAC downloads the latest available information from data.hurrevac.com. To refresh the gauge display after a number of hours of viewing, simply un-check and then re-check the River Gauge layer.

River Gauges Map Display

River gauges are best seen on the map when zoomed in to a state-wide or tighter view. The gauges then show up as either circles or squares of four different colors.
Shape indicates the type of data available:

- Gauges marked as **colored circles** have recent data including BOTH OBSERVATIONS and FORECASTS. Typically the observations go back 36 hours from the time of the most recent data and the forecasts go forward in 6-hourly increments to 120 hours or 5 days.
- Gauges marked as **colored squares** have recent data but ONLY OBSERVATIONS and no forecast river conditions. Typically the observations go back 36 hours from the time of the most recent data.
- Gauges marked as **white circles or squares** have only OLD or OUTDATED data (or no data)

Color indicates river stage:

- Green for below flood stage
- Orange for minor flooding
- Red for moderate flooding
- Purple for major flooding

**River Gauge Browser**

The browser is used to display the data from an individual gauge site. You bring up the browser by clicking on the circle representing the gauge of interest.
Graph of river level and rainfall

The River Gauge browser time frame is different for observation-only display and observation and forecast displays:

- For observation-only displays, the 36 hours of past gauge readings are spread out across the graph for clarity...with the last reading where the heavy vertical line is drawn.
- For observation and forecast displays, the 36 hours of past readings are on the left side of the graph...followed by 120 hours of forecast stages on the right 2/3rds of the display.

The color scheme for the observations and forecasts are noted at the bottom of the browser.

Clicking anywhere within the graph will update the information shown in the 'River Level' box with the corresponding 'Selected Time' at the bottom of the browser. 'Scale' buttons are also provided for controlling the graph display. The Up Button adjusts the graph scale upward to allow view of Flood, Moderate Flood, and Major Flood levels. The Down Button adjusts the graph scale downward to allow viewing of smaller fluctuations.

Other Information available in the browser

- Impacts statements (Impacts button) from the USGS describe the effects from past floods of various levels;
- Historical crests and lows (Crests button) from the USGS with high and low water observations from the past;
- River Gauge Map shows the area around the gauge that would be inundated by a 100-year flood and by a 500-year flood.
Tide Gauge

The Tide Gauge Browser is accessed from the BROWSER heading of HURREVAC’s Toolbox. This browser can also be launched by clicking on a specific tide gauge point on the map. Tide gauges are an available data layer on the ‘Current’ data tab.

HURREVAC monitors over 150 coastal tide gauges in hurricane prone states from Texas to Maine, plus Hawaii and US territories in the Caribbean and Pacific. The program’s Tide Gauge display is an important tool for assessing potential for tidal inundation and storm surge threats from approaching storms. The storm surge components of this browser are detailed in the SLOSH Display topic.

NOAA’s National Ocean Service (NOS) is the source of this tide gauge data. The HURREVAC system (data.hurrevac.com) receives updated gauge observations and forecasts as often as every hour from NOS. Each time you turn on the Tide Gauges layer of the ‘Current’ data tab, HURREVAC downloads the latest available information from data.hurrevac.com. To refresh the gauge display after a number of hours of viewing, simply un-check and then recheck the Tide Gauges layer.
Working with Tide Gauges

Tide gauges are best displayed on the map when zoomed in to a state-wide or tighter view. The gauges appear as circles along the coast. Click on the circle of interest to bring up the Tide Gauge Browser for that gauge.

The Tide Gauge browser time frame is typically from 48 hours before current time to 30 hours or so beyond the current time. Observations versus predicted heights are available up to the current time and predictions only from current into the future up to 5 days (120 hours). The time frame of the display can be lengthened forward up to 120 hours by using the Time Frame buttons below the graph. The vertical scale of the gauge display can be adjusted using the Scale buttons below the graph.

The heavier gray vertical line represents the latest data and can be moved left or right either by clicking with your mouse or by using the left or right arrows on your keyboard. The data at the time referenced by the heavy vertical line is displayed in boxes below the graph.

MLLW or Mean Lower Low Water represents the average of the lowest of the tides during the day (typically there are two, one lower than the other). So height MLLW represents the height of the water above this low reference value.

Predicted values are the values computed by using the NOAA Tidal Harmonics algorithms for each gauge (each gauge has a different set).

The Residual shown is the Tidal Anomaly computed by subtracting the Predicted from the Observed reading. Positive numbers represent tide above normal and negative represent tide below normal.

Tide gauge readings are updated at data.hurrevac.com about once an hour but there is some lag to the NOS data, so expect some gauge data to be between 1 and 2 hours old even when just downloaded. The residual or anomaly is the most important data and is usually quite slow to change except as the center of a storm approaches. So, in most cases a fairly good estimate can be made of the current tidal height by using the most recent hour’s residual and applying it to the current hour.
Utilities

UTILITIES is a heading within HURREVAC’s Toolbox.

Available Utilities

- Evacuation Option Settings
- Storm Data Entry
- Exercise Track Wizard
- Export/Import
Evacuation Options

Evacuation Options are available under the UTILITIES heading of HURREVAC’s Toolbox and can also be accessed directly from Evacuation Timing Reports.

The selections you make are very important. They determine the number of evacuation clearance hours to be used in calculating the time at which actions (if any) should be taken. This affects all the Evacuation Timing Reports and the map display of Clearance Time Arcs.

NOTE: HURREVAC cannot advise you on which scenario to select or whether to override certain variable settings. These decisions should be made after studying your HES document and consulting with local officials as to the best course of action. Coordination with surrounding counties and state EM offices is recommended so that all users of the program are looking at reports based upon the same parameters. If several different scenarios are under consideration, you can employ HURREVAC’s view tabs to display multiple reports in the same session.

Evacuation Options are organized on three tabs:

1. **Storm Category Scenarios** - Scenarios based on Saffir/Simpson storm category;
2. **Evacuation Zone Scenarios** - Scenarios based on evacuation zones or other filters unique to particular study areas; and

NOTE: 'Storm Category Scenarios' were the only type available for use in HURREVAC prior to the 2017 season release.
Storm Category Scenarios

The locations/scenarios appearing in the list are only those counties/parishes that have undergone an official HES. Counties/parishes appear more than once in the list if multiple 'scenarios' are provided by the HES. These scenarios account for varying evacuation patterns such as local versus regional evacuations, heavy versus light traffic, and lane reversal options.

For each location/scenario combination, the Evacuation Settings panel presents just one value at a time, based upon selections of the following variables from a matrix (or table) of available clearance times:

- Storm Category (Saffir/Simpson scale) - 1 to 5
- Occupancy - Low, Medium, High and Worst /Extreme
- Response - Immediate, Rapid, Medium and Slow.

NOTE: HURREVAC’s Evacuation Clearance Time Browser can be used to see the complete set of storm category matrices for a location.

Overriding Default Evacuation Settings for Storm Category Scenarios
1. **Category of Storm** - The default setting is the maximum wind predicted at any one time over the 120-hour forecast period, however if the maximum wind is within 5 knots of the next Saffir/Simpson category, the category is bumped up one step as insurance. You may wish to change this setting if, for example, your EM office has a policy of evacuating for one category higher than forecast as added insurance. Conversely, New England locations considering the threat from a Cat 4 or 5 storm still well south may want to drop the storm category because the storm is forecast to be much less intense once over the cooler waters of the Northeast.

2. **Tourist Occupancy** - This option defaults to medium, but can be changed if necessary to a setting relevant for your area. This setting tends to be time dependent and not area dependent. For example, a late October weekday would often find all areas with low tourist occupancies, but a Labor Day weekend would find most all areas with very high occupancies.

3. **Response** - This also defaults to medium when the screen appears for the first time, but should be set to a coordinated setting relevant for your area. A nighttime evacuation would probably evoke a Slow response, as would heavy rain ahead of the storm or weak media treatment of the threat.

4. **Optional Safety Buffer (SB)** - The default setting is zero, but you can add up to 10 hours to the evacuation clearance times as a safety buffer, or to allow for pre-evacuation duties or preparation. Any amounts selected will be shown in the SB column and added to the total clearance time period that is needed.

5. **Apply Settings to the list** - You must apply the settings to the list in order to make the new calculations effective. In most cases, you will use the **Apply To All** button to make the settings applicable to all areas. For some users with multi-state configurations, the **Apply To Selected** may be appropriate. If you wish to apply the settings only to certain areas, you may click and drag on the list, or hold down the CTRL button on your keyboard while clicking on multiple areas. You must press the OK button on exit to make the settings active.

**Evacuation Zone Scenarios**

These are HES scenarios that are organized by geographic zones or various other types of delineation. Whereas under Storm Category Scenarios, HURREVAC attempts to select the most appropriate level of evacuation based on storm severity (the maximum forecast SSCat), here the selection is left entirely up to the user. Depending on the complexity of the particular HES, anywhere from 1 to 5 filters may be needed to drill down to the selection of a single clearance time.

To make one or more ‘zone’ clearance times available for use in **Evacuation Timing Reports** and the map display of **Clearance Time Arcs**, you must first add the scenario(s) to the list shown below. **It is recommended that you make selections based upon the current storm situation and delete or make adjustments to the list as new storm situations arise.**
These selections are stored in a file called ZoneEvacuationScenarios.xml and can be either exported or imported via the HURREVAC Setup Form.

NOTE: As of the 2017 Season Release of HURREVAC, only a few states' official HES clearance times are available as Evacuation Zone Scenarios. If you don't see your state and county in the pick list, it is because the official HES study data has not yet been republished under this new Evacuation Zone Scenario format. Check with your state's hurricane planner for information on when that might change and/or to make a request for additions to HURREVAC.
Manual Clearance Times

Manual clearance times are scenarios added to the program by the individual user which are simply defined by a name, description, and number of hours. You may wish to use this feature to do evacuation timing for inland counties that lack official HES data. Another use for manual entries is if you wish to use something other than the official HES scenarios and their times that are published in HURREVAC.

These manual entries are stored in a file called UserDefinedEvacuationScenarios.xml and can be either exported or imported via the HURREVAC Setup Form.

Evacuation Start Time Alerts

Refer to the topic Evacuation Start Time Alert for a description of this additional function of the Evacuation Options.
Storm Data Entry

The Storm Data Entry tools are located under the UTILITIES heading of HURREVAC's Toolbox. These tools give you the ability to edit or create STM files, HURREVAC’s native storm file format. The most common use is for creation of a hypothetical storm from scratch or by modifying an existing STM file. Another possible use would be if you were unable to receive STM file updates from data.hurrevac.com and needed to manually enter forecast information into the program.

Manual Data Entry/Edit

This screen is where you enter data manually (by hand) if you do not have access to the Internet but have a printed copy of the NHC, CPHC, or JTWC forecast advisory available.

The official National Hurricane Center (NHC), Central Pacific Hurricane Center (CPHC), and Joint Typhoon Warning Center (JTWC) forecast advisories are the sources for all data used by HURREVAC concerning the current storm. This is the most important data the program ingests, and must be done correctly or errors will result in all calculations based on this data. The program does checking of gross errors in input but cannot catch all minor errors that may occur.

Header Information

Disk Filename - In this box, you select the filename for the storm file you wish to work with. All advisories for a storm come within one storm file, so if you just want to select another advisory, choose the Advisory box (see below).

Storm Name - The selected storm’s name is printed in this box.

Advisory # - This is the box where you can either select another advisory’s data to view, or more commonly, this is where you enter a new advisory number to indicate that you want to enter new advisory data from the latest NHC or CPHC Forecast / Advisory.

Time of Advisory Issuance - When entering a new advisory, remember that you must use the Z or Zulu (also called GMT) issuance time of the advisory. This is the time frame that is used with the Forecast/Advisory and printed at the top of that advisory. Options presented by the Change Date/Time button are to change just the currently displayed advisory, or to shift the time or other advisories in sequence.
Data Entry Boxes

It is best to enter new data by Row rather than by Column, since the data on the Forecast/Advisory is grouped together by time. So begin first with the Row labeled Initial Position and enter as follows:

**Initial (and Forecast) Eye Positions** - The first row represents the current or initial position of the storm from the Forecast/Advisory text. The following rows represent forecasts valid at the time printed to the left of these boxes. Enter the latitude (Lat) and longitude (Lon) taken from the Advisory.

**Maximum Wind** - Enter in these boxes the maximum sustained wind (not gusts) from the advisory at the time indicated for that row (on the entry screen, times are at the extreme left of the row).

**34-Knot Wind Range** - Enter the range of 34 knot winds in each quadrant (NE=northeast) (SE=southeast) (SW=southwest) and (NW=northwest) in nautical miles (n.m.) taken from the advisory lines labeled 34KT at the time indicated for the row (on the entry screen, times are at the extreme left of the row). If none, leave blank.

**50-Knot Wind Range** - Do the same for the 50 knot winds (labeled 50KT in the advisory) taken from the advisory at the time indicated for the row (on the entry screen, times are at the extreme left of the row). If none leave blank. Auto-Fill Ranges will fill all 50KT boxes with some percentage of the 34KT ranges. The initially suggested ratio is 50%.

**64-Knot Wind Range** - Do the same for the 64 knot winds (labeled 64KT in the advisory) taken from the advisory at the time indicated for the row (on the entry screen, times are at the extreme left of the row). If none leave blank. Auto-Fill Ranges will fill all 54KT boxes with some percentage of the 34KT ranges. The initially suggested ratio is 25%.
Central Pressure (in millibars MB) - Enter the central pressure found on the advisory at the initial (current time or time of issuance of advisory) This is sometimes given in both inches and millibars, but enter the data label MB or millibars.....this will be a number somewhere in the range 900 to 1020.

Storm File Options
Delete Advisory Button - If you wish to delete the currently shown advisory from the storm file shown, use this option. Use with care...you can always just edit the information if some is bad.

Input Boxes - Edit Options
Clear Boxes - This option clears all of the data input boxes (not the date/time or filename/advisory boxes)...To allow you to start with a clean slate. If you are entering a new advisory...the old advisory data will still be in the input boxes. At that point you can either edit that data or use this option to start anew. If you use this option you can restore the previous data by clicking on the Restore button. (See below)

Restore Boxes - This button restores the data which was in the boxes before the last Clear or Fill In Boxes option.

Fill Rest of Blank Boxes with Last - This option is handy for filling in boxes when there is little or no change from the previous forecast valid time(s) on the advisory. The program fills in the boxes below (later times) with information from the previous boxes, if the previous box had any values. From there, you can edit in any changes needed to reflect the Forecast/Advisory data.

Other Items
Warnings - The Enter-Edit Warnings button brings up a screen where you can select areas of watches and warnings for display with the active advisory in the program.
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![User Interface Screen](image_url)

### Watches and Warnings For IKE

**Areas**
- US Coast
- US Bays + Sounds
- Bahamas + Caribbean
- Mexico + Central and S. America
- East Pacific
- Central Pacific

**Type ....**
- Hurricane Warning
- Hurricane Watch
- Trcp. Storm Warning
- Trcp. Storm Watch

**From ....**
- Brownsville TX
- Port Mansfield TX
- Baffin Bay TX
- Corpus Christi TX
- Port Aransas TX
- Port Oconnor TX
- Matagorda TX
- Sargent TX
- Freeport TX
- San Luis Pass TX
- High Island TX

**To ....**
- Brownsville TX
- Port Mansfield TX
- Baffin Bay TX
- Corpus Christi TX
- Port Aransas TX
- Port Oconnor TX
- Matagorda TX
- Sargent TX
- Freeport TX
- San Luis Pass TX
- High Island TX

**List of Watches and Warnings**
- Trop Storm WARNING Haiti N Border w/DomRep to.. Gonavefs Haiti
- Hurricane WARNING Turks and Caicos to.. Central Bahamas
- Hurricane WARNING Guantanamo Cuba to.. Ciego de Avila Cuba
- Trop Storm WARNING Cayman Islands to.. Cayman Islands
- Hurricane WARNING Guantanamo Cuba to.. Cienfuegos Cuba
- Hurricane Watch Matanzas Cuba to.. La Habana Cuba
- Hurricane Watch Dry Tortugas FLto.. Ocean Reef FL

**Note - In case of overlapping areas.... highest category in area will show**

[Buttons: Add to List, Delete Selected Item, Delete All Items, Restore Original Items, Use Previous Advy, Cancel, OK / Save]
Advisory Text Decoder

This tool allows you to decode an ascii (text) file of the NHC, CPHC, or JTWC Forecast/Advisory into an .STM file. Follow the instructions and specify where the forecast advisory and the NHC Wind Probabilities files reside on your system and a data file will be created, or added to, as appropriate.
Exercise Track Wizard

The Exercise Track Wizard is located under the UTILITIES heading of HURREVAC’s Toolbox. This tool leads you through steps necessary to create an STM file of your own for an exercise. STM files are HURREVAC’s native file format for storing all the forecast advisories from a single storm.

The Exercise Track Wizard leads you through a sequence of 5 steps. You can use the Previous Step button to backtrack at any point, but keep in mind that any work you have done on later steps will be overwritten.

1. Set the beginning location and time for storm. LST/LDT stands for Local Standard Time/Local Daylight Time.

2. Set the ending location and time for storm. The correct number of 6-hourly advisories will be created along a straight-line track when you complete this step.

3. Next, work with the initial location of each advisory, adjusting its location and storm category (SS CAT) to suit. Pay close attention to the movement speed and place advisory locations closer together if speed seem unrealistically high. By default the Wizard escalates the storm’s intensity up to the final advisory. If your final advisory is well inland, be sure to drop the storm category to a realistic intensity.
4. In this step, modify the forecast track of each advisory as desired. The wizard creates forecast tracks that are very similar in intensity and speed to the later advisory positions. It positions the track slightly to the left.

5. Finally, name the storm. The filename will be saved as Xx_yyyy.stm (example XA_2002.stm for Allison from 2002), so as to prevent an overwrite by real storms during the season. The name inside the file however will be whatever name you gave it in the Name box and when you load the Xx file the name you gave it will appear within the program as usual. Your storm will be saved in a special ExerciseSTMFiles data directory and is accessible in the program through the Exercise heading of the Archives Tab.

NOTE: Standard wind ranges are assumed by the Track Wizard initially. You can make fine-tuning adjustments to the wind ranges and add watch / warning locations by using Storm Data Entry... Manual Edit utility.
Export/Import

Export/Import Tools are located under the UTILITIES heading of HURREVAC’s Toolbox.

The Export and Import Plot tools copy STM files in and out of the STMFiles data directories. Imported storms are placed in a special ExerciseSTMFiles data directory and appear in the program under the Exercise heading of the Archive Tab.

Export to GIS

The GIS Export Tool generates shapefiles from HURREVAC’s storm tracking display that can be loaded into outside mapping programs.

Shapefile is a widely adopted vector data format for describing geospatial points, lines, and polygons along with their associated tabular attribute data. ESRI developed the format with open specifications, and therefore many Geographic Information System software programs have incorporated the ability to read and write shapefile data.

The shapefile (with an “.shp” extension) stores geometry of either points, lines, or polygons. It must be accompanied by two supporting files of the same name—an “.shx” file containing an index to the geometry, and a “.dbf” storing a database of attributes associated with the geometric shapes. A number of other files having the same name but different extensions may also accompany the .shp file. Most notable of these are the “.prj” file that stores the geographic coordinate system, or projection, and the “.shp.xml” that stores metadata.

HURREVAC's GIS Export Tool creates .shp, .shx, .dbf, and .lyr files for each shapefile.
Available Layers
The number and types of fields available for export will vary based upon what is currently displayed on the Storm Map. The following fields may be available and are described here.

1. **A forecast track** from the current advisory as points and lines. Separate files are created for the two shape types and are differentiated by “_p” and “_l” tacked on to the end of the filenames. Nodes (in the line file) and points (in the points file) represent the 0, 12, 24, 36, 48, 72, 96, and 120-hour forecasted positions for the current advisory. Points are attributed with a date/time field and a maximum wind speed field.

2. **A past track** as points and lines. Separate files are created for the two shape types and are differentiated by “_p” and “_l” tacked on to the end of the filenames. Nodes (in the line file) and points (in the points file) represent the initial positions of each advisory for the past track. Points are attributed with a date/time field and a maximum wind speed field.

3. **The wind ranges** from any forecast hour (0-72) as polygons. Up to three rings with values of 39, 58, and 74 mph may be output.

4. **Wind swath through hour 72 of current advisory as polygons**. Up to three polygons with values of 39, 58, and 74 mph may be output.

5. **Error swath or error swath plus winds as polygons** -- Up to three polygons with a single attribute field indicating 72-hour average error (72), extended forecast average error (120), and average error plus winds (0).

6. **Error ellipse (with or without winds) from any forecast hour (0-120) as polygons**. One polygon (attribute value of 72 or 120) for the error ellipse and a larger wind ellipse (attribute value of 0).

7. **MEOW (wind)** for specified region and storm conditions as polygons. Polygons are attributed with 39, 58, 74, 92, 109, and 127 mph to indicate the maximum wind possible for the region.

8. **HPC rainfall isopleths for specified day (1-3) as polygons**. Polygons have attribute values to indicate a region's expected rainfall in 100th of inches.

9. **NWS river flood outlook as polygons**. Polygons have attribute values to indicate whether the likelihood of flooding in a region is possible (1), likely (2), or imminent or occurring (3).

Additional Notes
By default, the polygons overlay each other. In other words, with the 3 wind ranges surrounding a hurricane the 64kt (74mph) wind ring will overlay the 50kt(58mph) wind polygon, which will in turn overlay the 34kt(39mph) polygon. If the higher 2 wind polygons are then turned off in the GIS program display, what will remain is a polygon representing winds >34kt (39mph). In other words, you do not have “doughnuts” representing wind >34kt and <50kt. The wind swaths, error swaths, and HPC rainfall isopleths also export in this manner.

For help in creating unique “doughnut” polygons, refer to the “GIS Issues” page of the support website at www.hurrevac.com. Legend (.AVL) and layer (.LYR) files are also available on the web site to assist you in illustrating exported shapes in Arcview 3.x and ArcGIS 8.x as they appear in
HURREVAC Users Manual

HURREVAC. Experience in GIS is recommended, as the manipulation of these exported files may not be easy for the casual user of HURREVAC.
Reports

REPORT tabs hold analysis made on a particular forecast advisory or other data layer. Results of the analysis can be presented in the form of a spreadsheet-type table, a graph, or special chart.

To generate a storm-specific report, you must first highlight the desired storm on the map by clicking on its name in the list.

The 'Analysis/Reports Selection' form is called when you click on the Reports [+ ] tab to add a new data view to the program.

To guide your selection, each report is accompanied by a description (or 'Meaning of Report') and 'Cautionary Notes.'
Standard Available Reports

- Evacuation Timing
- Wind Timing and Charting
- Rainfall
- River Flood Outlook
- Storm Statistics
- Wind Decay
- Wind Probabilities
- Surge Probabilities
- Closest Approach
- Error Swath

Special Reports

The following reports are special state-specific tools.

- NYC Metro Facilities
- Risk Profiles
Evacuation Timing Report

Evacuation Timing Reports are available for counties with Hurricane Evacuation Study clearance times installed.

The purpose of Evacuation Timing is to determine how long you can afford to wait before beginning an evacuation. The advantage of delaying this evacuation start for as long as possible is so that your decisions are based on the most accurate storm forecast, while still allowing enough time for preparations to be completed if needed.

Note that all the computations done to arrive at the information here assume a direct hit on the area for the purposes of timing actions (a worst case scenario and one you must consider if in or near the threat area).

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

Single Area Scenario

The Evacuation Timing > Single Area Scenario report consists of an hour-by-hour timeline of actions for a selected county. The time frame ranges from hour 0 (the hour of the forecast) to hour 72 (the limit of the wind forecast). Rows of the tabular report are colored according to activity: gray if pre-evacuation start time or post-storm time, green if active evacuation time, blue if within tropical storm force (34kt or 39mph), yellow if within 50kt or 58mph, and red if within hurricane force (64kt or 74mph) conditions.

In the final column, the hours in daylight and dark are noted - an important consideration when deciding on the best time to begin an evacuation.
All Affected Area Scenarios or Local Affected Area Scenarios
The Evacuation Timing...All Affected Areas report consists of evacuation timeline information for all locations with HES clearance times available that are within the Error Cone and surrounding fringe wind area.

The report's data is initially sorted by earliest evacuation start time. To sort by a different item, click on its heading once for ascending order, twice for descending order. Items in the report are:

- Evacuation Type - as determined by the selected scenario in the Hurricane Evacuation Study
- Evac Start - Date/Time of evacuation start time. [Past] indicates that the evacuation should already be underway if needed.
- Duration - the clearance time, or number of hours, needed to complete the evacuation
- Category/Occupancy/Response - HURREVAC defaults to medium occupancy, medium response, and the max storm category forecasted.
- Arrival times of 34kt (tropical storm-force) and 64kt (hurricane-force) winds, plus the eye of the storm
• ‘Nearest’ refers to how close the actual forecast comes to the county. This is the only data item that is based on the actual forecast rather than the worst-case, direct hit scenario.

In Error Cone limits the list to those within just the Average Error Cone, and not the fringe winds area. All Items is the default and produces a list that includes counties in the fringe winds.
Wind Timing Reports and Charts

The Wind Timing Reports and Charts are accessed through the Analysis/Reports Selection panel.

Note that all the computations done to arrive at the information here use the advisory forecast's wind swath as a basis. This is more specific information (subject to forecast error) which should not be utilized until the last few advisories before landfall.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

Single Location Reports

The Wind Timing > Single location reports consists of hour-by-hour wind detail information for a selected county or user-defined Point of Interest. The time frame ranges from hour 0 (the hour of the forecast) to hour 72 (the limit of the wind swath). Each row of the tabular report is colored according to the wind intensity - gray if under threshold for tropical storm force winds, blue if tropical storm force (34kt or 39mph), yellow if 50kt or 58mph, and red if hurricane force (64kt or 74mph).
All Affected Locations Reports

Wind Timing > All Affected locations reports consists of information for all counties or user-defined Point of Interests within the wind swath of the advisory forecast. The forecasted arrival time and ending time is given for each of the three categories of wind. Duration of winds equal to or greater than the category appear in parentheses after the ending times. Time of peak winds (storm's closest approach) is reported in the final column.
The report's data is shown here sorted alphabetically by state and county. To sort by a different item, click on its heading once for ascending order, twice for descending order. Each row of the tabular report is colored according to the maximum wind intensity forecast for that county - blue if tropical storm force (34kt or 39mph), yellow if 50kt or 58mph, and red if hurricane force (64kt or 74mph).

You can also run this Wind Timing analysis for Local Areas for a more selective county-based report.
Wind Timing Charts

Wind Timing Chart > All Affected locations provides wind timing and intensity information identical to what is reported in the detailed Single location reports. The advantage of this chart-based layout is that you can more easily visualize possible wind conditions over time for multiple locations.
Rainfall Forecast

The 3-day Quantitative Precipitation Forecast is one of several Other Weather Data products that can be helpful to consider when weighing the flooding threat from an approaching storm. This information can be displayed on the map and in a report of affected locations.

The source of this data is the WPC, or NOAA Weather Prediction Center, which compiles generalized precipitation forecasts for the continental US. These forecasts are for three successive days and are issued twice a day, around 8am and 8pm Eastern (12Z and 0Z).

Each 24-hour cumulative rainfall forecast takes the form of isopleths (polygons) of rainfall amount, with the higher amounts of rain nested within the lower amounts. The amounts are in hundredths of an inch, with 0.25 = 1/4 inch, 1.50 = 1-1/2 inch, etc.

Map View

Days 1, 2, and 3 can be cycled through using the radio buttons under the Rain Forecast heading of the Current data tab.
Report View
Rainfall reports are accessed through the Analysis/Reports Selection panel. These reports tally forecasted rainfall amounts for all affected counties or user-defined Points of Interests. There is also a Rainfall Forecast Discussion which consists of a text description of the forecast and affected regions.

The report’s data can be sorted by any of the column headings. Click on a heading once for ascending order, twice for descending order...or you can sort by the Most Rain and Alphabetical
buttons at the bottom of the report. Each row of the tabular report is colored according to the 3-day total rainfall forecast.

In county-based reports, the data can be filtered by 'Locals Only,' or restored to All Items. The Refresh button should be used if you wish to update the report after a new HPC rainfall forecast is downloaded.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

IMPORTANT NOTES

These forecasts from WPC are currently issued every 12 hours and the NHC issues advisories on hurricanes at least every 6 hours. Therefore by the time the latest advisory from NHC is issued...the WPC rain forecast can easily be several hours old and therefore may not reflect the latest forecast storm track from NHC.

Also, these rainfall forecasts are smoothed and averaged amounts, while actual rain amounts, especially in the warm months, are not usually distributed as evenly, and tend to fluctuate widely over an area.

Therefore, as in hurricane forecasting, think of the forecast rain amounts as “educated guesses” that help you to zero in on the most vulnerable areas. Also as in hurricane forecasting, the rain amount error increases dramatically as the forecast goes to Day 2 and especially Day 3.

Always check with your local Weather Service office for the latest updates on the rainfall situation and the latest river stages. These forecasts are constantly being revised and the WPC forecast shown in HURREVAC can be several hours old.
Wind Decay Report

The Wind Decay Report, formerly referred to as the MEOW or Maximum Envelope of Winds, describes the maximum distance certain categories of wind can penetrate inland, given the storm strength and forward speed. These wind decay models are particularly important for determining winds over areas far inland from the coastline, and for planning purposes. In the last few hours before landfall, the specific NHC Wind Swath and Wind Timing Report should be used instead of the wind decay models.
If no decay model is currently selected, a selection panel will appear, asking you to choose one. The default model selected is one determined from the Max Wind forecast by the NHC for that advisory at any time out to 72 hours and the forecast forward speed of the storm over the next 36 hours. You can choose any model you wish or leave the selection as is.

HURREVAC initially generates a report for In Error Cone rather than an entire region (Northeast, Southeast, or Gulf Coast). This filter can be removed by pressing All Items, however the list for the entire region will be very long and likely includes many counties that are well away from the forecast track. To limit the report length you could also choose Locals Only.

The report’s data is initially sorted alphabetically by location. To sort by the category of wind, click on its heading once for ascending order, twice for descending order. There is no timing involved with this report, just the strength of winds that could occur in an area, given a perfect strike on the area at a selected storm strength and selected forward speed. Each row of the tabular report is colored according to the wind intensity - blue if tropical storm force (34kt or 39mph), yellow if 50kt or 58mph, and red if hurricane force (64kt or 74mph).

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

**Background Information**

The NHC Wind Decay Model (DeMaria and Kaplan 1996) predicts how far inland certain categories of wind will penetrate, assuming a) a direct hit b) specified maximum sustained winds of the storm and c) specified forward speed of the storm.

There are 3 regions which were computed in the decay model, necessitated by the different behavior of storms in these 3 areas.

- Gulf Of Mexico land-falling storms (includes the west coast of Florida)
- Southeast Coast land-falling storms (from Key West to the NC/VA border)
- Mid Atlantic and New England storms (north of NC/VA border) - this separate area necessitated by the faster forward speeds typical there.
Wind Probabilities

Tropical cyclone wind speed probabilities are important because they communicate forecast uncertainties not immediately apparent from the deterministic wind projections presented in HURREVAC's wind timing and evacuation decision timing analyses. They answer questions such as 'What is possibility that tropical storm force winds will begin earlier than estimated and how many hours earlier should I begin preparations because of that uncertainty?' and 'How likely is it that my community will experience hurricane-force winds from this storm?'

Data Sources

Probabilities for 34kt, 50kt, and 64kt tropical cyclone wind speeds are derived from the Monte Carlo method of randomly sampling alternative tracks and intensities from a large set of plausible forecasts that fall within the average error swath of the official forecast track. A climatology and persistence model (CLIPER) is used to forecast wind extents (size of the three wind radii) for each alternate track. The Tropical Prediction Center (TPC), together with NHC, is responsible for computing wind probabilities for storms that occur in the Atlantic basin, the Eastern Pacific basin, the Central Pacific basin, and the Western Pacific basin.

HURREVAC contains several resources for evaluating the wind probabilities generated by an approaching storm:

- **Wind Prob Locations** (values for selected city point locations) sourced from the Wind Speed Probabilities text product include by NHC and CPHC in single storm advisory packages; and
- **Gridded Wind Probabilities** from all tropical cyclones (values at a resolution of every half-degree of latitude and longitude across the entire Northern Hemisphere) sourced from the National Digital Forecast Database (NDFD).

Gridded wind probability product release follows the same 6-hour cycle as tropical cyclone advisories, however the NDFD version is typically not available until shortly after the 5am, 11am, 5pm, and 11pm Eastern time advisory issuance hours due to its composite nature. This is a large and versatile data set which HURREVAC utilizes in map view and in various reports of affected counties/parishes.

Map View

A Wind Probabilities data layer is available on the Current map display and under 'Other Archived Data' of the Archives tab. Values shown on the map are the 5-day (cumulative) probabilities of winds occurring that meet either tropical storm, 50kt (strong tropical storm), or hurricane threshold. Within the map presentation, values of 5% and greater are shown according to the color scheme indicated in the legend.
Report View

Reports and graphs offer the ability to further investigate the likelihood of winds meeting these three thresholds through successive time intervals from 6 to 120 hours. Probabilities for 34kt and 50 kt winds are reported for given locations when the 5-day cumulative probability is at least 3%. Probabilities for 64kt are reported when the 5-day cumulative probability is at least 1%. X indicates probabilities are less than 1%.

Single Location

This report represents the chances of sustained (1-minute average) wind speeds of at least 34kt, 50kt, and 64kt within a single county. Probabilities are given as IP(CP) where

- **Individual Probability** is the probability of the event beginning during an individual time period (*i.e. between forecast hours 48 and 54*)
• **Cumulative Probability** is the probability of the event occurring any time up to a forecast hour (i.e. between forecast hours 0 and 54)

The time frame ranges from hour 0, the hour of the model run, to hour 120 (5 days). Columns of the tabular report are colored according to the wind intensity - blue if tropical storm force (34kt or 39mph), yellow if 50kt or 58mph, and red if hurricane force (64kt or 74mph). Individual 34kt and 50kt time periods that meet a 3% minimum are emphasized in cells with brighter background colors. Individual 64kt time periods that meet a 1% minimum are also emphasized with brighter background. The effect of this coloring is to draw the user’s attention to the blocks of time where chances are highest.

To **print or save** the report data to a text file, click the Print button within the Program Header or choose ‘Export Report to Excel’ after right-clicking on the tab name.
Single Location Graph
An additional option is available within the 'Analysis/Reports' selection to display wind probabilities for a single location in graph form. Radio buttons across the bottom are used to switch the display type between cumulative and individual onset probabilities.

The cumulative probability graph represents the likelihood that winds will begin by certain hours. Below the graph is a tool for selecting a specific % chance (vertical y-axis) or time (horizontal x-axis) and looking up the corresponding value on the other axis. Green lines on the graph connect the two axes at the specified wind threshold.

On the individual probability graph, steep rises and peaks in the plot highlight the discrete periods of time when the onset of winds is most likely.
All Locations or Local Areas
This report consists of information for all counties meeting the 3% minimum for 34kt and 50kt/1% minimum for 64kt. It is similar in format to the NHC wind probabilities text product, however HURREVAC's version reports the highest probability with a county rather than at a point location. Time intervals match those in the NHC text product: 12, 24, 36, 48, 72, 96, and 120 hours. Individual 34kt and 50kt time periods that meet a 3% minimum are emphasized in cells with brighter background colors. Individual 64kt time periods that meet a 1% minimum are also emphasized with brighter background. The effect of this coloring is to draw the user's attention to the blocks of time where chances are highest.
This report can be run for either all areas (meeting the 3% minimum for 34kt winds) or for local areas only. The All Areas analysis involves intensive computation and may take a few minutes to be produced. For optimum speed, it’s recommended that Local Areas be defined and this more limited wind probabilities report run.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.
Surge Probabilities

Probabilistic storm surge (P-Surge) is an important new forecast product for assessing potential storm surge flooding threats from an approaching storm. It is one of several flood-related data types included in HURREVAC and described under the topic Other Forecast Data.

The source of this data is NHC's P-Surge 2.5—an operational product beginning with the 2016 hurricane season. P-Surge 2.5 is probabilistic surge (with tide) from a SLOSH ensemble model of possible forecast tracks and intensities. The information is reported in HURREVAC as water depths above ground level with a 1 in 10 chance of being exceeded.

The range of geographic coverage for this layer is the coastal area from Texas to Maine that could experience flooding, or inundation, from an advancing tropical cyclone pushing ocean water high enough to overtop lower elevation land. The timeframe for the data is 78 hours, although the SLOSH model runs are not typically begun until a storm is within 48 hours of landfall and watches/warnings are issued.

P-Surge product release follows the same 6-hour cycle as tropical cyclone advisories. However due to the time needed for processing, the P-Surge information may possibly be delayed by as much as 45 minutes following advisory issuance hours of 5am, 11am, 5pm, and 11pm Eastern daylight time.

Visit the National Hurricane Center website at www.nws.noaa.gov for further information on P-Surge and the SLOSH model.

Map View

In live storm situations, the Surge Probabilities data layer is accessed on the Current map display. HURREVAC's installation also includes a few sample datasets that can be accessed under 'Other Archived Data' of the Archives tab.

Once loaded, the map view initially shows 78-hour (cumulative) P-Surge values, meaning that they represent the greatest amount of inundation possible (with a 1 in 10 chance) over the entire timeframe simulated by the SLOSH model. Storm surge tools are provided in the program header so that you can investigate the expected build-up and dissipation of surge over time, as well as note the tidal fluctuations. Data from the model is in 6 hour increments.
Surge Timing buttons are for viewing the 6-hour incremental surge over time with back/forward/animate. The fourth button in the row is used to reset the display back to 78-hr cumulative surge.

Use these radio buttons to switch back and forth between the two color scales.
Report View

Surge analysis is based on specific point locations rather than the county-wide 'Area' perspective that is the basis for many of HURREVAC's other report types. There are several means for specifying a point location of interest for storm surge reporting.

**Option 1** - Right-click on the map and select 'Surge Probabilities This Location' to generate a report with specific latitude/longitude coordinates.

**Option 2** - Designate Points of Interest and select one of those when generating a Surge Probabilities > Single Point of Interest report from the +tab

A Single Point of Interest report looks as follows.
To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

Single Location Graph
Another option is to create a graph of surge probabilities for a single point of interest or latitude/longitude location. Here only the incremental probability values are plotted. Steep rises and peaks in the plot highlight the period of time when the surge is expected to be highest.
To print or save the graph as an image file, click the Print button within the Program Header.

IMPORTANT CONSIDERATIONS - The P-Surge data shown in HURREVAC does not have as much detail as NHC's new storm surge inundation graphics. Those products have been created using a much finer resolution digital elevation model that requires intensive GIS processing, but produces street-level detail of the areas of potential inundation.

Instead, HURREVAC's display is of the original GRIB2 continental US grid with cell sizes of 625 x 625 meters square. A mean elevation is used for each cell to determine possible inundation and for cells that straddle water and land, water depths above actual ground level are likely to be over estimations.
Storm Statistics Report

The Storm Statistics Report consists of past wind speed, pressure, and forward speed during the life of the storm to date, and then forecast of wind speed and forward speed out to 120 hours. Each row of the tabular report is colored according to the intensity of the storm at the time of that forecast hour or old advisory - blue if tropical storm force (34kt or 39mph), yellow if 50kt or 58mph, and red if hurricane force (64kt or 74mph).

The report’s data is initially sorted by Date/Time. To sort by any other item, click on its heading once for ascending order, twice for descending order.

If you have downloaded an advisory update or switched the map display to a different advisory, use the ‘Refresh’ button to rerun the analysis based upon the changed forecast information.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

Storm Statistics Graph
An additional option is available within the 'Analysis/Reports' selection to display storm statistics in graph form.
The forward speed is plotted in black with its scale bar at far left. Maximum sustained winds is plotted in red with a scale bar at near left. Central pressure is plotted in blue with a scale bar on the right edge of the graph. Statistics from old advisories are connected by a solid line. Statistics from the forecast period are connected by a dashed line. The NHC does not provide forecasts of barometric pressure, so the blue line is not plotted for the forecast period.

To print or save the graph as an image file, click the Print button within the Program Header.
Closest Approach Report

The Closest Approach report shows the closest distance, point in time, and direction that a storm is forecasted to approach each county in the list. The predicted storm track of the current advisory is used to calculate this information.

The report's data is initially sorted by Date/Time of closest approach. To sort by a different item, click on its heading once for ascending order, twice for descending order.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.
Error Cone / Potential Track Area Report

This report is an analysis of counties or parishes located within the 120-Hour Potential Location, or white cone surrounding a storm's forecast track. Counties within the error cone or fringe winds area bordering the error cone have a chance of eventually being affected by the storm.

For each reported county, an indication is given of how early or how late the center could cross the area, assuming average error late and average error early, as well as the time implied by the advisory as the median arrival time. The 'Winds Possible' heading indicates whether the county is within the actual error cone (making Max Winds from the storm's core possible) or within only the tropical storm-force (fringe wind) area.

The report's data is initially sorted by counties affected first ('Time of Peak' heading). To sort by any other item, click on its heading once for ascending order, twice for descending order. Additionally, the list may be filtered for 'Locals Only'.

If you have downloaded an advisory update or switched the map display to a different advisory, use the 'Refresh' button to rerun the analysis based upon the changed forecast information.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.
River Flood Outlook

The National River Flood Outlook is one of several Other Weather Data products that can be helpful to consider when weighing the flooding threat from an approaching storm. This information is displayed on the map when the Rivers > Flood Outlook heading is checked under the Current data tab.

Map View

The NOAA Weather Prediction Center issues a 5-day forecast of freshwater flooding hazards for the continental US using more specific forecasts for each flood basin provided by several regional NWS River Forecast Centers (RFCs) around the country. These outlooks are currently issued once a day around 19Z or 3PM Eastern Daylight Time.

The Flood Outlook takes the form of polygon regions that are color-coded according to the likelihood of flooding. The categories are defined as follows:
- Occurring/Imminent (red) Significant flooding is already occurring or is forecast to occur during the outlook period.
- Likely (blue) hydro meteorological conditions indicate that significant flooding can be expected during the outlook period.
- Possible (black) hydro meteorological conditions indicate that significant flooding could occur. Such flooding is neither certain nor imminent.

**Report View**

River Flood Outlook reports are accessed through the Analysis/Reports Selection panel. Report options are for all affected counties or for user-defined Points of Interests.
The report's data can be sorted by any of the column headings. Click on a heading once for ascending order, twice for descending order...or you can sort by the Greatest Risk and Alphabetical buttons at the bottom of the report.

The report's data can be filtered by 'Locals Only,' or restored to All Items. The Refresh button should be used if you wish to update the report after a new HPC rainfall forecast is downloaded.

To print or save the report data to a text file, click the Print button within the Program Header or choose 'Export Report to Excel' after right-clicking on the tab name.

IMPORTANT NOTE
This flood outlook is intended to provide a general outlook for significant river flooding. It is not intended to depict all small-scale events such as localized flooding and/or flash flooding. This graphic will not depict minor river flooding as this implies only minimal or no property damage with possibly some public inconvenience. Also, these forecasts are constantly being revised and the HPC forecast shown in HURREVAC can be several hours old. Please refer to products issued by local NWS offices for the latest official river forecasts and warnings.
Other Forms

Setup

HURREVAC's Setup Form is accessed from the top left of the Program Header.

Program settings are organized on various tabs within the Setup Form:

- Download Schedule
- Connection
- Local Areas
- Points of Interest
- Timeline
- Time Zone
- Default Map

Export and Import of Settings

The Export and Import buttons make it possible to share your HURREVAC setup preferences with other computers via portable XML files. Once settings are imported, the new selections are made visible on each of the tabs.
Working with HURREVAC User Settings

There are potentially as many as four XML files used in HURREVAC’s Export and Import: UserSettings.xml, PointsOfInterest.xml, PointsOfInterestStyles.xml and Timeline.xml. During export, you will be offered the option to save all file types. When importing, you can choose any or all types of files. General settings for all Setup tabs except Points of Interest and Timeline are defined in the UserSettings file.

**IMPORTANT - Be sure to Export first (to save a back up of your own settings) if you are uncertain about what is being imported or have work you want to save.**

A technical note at www.hurrevac.com explains how to merge settings (outside of HURREVAC, using a text editor) if you need to combine portions of lists such as Timeline items and Points of Interest from multiple computers.
Download Schedule
A Download Schedule is configured in HURREVAC’s Setup Form.

HURREVAC will routinely poll for new storm advisories and other forecast data if you select ‘Automatic Status Check’ in the Download Schedule. When HURREVAC is left running on your desktop in this auto mode, a small status.txt file is downloaded from data.hurrevac.com at the interval you have specified. If files described in the status.txt file are new or different that what already exists, the program will download updates to your computer.

For more information about the program’s download and monitoring functions, refer to the Program Header topic.

Default Basin Selections

HURREVAC tracks tropical cyclones worldwide, however most people will find that they prefer to focus on a single basin...typically the Atlantic only...and not be interrupted by map refreshes for storms elsewhere. Basin selections determine how the program handles new storm data that it has downloaded. Only those storms in checked basins will automatically be drawn on the map.
Connection Settings
Connection Settings are handled by HURREVAC's Setup Form.

HTTP Proxy Settings may be left blank under normal situations. However, if the program gives you a message about not being able to connect to the internet site, then try to access http://data.hurrevac.com using your web browser. If you are able to connect in the web browser but not in HURREVAC, you may need to duplicate the proxy settings from the browser here. Contact your network administrator if you have trouble finding these settings.
Local Areas
Local Areas selections are made in HURREVAC’s Setup Form.

On this Setup tab, mark the counties/parishes of interest to you. Many of HURREVAC’s reports contain information on a large number of localities. Specifying a local area of interest will give you the ability to limit the report size if desired.
Points of Interest

Points of Interest are managed from within HURREVAC’s Setup Form.

Points of Interest appearing in the list are managed within HURREVAC and stored in a file called PointsOfInterest.xml. You can share your entries, along with a collection of other user preferences through the Export/Import options at bottom left of HURREVAC SETUP. CAUTION: Importing a new PointsOfInterest.xml file will overwrite any points that are already entered within this screen.

To take actions on a group of points at once, hold down either CTRL or SHIFT on the keyboard to make multiple selections. Then press the ‘Delete Point(s)’ button or enter a new type.

A batch of additional points can be added to the existing list using the ‘Import from Spreadsheet’ button. The program can read .xls and .xlsx file formats and will attempt to import the first three columns of each spreadsheet within the file. The data in these columns should be ordered as Name | Latitude | Longitude | Type, either with or without a header row.
Points can also be externally sourced from shapefiles. Click ‘Browse’ to locate a directory on your computer or a local network drive where shapefiles are stored. The program will attempt to read from all point-based shapefiles that are located within the directory. The first attribute field within the shapefile(s) will be used as the point’s Name within HURREVAC. **NOTE: Points within the shapefile(s) are read-only and must be managed using another GIS program. They appear on the map and in reports, but not within SETUP.**

**Points of Interest Mapping Styles**
This screen is used to define that mapping styles which will dictate how points are drawn on the map in terms of font color, font type, size, and zoom level for initial appearance. Types can also be added or deleted here. If deleting a Type that has associated points, those points will be assigned a new Type of ‘other’.
Timeline
Timeline items are configured in HURREVAC’s Setup Form.

The Timeline feature allows you to specify Standard Operating Procedure-type actions to be taken at times relative to any of the following storm events:

- arrival of the 34kt winds
- arrival of the 50kt winds
- arrival of the 64kt winds
- time of eye’s closest approach
- evacuation start time (available only for counties with HES clearance times)

Results will be available in the Wind Timing (single area) and Evacuation Timing (single scenario) reports when the Timeline Option button on the report is toggled on.
Timeline Groups
The purpose of timeline groups is to maintain collections of timeline action items that can be activated as needed. Only one timeline group will be in active use at any one time, but individual items can be assigned to any number of groups.

Timeline Item Alerts
You can also monitor timeline-associated actions while tracking the progress of a storm from one advisory to the next using HURREVAC's system for Evacuation Timing Alerts. In order for timeline items to be included, a single county of interest must be specified. The alerts on timeline-specific items then begin when the county falls inside of the 72-hour forecast wind swath.

Clicking on the item in the Alert dropdown menu, you are then presented with the Wind Timing > Single Area report for that county.
Time Zone
Time Zone is a tab on HURREVAC’s Setup Form.

Under most conditions, you will not need to touch this setting because the time zone setting in HURREVAC matches your computer clock. This option is here in case you are preparing a map or report for a distant location and want to use the local time zone without changing your computer’s setting.

The optional second and third time zones are used only in the labeling of storm advisories on the map and in the legend as shown below.
Default Map Settings

Set Map Defaults is a tab on HURREVAC’s Setup Form.

Use this to set your preferences for a Default FULL SIZE Map and a Default LOCAL Map. Your selections will be saved upon exit of the program. You can easily access these maps through left and right clicks to the Globe button near the top of the Map Toolbar.
Printing

HURREVAC's Print Options are accessed though a button within the Program Header.

HURREVAC's Print Options are used both for printing to a printer and for exporting maps and data ('Print to File')

Print Item

Report Text - If you have an active report or text advisory showing, HURREVAC assumes that you want to print the report. If you want to print such a report you must generate it first and leave it showing on the screen. Caution: Some of these lists (especially the Wind Decay affected list) can be quite long and you may want to select lines first for printing (see below).

Storm Map - This item is set automatically if there is no report showing. This prints the map only, including any annotations thereon.

Current Report Extent

Selected Lines - If you have selected lines in the report showing on screen, this option is set automatically. You must select lines in the report (click and drag over the ones you want) in order to use this option.

Entire List - If you have not selected lines in the current affected list showing on screen, then it is assumed you want to print out the entire list.

Print Output

Printer - Sends the printout to the current printer.

File - Sends the printout to a file of your choice with a default destination of 'My Documents.' Graphics files can be saved in several different formats. Reports are saved as plain text files which may be imported into a spreadsheet as 'space delimited' data.
Storm Summary PDF

To generate a PDF document containing summary information from the currently displayed storm and advisory, click the Storm Summary PDF button within the Program Header.

Choose what contents are desired for inclusion in the Storm Summary PDF. A basic summary will include several paragraphs of information concerning the storm’s strength and current location, plus a screen capture from the current map display. The forecast center's official advisory text products (public advisory plus forecast discussion) are appended to end of the summary unless the box for this option is unchecked.

Local Information

Use these options to also include a synopsis of wind timing and/or evacuation timing for a single location. Note that this information can only be reported if the forecast track projects winds at that location within 72 hours.

PDF Output

Storm summary items are compiled into a multi-page PDF file. If Adobe Acrobat Reader or some other PDF-capable program is installed on the computer, the ‘View PDF’ button will launch this program and load the most recently saved file.
Animated GIF Recording

This feature is used to capture snippets of action from HURREVAC. For instance, you could record wind ranges advancing along the forecast track of the storm to illustrate the projected timing of wind hazards and then distribute this GIF file via email, text, or social media.

Use the two buttons located within the Program Header for GIF recording:

1. First define an area for recording by clicking the left button. The entire screen will wash out slightly until you click and drag a box on the screen to define the record area.
2. To begin recording, click the right button or press CTRL-R. The button will flash red while recording.
3. Use HURREVAC buttons and menus as you normally would during the recording session.
4. Click the right button or CTRL-R again to stop the recording. You will immediately be prompted to save the GIF to the computer’s hard drive. GIF recording options are operated using these two buttons.

TIP: The animated GIF file type is best suited for capturing a small region of the screen for a short amount of time. It is not intended for full screen, lengthy video recording.
Program Header and Footer

Header

Standard items within the header are as follows (from left to right):

Setup - Access to HURREVAC’s Setup Form

Update Now - Used to IMMEDIATELY check for and download any new data. Right-clicking this button will force a refresh of all current forecast data, regardless of whether or not these items had previously been downloaded. Right-clicking can be useful if a download was interrupted by internet access problems or if files have been returned from a stale cache on the local network. This button is disabled while working on the Archives tab.

Print Button - Access to HURREVAC’s Printing options.

Storm Summary PDF - To export a multi-page PDF storm summary of information from the current advisory

Animated GIF Recording - To capture snippets of action from HURREVAC in animated GIF format

System Messages - Signals that you have the latest version of HURREVAC installed and changes to an exclamation mark if a later version is available. You can click on the mark for details. Other types of system messages may appear from time to time when HURREVAC’s technical support staff or the National Hurricane Program administrators have important information to share concerning operation of the software.

Help - To access HURREVAC’s help system.

Additional items show up in the header as needed for program operation. For instance, Evacuation Timing Alerts appear when tracking a storm that is nearing your area of concern. Also when surge probabilities are checked on in the map display, additional buttons appear for animating surge over time.
Footer

Messages and alerts concerning important forecast updates will appear in HURREVAC's footer. If automatic polling is turned on, the footer will alternately show either the status of the last check for new data or the countdown to the next one. The window will flash red when a new storm advisory has been downloaded and stop flashing once you have acknowledged the alert by clicking on the program window.

Log Status - Click this link to see a text log of recent monitoring and download activity.

Lat/Lon Position Indicator - These numbers are updated continuously as the cursor is moved around the map.

Zoom Level Indicator - A number ranging from 5 to 13 that indicates map scale. Its purpose is as a point of reference in program development and in certain technical support inquiries.
Map Toolbar

The Map Toolbar consists of a set of a set of buttons and tools for map and storm plot manipulation.

Items on the toolbar are as follows (from top to bottom):

**Zoom Tool** - Click-and-Drag zooming on the map.

**Pan Tool** - Click-and-Drag panning on the map.

**Distance Ruler** - Left-click to activate and begin marking measurement starting and ending points. Right-click to erase all segments previously drawn.

**Extent Button** - Left-click to zoom to full-extent map, right-click to zoom to local map. See UTILITIES... Map Defaults for configuration instructions.

**Zoom IN and OUT Buttons** - Zoom in and out by 1 level.

**Move Storm AHEAD and BACK Buttons** - Advance storm forward or back in forecast hour (1 hour with left-click, 6 hours with right-click).

**NEXT and PREVIOUS Advisory Buttons** - Advance storm forward or back in advisories (1 advisory with left-click, 3 advisories with right-click).

**Hourly Wind Field Button** - Action duplicates STORM FEATURES > Hourly Forecast > Forecast Wind Field.

**Potential Location Button** - Action duplicates STORM FEATURES > Hourly Forecast > Potential Location.

**Forecast Wind Swath Button** - Action duplicates STORM FEATURES > Entire Forecast > Forecast Wind Swath.

**Potential Track Area Button** - Action duplicates STORM FEATURES > Entire Forecast > Potential Track Area.

**Advisory Labels Button** - Action duplicates STORM FEATURES > Advisory Labels.

**Watches/Warnings Button** - Action duplicates STORM FEATURES > Watches/Warnings.

**Wind Prob Locations Button** - Action duplicates STORM FEATURES > Wind Probability Locations.

**Previous Map Extent Button** - Restore the map extent to the previous location and scale. Further clicks of this button with restore earlier and earlier map extents until reaching the initial extent when the program was opened or a new storm was loaded. Right-click to return to a later map extent.

**Reset Button** - Return the storm to the initial position of the forecast advisory and turn off all storm features and map annotations except those set as default. Default is initially configured...
to ‘declutter' the map and return to HURREVAC’s standard presentation of forecast wind field + potential track area. A right-click to the Reset button will cause HURREVAC to remember the present combination of storm features and map annotations as the new default.
Evacuation Timing Alerts

During the tracking of an approaching storm, the Alert system begins notifications with the first forecast *advisory* that puts the storm within 12 hours of *evacuation start time* for select counties and evacuation scenarios.

A single audible chime will sound along with the flashing yellow alert in the program header:

Since the *NHC*, *CPHC*, and *JTWC* issue new forecast advisories at 6-hour intervals, the alert is intended as advance warning that a decision about starting an evacuation will need to be made based upon the next advisory or two. The appearance of the Alert does not automatically imply
an evacuation is necessary, merely that the time is nearing. See Evacuation Timing for more information on this topic.

Clicking on the item in the Alert dropdown menu, you are then presented with the calculated Evacuation Start Time and the actual number of hours remaining (Time Left to to Evac Start).

Evacuation Time Alerts are configured under the Evacuation Options UTILITIES within HURREVAC’s Toolbox. Up to 10 scenarios can be selected for this alert. This is recommended if you are responsible for multiple counties or are considering multiple scenarios for your county. The scenarios you select will be retained even upon exit of the program.
Adjustments you make to evacuation options such as SS Category, Tourist Occupancy, and Response will also be reflected in the Evacuation Time Alert, however they will not be retained upon exit of the program.
River Gauges
River gauges are an available data layer on the 'Current' data tab under the heading 'Rivers.'

HURREVAC monitors roughly 1100 river gauges in hurricane prone states from Texas to Maine, plus Puerto Rico and Hawaii. The program's River Gauge display is part of a suite of inland flood tools that also include the National River Flood Outlook and the HPC 3-day Rainfall Forecast. Refer to the Other Weather Data topic for more information on these.

NOAA's Advanced Hydrologic Prediction Service (AHPS) is the source of this river gauge data. The HURREVAC system (data.hurrevac.com) receives updated gauge observations and forecasts as often as every hour from AHPS' vast network. Each time you turn on the River Gauge layer under the Rivers heading of the 'Current' data tab, HURREVAC downloads the latest available information from data.hurrevac.com. To refresh the gauge display after a number of hours of viewing, simply un-check and then recheck the River Gauge layer.

River Gauges Map Display
River gauges are best seen on the map when zoomed in to a state-wide or tighter view. The gauges then show up as either circles or squares of four different colors.

![River Gauges Map Display](image)
Shape indicates the type of data available:

- Gauges marked as **colored circles** have recent data including BOTH OBSERVATIONS and FORECASTS. Typically the observations go back 36 hours from the time of the most recent data and the forecasts go forward in 6-hourly increments to 120 hours or 5 days.
- Gauges marked as **colored squares** have recent data but ONLY OBSERVATIONS and no forecast river conditions. Typically the observations go back 36 hours from the time of the most recent data.
- Gauges marked as **white circles or squares** have only OLD or OUTDATED data (or no data)

Color indicates river stage:

- Green for below flood stage
- Orange for minor flooding
- Red for moderate flooding
- Purple for major flooding

**River Gauge Browser**
The browser is used to display the data from an individual gauge site. You bring up the browser by clicking on the circle representing the gauge of interest.

![River Gauge Browser](image)

**Graph of river level and rainfall**

The River Gauge browser time frame is different for observation-only display and observation and forecast displays:
For observation-only displays, the 36 hours of past gauge readings are spread out across the graph for clarity...with the last reading where the heavy vertical line is drawn.

For observation and forecast displays, the 36 hours of past readings are on the left side of the graph...followed by 120 hours of forecast stages on the right 2/3rds of the display.

The color scheme for the observations and forecasts are noted at the bottom of the browser.

Clicking anywhere within the graph will update the information shown in the 'River Level' box with the corresponding 'Selected Time' at the bottom of the browser. 'Scale' buttons are also provided for controlling the graph display. The Up Button adjusts the graph scale upward to allow view of Flood, Moderate Flood, and Major Flood levels. The Down Button adjusts the graph scale downward to allow viewing of smaller fluctuations.

Other Information available in the browser

- **Impacts statements** (Impacts button) from the USGS describe the effects from past floods of various levels;
- **Historical crests and lows** (Crests button) from the USGS with high and low water observations from the past;
- **River Gauge Map** shows the area around the gauge that would be inundated by a 100-year flood and by a 500-year flood.
Tide Gauge

The Tide Gauge Browser is accessed from the BROWSER heading of HURREVAC’s Toolbox. This browser can also be launched by clicking on a specific tide gauge point on the map. Tide gauges are an available data layer on the ‘Current’ data tab.

HURREVAC monitors over 150 coastal tide gauges in hurricane prone states from Texas to Maine, plus Hawaii and US territories in the Caribbean and Pacific. The program's Tide Gauge display is an important tool for assessing potential for tidal inundation and storm surge threats from approaching storms. The storm surge components of this browser are detailed in the SLOSH Display topic.

NOAA’s National Ocean Service (NOS) is the source of this tide gauge data. The HURREVAC system (data.hurrevac.com) receives updated gauge observations and forecasts as often as every hour from NOS. Each time you turn on the Tide Gauges layer of the ‘Current’ data tab, HURREVAC downloads the latest available information from data.hurrevac.com. To refresh the gauge display after a number of hours of viewing, simply un-check and then recheck the Tide Gauges layer.
Working with Tide Gauges
Tide gauges are best displayed on the map when zoomed in to a state-wide or tighter view. The gauges appear as circles along the coast. Click on the circle of interest to bring up the Tide Gauge Browser for that gauge.

The Tide Gauge browser time frame is typically from 48 hours before current time to 30 hours or so beyond the current time. Observations versus predicted heights are available up to the current time and predictions only from current into the future up to 5 days (120 hours). The time frame of the display can be lengthened forward up to 120 hours by using the Time Frame buttons below the graph. The vertical scale of the gauge display can be adjusted using the Scale buttons below the graph.

The heavier gray vertical line represents the latest data and can be moved left or right either by clicking with your mouse or by using the left or right arrows on your keyboard. The data at the time referenced by the heavy vertical line is displayed in boxes below the graph.

MLLW or Mean Lower Low Water represents the average of the lowest of the tides during the day (typically there are two, one lower than the other). So height MLLW represents the height of the water above this low reference value.

Predicted values are the values computed by using the NOAA Tidal Harmonics algorithms for each gauge (each gauge has a different set).

The Residual shown is the Tidal Anomaly computed by subtracting the Predicted from the Observed reading. Positive numbers represent tide above normal and negative represent tide below normal.

Tide gauge readings are updated at data.hurrevac.com about once an hour but there is some lag to the NOS data, so expect some gauge data to be between 1 and 2 hours old even when just downloaded. The residual or anomaly is the most important data and is usually quite slow to change except as the center of a storm approaches. So, in most cases a fairly good estimate can be made of the current tidal height by using the most recent hour’s residual and applying it to the current hour.
SLOSH Display

SLOSH (Sea, Lake, and Overland Surge from Hurricanes) is a computer software model used by the NHC to predict potential storm surge for a storm of specific barometric pressure, direction and speed of approach, and wind field size. Geography of the local area (shape of the coastline, depth of the ocean floor) are also critical inputs into the model.

HURREVAC does not do actual SLOSH modeling, but rather ingests SLOSH model output from NHC and superimposes the surge predictions on the Tide Gauge Browser. There are two types of SLOSH display modes available:

1. Normal mode for SLOSH P-surge forecasts

NORMAL mode is for live storms. It displays the usual tide plot PLUS SLOSH P-Surge with a 1 in 10 chance of exceedance. This PSURGE is experimental for 2015 and may be available only 36 hours before projected landfall of a storm.

When real-time SLOSH P-Surge data is available for a gauge, the location will be marked on the map with an S. Click on the gauge to display its tide chart. The SLOSH-based P-Surge guidance amounts will be displayed as red circles above the tide table heights on the right side of the graph. You can check the individual values at any point by clicking on the graph at the hour of
your choice. Underneath the graph, in the box labeled Residual, is the tide height above normal predicted tide.

The <-Peak and Peak-> buttons at the bottom of the panel allow the user to adjust the arrival time of the Peak Surge forward or backward 6 hours in time. The current setting of this adjustment is displayed on the graph in parentheses( ) following the Peak surge adjustment explanation.

2. Exercise mode for hypothetical MEOW/MOM values

MEOW or MOM Exercise mode allows the user to choose, for exercise purposes, a Maximum Envelope Of Water (MEOW) storm surge amount or a Maximum of Maximums (MOM) storm surge amount from the drop-down lists shown for this particular tide gauge.

The MEOWs refer to SLOSH surges grouped into categories of Saffir Simpson scale (1 to 5), direction of movement, and speed of movement.

The MOMs refer to the maximum surge amounts for each SS Category, regardless of direction or speed.

Once a MOM or MEOW is selected, a grey line is drawn on the right hand side of the graph, indicating the storm tide amount that could be expected given the tide table height for that hour, and the MEOW or MOM surge height. By clicking on the graph at a specific hour, a red circle is drawn at the projected hypothetical storm tide height. Underneath the graph, in the box labeled Residual, is the specific SLOSH value, which is added to the tide table value to obtain the total Guidance storm tide level amount.
NWS Radar Mosaic

Doppler Radar Observations is one of the Other Weather Data layers in HURREVAC. The layer updates every 10 minutes with a new snapshot from the network of NEXRAD stations in the continental United States, Puerto Rico, and Hawaii.

In the context of hurricane tracking, the colors of the radar image provide a useful illustration of the extent of heavy rainfall and severe thunderstorms for a storm near or over land.

The radar data is reflectivity, or echo intensity, which is measured in dBZ (decibels). The higher the dBZ, the greater the rate of precipitation.
GOES Satellite Imagery

GOES Satellite Imagery is one of the Other Weather Data layers in HURREVAC. The layer updates every 15 minutes with composite imagery from the visible channel of GOES-East and GOES-West: geostationary satellites that together cover North America, Central America, and surrounding Atlantic to Pacific Ocean areas.

The images are gray-scale and depict the reflected solar radiation from clouds in white, contrasting with water and land surfaces in shades of gray or black. In the context of hurricane tracking, the satellite image provides a useful illustration of the extent of storm size and location, especially when the storm is too distant to be picked up by land-based Doppler radar stations.
Special Tools

Supplementing HURREVAC’s standard toolset are a few special tools that handle unique circumstances and locally-tailored analysis for certain states. These special tools are included with HURREVAC’s main installation.

Special tools currently available in HURREVAC are as follows:

**NYC Metro Facilities** - Reports and special settings that handle complex HES clearance time calculations for bridges, tunnels, and other transportation facilities in the New York City metropolitan area.

**Risk Profile** - A report that compiles custom threat assessment information for a state and its localities. Risk Profiles are available for the following states:

- New York (including northeastern New Jersey)
- Virginia (including northeastern North Carolina)
- Florida
NYC Metro Facilities

*Last updated: 2-2015*

The NYC Metro Facilities tools are special functions within HURREVAC developed specifically to accommodate Hurricane Evacuation Study (*HES*) clearance times for bridges, tunnels, and other transportation facilities in the New York City metropolitan area. The 132 entries that are part of this module were determined by the transportation agency to be the most critical facilities or locations within their transportation network that are vulnerable to a hurricane. Some entries represent multiple facilities or locations.

HURREVAC’s report capabilities for facilities are similar to those for counties, but with some extra features to handle the more complicated evacuation/closure scenarios required by facilities. The facility reports also contain filtering options and certain configuration settings not found elsewhere in HURREVAC.

Discrete Action Periods

Instead of a single evacuation clearance time as in the case for counties, facilities have 3 time periods for actions that need to be taken before arrival of the hazards (storm surge or wind). Individual times are dependent on a variety of factors including agency ownership and type of facility. The discrete action periods are:

1. **Mobilization Period** - Amount of time needed to organize internal decision making and stage equipment, vehicles, and personnel. Most agencies have designated only a brief mobilization time of 1 to 2 hours, expecting this time to be executed quickly or even concurrently with other emergency time phases. Exceptions are the transit agencies with concerns about redirecting resources/transit cars and buses.
2. **Evacuation Period** - Time frame during which a facility will function to move evacuees. Commuter transit facilities will function like they do in a heavy AM or PM peak period; highway facilities will carry evacuation traffic over time periods defined in the 2011 Metro New York Evacuation Project.
3. **Closure Period** - Amount of time needed to secure and close facilities and redirect employees to safe shelter before hazards arrive.

A facility’s clearance time is the sum total of the mobilization, evacuation, and closure periods.

Wind versus Surge-Timed Facilities

In calculating the hazard arrival time for facilities, HURREVAC must differentiate between two types of facilities:

**Wind-Affected Facilities**

These facilities are affected primarily by wind hazards, specifically 39mph (34 knot) winds of an approaching storm, and treated much the same as county evacuation timing in HURREVAC. For tall facilities such as bridges however, an offset (also known as pre-landfall hazard time) of 1, 2,
or 3 hours is placed in front of (ground) forecasted 39 mph wind arrival time to account for the fact that winds are routinely stronger at these high altitudes and the storm effects will be felt sooner at these locations.

Therefore with wind-affected facilities, HURREVAC computes the arrival time of 39 mph winds to the facility, and subtracts the combined times for mobilization, evacuation and closure to arrive at a clearance start time. The calculated start times are essentially deadlines for initiating actions if adequate time is to be allowed for completion before the arrival of potential wind hazards.

Note: Certain facilities affected primarily by RAINFALL flooding are placed in the wind-affected facilities category because wind and rainfall will begin at about the same time.

**Surge-Affected Facilities**

These facilities are affected first by flooding, specifically flooding from storm surge as determined by the National Weather Service Sea, Lake, and Overland Surges from Hurricanes (*SLOSH*) model, which predicts flooding that would occur assuming a direct hit or worst case assumption.

The SLOSH model data results in an offset time, in hours, before the arrival of the eye, when flooding would commence at the facility. This may range from 0 hours (flooding arrives only when eye arrives) or as much as 7 hours before the eye for a severe storm approaching from a critical direction. This offset is based on the location and elevation of the facility. In most cases, the flood-affected facilities will have much later start times than the wind-affected ones.

With surge-affected facilities, HURREVAC first computes the closest approach time of the storm’s eye or center in the area, and subtracts the pre-landfall flooding time in hours as determined by the SLOSH model for the worst case. After the surge arrival time is determined from the SLOSH model offset, the program then subtracts the combined times for mobilization, evacuation and closure to arrive at a clearance start time. The calculated start times are essentially deadlines for initiating actions if adequate time is to be allowed for completion before the arrival of potential storm surge hazards.
Distinction Between HURREVAC Overall Clearance Time and Facility Evacuation Times

Each of the facilities in HURREVAC’s facility timing tools has a different evacuation timeframe, although the City will base evacuation decisions and conduct operations according to the overall time needed for all movements. This is due to the fact that the evacuation times reflect facility operator estimates of time required to process the full, anticipated travel demands on their facilities, rather than the full amount of time their facilities would be in service for an evacuation operation. As such, the facility evacuation time measure helps illustrate relative potential congestion by facility within the total evacuation order period.

Presentation of Facilities Data

The primary presentation of facilities data is within the Facility Clearance Timing reports which calculate deadlines for mobilization, evacuation, and closure of all 132 wind and surge-affected facilities. This type of facility analysis is available in several report formats: 1) Clearance Timing for All Facilities and 2) Clearance Timing for a Single Facility.

For the 24 wind-affected facilities in the NYC Metro area, special Facility Wind Timing reports are also available as follows:

Wind Timing for All Facilities, Wind Timing for a Single Facility, and the Wind Timing Chart consist of deterministic wind forecasts appropriate to consider when a storm is near landfall. These reports contain very detailed estimates of hour-by-hour wind intensity and timing at facility locations using NHC’s forecast of wind ranges.

The Wind Probabilities report provides wind timing and intensity information, but in a general assessment that is most appropriate to consider when the storm is distant and the forecast uncertainty is still high.
Facility Clearance Timing

Facility clearance timing functions of HURREVAC's special toolset for New York City metropolitan area transportation facilities are accessed through the Analysis/Reports Selection panel.

The two types of facility clearance timing reports are highlighted below:

These timing reports are based upon the deterministic forecast of storm track and winds from whatever storm advisory is currently displayed in the Map View. Note: The NHC does not include wind ranges information in the extended forecast from 72 to 120 hours. Therefore, the reporting period for this tool is only from hour 0 (the hour the NHC forecast is issued) to hour 72.
Clearance Timing for All Facilities
This report calculates timing for all of the 132 transportation facilities that are within the 72-hour wind swath.

Report columns include:

- **Evac Type** - identifies facility as either wind or surge vulnerable.
- **Mobilize (hrs)** - Date/Time to start mobilization with the duration in parentheses. [Past] indicates that the action should already be underway if needed.
- **Evac (hrs)** - Date/Time to start an evacuation with the duration in parentheses. [Past] indicates that the action should already be underway if needed.
- **Closure (hrs)** - Date/Time to start closure with the duration in parentheses. [Past] indicates that the action should already be underway if needed.
- **Hazards (hrs)** - Beginning time for the wind or surge hazards. This calculation includes the hazards offset (in parentheses) which is used to account for earlier winds (at high elevations) or surge in advance of eye arrival.
- **Closest Approach (or Eye Arrives)** - Date/Time when the eye of the storm would pass closest to the facility. If direct hit timing is selected instead of forecast track, then this column is labeled as the time of eye arrival.
- **Jurisdiction/Owner/Type/Location** - facility description details which can be used to sort or filter the list. Clicking on any heading will cause the list to sort according to data

<table>
<thead>
<tr>
<th>Facility Location</th>
<th>Evac Type</th>
<th>Mobilize (hrs)</th>
<th>Evac (hrs)</th>
<th>Closure (hrs)</th>
<th>Hazards (hrs)</th>
<th>Closest Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gowen Point Dock</td>
<td>Wind</td>
<td>10/28 02E (1)</td>
<td>10/28 03E (14)</td>
<td>10/28 17E (8)</td>
<td>10/29 01E (6)</td>
<td>10/29 22E</td>
</tr>
<tr>
<td>Fire Island Ferry</td>
<td>Wind</td>
<td>10/28 02E (1)</td>
<td>10/28 03E (14)</td>
<td>10/28 17E (8)</td>
<td>10/29 01E (6)</td>
<td>10/29 23E</td>
</tr>
<tr>
<td>Hutchinson Ri Prox-Pham Priy and II 35</td>
<td>Wind</td>
<td>10/28 10E (3)</td>
<td>10/28 13E (7.5)</td>
<td>10/28 21E (5)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Hutchinson Ri Prox-Gat 9</td>
<td>Wind</td>
<td>10/28 11E (3)</td>
<td>10/28 14E (7.5)</td>
<td>10/28 22E (5)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Pulaski Skyway Bridge</td>
<td>Wind</td>
<td>10/28 10E (3)</td>
<td>10/28 13E (8.5)</td>
<td>10/28 22E (5)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Hutchinson Ri Prox-MLK Blvd</td>
<td>Wind</td>
<td>10/28 12E (3)</td>
<td>10/28 15E (7.5)</td>
<td>10/28 23E (5)</td>
<td>10/29 05E (6)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Cross Bay Bridge-east span</td>
<td>Wind</td>
<td>10/28 15E (3)</td>
<td>10/28 18E (7)</td>
<td>10/29 01E (1.25)</td>
<td>10/29 02E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Verizon Bridge-east span</td>
<td>Wind</td>
<td>10/28 16E (3)</td>
<td>10/28 19E (6)</td>
<td>10/29 01E (1.25)</td>
<td>10/29 02E (1.5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Marine Prox Bridge-east span</td>
<td>Wind</td>
<td>10/28 16E (3)</td>
<td>10/28 19E (6)</td>
<td>10/29 01E (1.25)</td>
<td>10/29 02E (1.5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Williamsburg Bridge-east span</td>
<td>Wind</td>
<td>10/28 15E (3)</td>
<td>10/28 18E (8.5)</td>
<td>10/28 01E (2)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>GW Bridge-east span</td>
<td>Wind</td>
<td>10/28 15E (3)</td>
<td>10/28 16E (8)</td>
<td>10/28 01E (2)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Greenpoint Bridge-east span</td>
<td>Wind</td>
<td>10/28 16E (3)</td>
<td>10/28 01E (2)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
<td></td>
</tr>
<tr>
<td>EK Bridge-east span</td>
<td>Wind</td>
<td>10/28 17E (3)</td>
<td>10/28 20E (5.4)</td>
<td>10/29 01E (2)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>MN Bridge-east span</td>
<td>Wind</td>
<td>10/28 17E (3)</td>
<td>10/28 20E (5.4)</td>
<td>10/29 01E (2)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
<tr>
<td>Gatesbridge Crossing-east span</td>
<td>Wind</td>
<td>10/28 17E (3)</td>
<td>10/28 20E (5.4)</td>
<td>10/29 01E (2)</td>
<td>10/29 03E (5)</td>
<td>10/30 01E</td>
</tr>
</tbody>
</table>
in that column.  *These columns are not visible in the above screenshot but can be viewed by scrolling to the right in a report.*

Filtering
The facilities list can be filtered by any or all of the following criteria: jurisdiction, owner, facility type, and hazard type. The effect of this filtering is to pare down the long list of facilities to only those of particular interest.

When the facility list is not filtered, the Filter button (shown on the lower left of the above screenshot) reads Filter (ALL). When the facility list has some form of filtering applied, this button instead reads Filter (SOME).

Clicking the Filter button on the main report brings up the following form for viewing and editing of selections.
Facility Options
To view/change the underlying facility clearance time components, press the Set Facility Options button. In the 'Mobilize time', 'Evacuate time', 'Closure time', and 'Total time' columns here, you see the default number of hours required for each category of storm (CAT 1/2/3/4/5*).

*HURREVAC is a global tool that requires inputs for all 5 storm categories. However in this table below, CAT5 is simply a duplicate of CAT4 values since an escalation over CAT4 conditions would be meteorologically unlikely for a storm impacting the NY area.

Modifying Facility Times
To add or subtract hours from the default values, enter an offset number in the appropriate box (using a minus sign before the number if subtracting) and press one of the two Apply buttons. The Apply to ALL Facilities Below button makes the change to all facilities shown in the list, while the Apply to Selected Facilities button makes the change to only those facilities highlighted. Click on a facility to highlight it in blue and use the CTRL key to make a selection of multiple facilities.

If closed with the Save/Exit button, the underlying report will refresh with adjusted times. If closed with the Cancel button, the time modifications from this Facility Options session will be discarded. The Reset to Original button is used to return to default values, thereby discarding modifications from all sessions.
In the following screen shot, times have been adjusted for NJ DOT facilities. The **Filter** button was first used to limit the list of facilities here and on the main Facility Timing Report to NJ DOT facilities. Next, a Mobilize Time Offset of 1 extra hour was added to all 7 facilities with the **Apply to ALL Facilities Below** button. This change is reflected in the CAT 1/2/3/4/5 values and (+1) notations in both the 'Mobilize time' and 'Total time' columns.

In the following screen shot, 2 hours have also been added to the closure time of surge-affected NJ DOT facilities. The desired facilities were individually selected while holding down the CTRL key and then **Apply to Selected Facilities**. The lone wind-affected facility retains a total offset of just 1 (Mobilize) hour, while the others now have a total offset of 3 hours (1 Mobilize, 2 Closure).

Such an adjustment might perhaps be temporarily warranted by a special condition on the ground, but generally speaking the HES clearance times should be used as is...with greater consideration given to the storm category selection. **Note**: Any adjustments made in the Facilities Options will be retained during this program session. After the user exits the program, all adjustments will be lost.
Storm Category Selection

Storm category is an important consideration in facility action start times. HURREVAC selects the default storm category based on the highest winds predicted over the 72-hour forecast period; however if the maximum wind is within 6 mph (5 knots) of the next Saffir/Simpson category, HURREVAC increases the default selection by one storm category as insurance.

Tip: New York locations considering the threat from a Cat 4 or 5 storm still well south may want to drop the storm category because the storm is forecast to be much less intense once over the cooler waters of the Northeast. For example, after consulting with your local NWS office, you might opt to select ‘CAT 2 (user selected)’ from the list below where ‘CAT 4 (NHC forecast)’ was the default for an intense storm still sitting off the coast of Florida.

Press the Refresh button to update the facility report for this advisory. Note: New advisories will revert back to the default selection since this is an important decision that must be re-evaluated with each new forecast.

Ideally, the evacuation scenario should match storm intensity at landfall so that you are not evacuating too many or too few people. Storm intensity is difficult to forecast precisely and therefore, as added insurance, emergency managers sometimes elect to prepare for one category higher than what is forecast at landfall.

Forecast Track versus Direct Hit Timing

The Facility Timing report’s default procedure is to take a forecast track approach for calculating hazard start time. This differs from the direct hit approach that HURREVAC uses in the standard county-based evacuation timing reports. For a curved-track storm such as Hurricane Sandy, forecast track timing suggests start times that are as much as 12 hours later than those suggested by a direct hit track. For relatively straight track storms such as Hurricane Irene, there is little difference between forecast track and direct hit timing.

Forecast track timing may be appropriate to use when there is a high level of confidence in the forecast track of the storm and consideration of the later times that it produces for mobilization,
evacuation, and closure is desirable. In nearly all situations, direct hit timing will produce a more conservative (earlier) timeline for preparations.

**Clearance Timing for a Single Facility**
This report is a slightly modified version of the standard (county-based) Evacuation Timing > Single Area report that contains an hour-by-hour breakdown of evacuation actions and storm conditions.

When this report is produced for a facility, the 'Possible Action' column specifically indicates each clearance hour as one of the three types (either mobilization, evacuation, or closure) and the hours after TASK COMPLETE as the type of hazard indicated for that facility (either wind or storm surge).

Rows of the tabular report are colored according to activity:

- **gray** if a pre-decision or post-action hour
- **yellow** if an active mobilization hour
- **green** if an active evacuation hour
- **red** if an active closure hour
In the 'Day/Night' column, the hours in daylight and dark are noted respectively as yellow or blue.

Additional Tips
To print the facility clearance timing report data to a file, click the Print button within the Program Header. An 'Export Report to Excel' option is also available by right-clicking on the report tab name.

Use the Refresh button at the bottom right to redo the report if you have a new storm or different advisory loaded into the map display. The Refresh button can be useful in a live-storm situation in which a new advisory is received by the system and you want to refresh the Facility Timing report with the latest forecast information.
Facility Wind Timing

Facility wind timing functions of HURREVAC's special toolset for New York City metropolitan area transportation facilities are accessed through the Analysis/Reports Selection panel.

The four types of facility wind timing reports are highlighted below:

The first three timing reports are based upon the deterministic forecast of storm track and winds from whatever storm advisory is currently displayed in the Map View. Note: The NHC does not include wind ranges information in the extended forecast from 72 to 120 hours. Therefore, the reporting period for these reports is only from hour 0 (the hour the NHC forecast is issued) to hour 72.

The final report type (Wind Probabilities) is based on analysis of a separate gridded wind probability dataset which provides probabilistic information for NHC's entire 120-hour forecast period.
Wind Timing for All Facilities

This report provides wind timing details for all of the 132 transportation facilities that are within the 72-hour wind swath. Each row of the report is colored according to the peak wind intensity - blue if tropical storm force (39mph/34kt), yellow if strong tropical storm (58mph/50kt), and red if hurricane force (74mph/64kt).

User-Defined Wind Triggers

These first three columns of data are provided for transportation agencies having action plans that are triggered when wind conditions meet or exceed a certain 1-minute maximum sustained speed. Wind trigger definitions are initially set to 40, 50, and 60 mph to match the action plans of Metro NYC bridge facilities; however these thresholds can be changed by clicking on the 'Edit' link at bottom right of the report.

The following screen is used to make edits to the wind trigger definitions. New numbers are retained upon exit of the program and used in future sessions of HURREVAC.
Note: HURREVAC's reporting of the expected ‘Wind Trigger’ hours is subject to a great deal of forecast uncertainty and large scale precision, and thus should only be taken as general guidance. Where possible, agencies are encouraged to utilize observed wind values (such as from anemometers installed at facilities) and local weather service office forecast products in decision-making.

NHC-Defined Wind Thresholds and Peak Winds
The next seven columns in the report on wind timing use the standard thresholds of 39mph/34kt, 58mph/50kt, and 74mph/64kt 1-minute maximum sustained winds that are provided in NHC's forecast advisories. The format and content of the data is similar to that found in the standard county-based Wind Timing > All Areas report. The forecasted arrival time and ending time is given for each of the three thresholds of wind. Duration of winds equal to or greater than the threshold appears in parentheses after the ending times. Time of peak winds (storm's closest approach) is reported in the final column.

Sorting and Filtering
The report's initial sort order is alphabetical by state and facility name. Buttons are provided at the bottom of the wind timing reports to change this sorting to either earliest wind arrival or strongest maximum winds.

The Filter button provides access to filtering capabilities shared with Facility Clearance Timing. Your filter selections are applied globally, meaning that any newly generated (or refreshed) reports will also contain the same pared-down list of facilities.

Wind Timing for a Single Facility
This is a slightly modified version of the standard (county-based) Wind Timing > Single Area report that contains an hour-by-hour breakdown of forecasted wind conditions.
A bolded row indicates that this is an hour at which a defined wind trigger is first met or exceeded.

<table>
<thead>
<tr>
<th>Date/Time (hr)</th>
<th>Wind Speed</th>
<th>From Direction</th>
<th>35mph distance</th>
<th>50mph distance</th>
<th>74mph distance</th>
<th>Eye distance</th>
<th>Hour</th>
</tr>
</thead>
<tbody>
<tr>
<td>08/27/11 20EDT</td>
<td>less than 39mph (990)</td>
<td>40 miles</td>
<td>130 miles</td>
<td>173 miles</td>
<td>243 miles</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>08/27/11 21EDT</td>
<td>less than 39mph (990)</td>
<td>25 miles</td>
<td>116 miles</td>
<td>158 miles</td>
<td>228 miles</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>08/27/11 22EDT</td>
<td>less than 39mph (990)</td>
<td>10 miles</td>
<td>100 miles</td>
<td>143 miles</td>
<td>213 miles</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>08/28/11 00EDT</td>
<td>40mph (35kts) (990)</td>
<td>0 miles</td>
<td>85 miles</td>
<td>127 miles</td>
<td>197 miles</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>08/28/11 01EDT</td>
<td>41mph (38kts) (990)</td>
<td>0 miles</td>
<td>58 miles</td>
<td>112 miles</td>
<td>182 miles</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>08/28/11 02EDT</td>
<td>43mph (40kts) (990)</td>
<td>0 miles</td>
<td>54 miles</td>
<td>96 miles</td>
<td>166 miles</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>08/28/11 03EDT</td>
<td>48mph (45kts) (990)</td>
<td>0 miles</td>
<td>42 miles</td>
<td>88 miles</td>
<td>150 miles</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>08/28/11 04EDT</td>
<td>51mph (45kts) (990)</td>
<td>0 miles</td>
<td>26 miles</td>
<td>67 miles</td>
<td>134 miles</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>08/28/11 05EDT</td>
<td>55mph (48kts) (990)</td>
<td>0 miles</td>
<td>10 miles</td>
<td>51 miles</td>
<td>117 miles</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>08/28/11 06EDT</td>
<td>59mph (52kts) (990)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>34 miles</td>
<td>100 miles</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>08/28/11 07EDT</td>
<td>63mph (58kts) (990)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>17 miles</td>
<td>83 miles</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>08/28/11 08EDT</td>
<td>71mph (64kts) (960)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>0 miles</td>
<td>50 miles</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>08/28/11 09EDT</td>
<td>74mph (69kts) (940)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>0 miles</td>
<td>56 miles</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>08/28/11 10EDT</td>
<td>74mph (69kts) (930)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>0 miles</td>
<td>56 miles</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>08/28/11 11EDT</td>
<td>74mph (69kts) (930)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>0 miles</td>
<td>56 miles</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>08/28/11 12EDT</td>
<td>71mph (64kts) (960)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>9 miles</td>
<td>47 miles</td>
<td>31</td>
<td></td>
</tr>
<tr>
<td>08/28/11 13EDT</td>
<td>64mph (59kts) (930)</td>
<td>0 miles</td>
<td>0 miles</td>
<td>2 miles</td>
<td>85 miles</td>
<td>32</td>
<td></td>
</tr>
</tbody>
</table>
Wind Timing Chart

This chart provides wind timing and intensity information identical to what is reported in the detailed Single Facility reports. The advantage of this chart-based layout is that you can more easily visualize possible wind conditions over time for multiple locations.

The numbers in individual cells represent the forecast wind speed in mph at each hour. A bolded value indicates that this is an hour at which a defined wind trigger is first met or exceeded. Sorting, filtering, and wind trigger edits operate the same as in the Wind Timing for All Facilities report.
Wind Probabilities
This report is identical in format to the standard, county-based Wind Probabilities > All Areas report. In order to generate this report, you must first load a wind probabilities data layer within either the Current map display or from 'Other Archived Data' of the Archives tab.

The Filter button provides access to filtering capabilities shared with Facility Clearance Timing.

Additional Tips
To print the facility wind timing data to a file, click the Print button within the Program Header. An 'Export Report to Excel' option is also available by right-clicking on any of the report tab names.

Use the Refresh button at bottom right to redo the report if you have a new storm or different advisory loaded into the map display. The Refresh button can be useful in a live-storm situation in which a new advisory is received by the system and you want to refresh the Facility Timing report with the latest forecast information.
Risk Profiles

The Risk Profile is a special state-specific tool in HURREVAC which highlights information that is regarded by a state's emergency management agency to be especially important to consider when under a tropical cyclone threat. Risk Profiles are only available for the states of New York, Virginia, and Florida.

The Risk Profile is accessed through the Analysis/Reports Selection panel and the resulting report is based upon whatever storm advisory is currently displayed in the Map View.

The initial display for the Risk Profile will be something similar to this example below from Virginia.
How a Risk Profile Works

A Risk Profile is customized for an individual state using a series of criteria (questions) and conditions (possible answers) identified by emergency managers in that state as most relevant. The Risk Profile extracts the required information from the main HURREVAC program and presents it in a series of tables.

For each criterion, a color coded box (red, yellow, or green) highlights the severity of the condition. *

* The New York Risk Profile also utilizes a fourth (gray) color to indicate that a criterion cannot be evaluated due to lack of data or distance of the storm.

When certain criteria reach either a yellow or a red condition, they are flagged (using one of the symbols below) to give special notice to their importance in the evacuation decision making process:
The **Critical Indicator** is a yellow triangle with an exclamation mark inside. This means that you should carefully consider the condition of this criterion. It is an important indication of a threat and is a critical one to consider. **

The **Indicator of Concern** is a white circle with an exclamation mark inside. This means that the condition of the criterion is important, but not quite at the critical level and should be monitored closely. **

**The New York Risk Profile does not employ these indicators.**

The intention is to lead the emergency manager toward a decision in a logical manner that takes advantage of the information that is available, but which may not be readily apparent to all but the most experienced.

**Risk Profile Components**

The following controls are used to manipulate the Risk Profile report (i.e. change the type of information displayed within the white box):

**Geographic Scope Selection**

This list box at top left of the Risk Profile is used to define a geographic scope for the report. Choices are either for an overall (State Profile) perspective or for the (Local) perspective of a single jurisdiction. Some states' Risk Profiles include a few neighboring counties in other states if their evacuation plans are interrelated (i.e. Outer Banks counties of Dare and Currituck, North Carolina would evacuate through the southeastern corner of Virginia).

Criteria are often worded differently depending on whether the scope is state-wide or local. For example, a state-wide question about forecast peak winds is phrased "Forecast peak wind in Virginia based on the 72-hr forecast track?" and answered "82 mph in Suffolk" while the county-specific question is phrased "Forecast peak wind in your locality based on the 72-hr forecast track?" and answered with a county-specific wind speed.

In a few cases, criteria may apply to one scope but not the other. For example, since interstate lane reversal is a regional evacuation option, it is only addressed in criteria that appear under the State Profile.

**Topics**

Criteria are organized and labeled according to topic. These topics are shown on sequentially-lettered (A, B, C, D, etc) screens. The number and types of topics vary according to the custom design of each state's Risk Profile.
The following topics are common to the Virginia and Florida Risk Profiles:

**Risk Area Definition** - Criteria that lead the user to consider information that is felt necessary to define the geographic region at risk and the change in risk from recent advisories.

**Storm Intensity and Evacuation Scenario** - Criteria that lead the user toward the correct Saffir-Simpson Category assumption for determining the type and extent of evacuation, should one be needed.

**Evacuation Characteristics** - Criteria that lead the user toward determining the evacuation start time, based not only on the length of clearance time needed, but on such things as the time of day at which evacuation occurs.

**Other Considerations** - This topic includes other information which may affect your evacuation, such as time of year, and whether other nearby regions are likely to be evacuating.

**One-Way Concerns** - This topic is usually available only when the state profile is selected. It considers the problem of whether and when to reverse-lane certain evacuation routes in order to increase capacity.

*New York’s Risk Profile has criteria arranged in four topics that align closely with New York City OEM’s Hurricane Forecast Summary template:*

**Trajectory and Strength** - Criteria that define the geographic region at risk and highlight storm statistics relevant to general situational awareness.

**Winds** - Criteria that lead the user to closely consider the potential for hazardous winds.

**Tide/Rainfall** - Criteria that lead the user to closely consider the potential for severe coastal storm surge and/or inland flooding due to heavy rainfall.

**Evacuation Decisions** - Criteria that lead the user toward determining the evacuation start time and deadlines for other actions.
Summary
A summary screen can be generated of either the state profile or local county topics by clicking on the Summary button. The summary provides a graphical overview of the Risk Profile Indicators for the last 12 advisories. Once the summary screen is displayed, subsequent clicks on the Summary button will toggle between a view of 12 main advisories and a view of main and intermediate advisories.

Special Considerations
The Risk Profile is very much a “weight of the evidence” system, designed to light up red when the user's region is threatened in a meaningful way. There are no hard and fast rules for using the system, but over time, users will no doubt develop some rules of thumb, such as a high number of red boxes on the Summary screen.

In looking for trends on the Summary screen, keep in mind that certain criteria, such as the One-Way Concerns, are designed to function more as timing indicators for starting a lane reversal.
option. That is, they move to red as the time for lane reversal setup is close and move back to green after the time has passed and the strategy can no longer be considered. Thus, while the other indicators may go to red and stay there as the storm approaches, the One-Way indicators on the State Summary screen will normally light up red only for one or two advisories around the time of One-Way setup.

Resources

The Resources list box at the bottom left highlights additional information (both internal and external to HURREVAC) that could be relevant to the local or state situation. Making a selection in this box and then pressing GO will either launch a web page or open a control within the program.

Additional Tips

To print or export the report’s data to a file, click the Print button within the Program Header.

*** The New York Risk Profile also offers a spreadsheet export option when the profile scope is set to a local jurisdiction. Information from the profile is export in New York City OEM’s Hurricane Forecast Summary format. This option is accessed by right-clicking on the NY Risk Profile tab and choosing ‘Export Report to Excel’.

Use the Refresh button at bottom right to redo the report if you have a new storm or different advisory loaded into the Map Display. The Refresh button can be useful in a live-storm situation in which a new advisory is received by the system and you want to refresh the Risk Profile with the latest forecast information.

The Evac Options button allows you to view and change the default HES settings for a county or counties. Changing these settings can have a major effect on the Risk Profile output and should only be manipulated if you are very familiar with the underlying Hurricane Evacuation Study. ****

**** Florida and Virginia profiles for jurisdictions with more than one scenario always utilize the one that produces the longest clearance time. The New York Risk Profile initially defaults to this longest clearance time, but also includes the option to override the scenario selection as shown below.
New York Risk Profile

Last updated: 2-2015

This series of images shows an example of the Risk Profile for New York from Hurricane Sandy Advisory #25 (2012). New York-specific criteria and special considerations are discussed.

State and Local Topics

Topic A - Trajectory and Strength

The overall purpose of the 'Trajectory and Strength' topic is to define the geographic region at risk and highlight storm statistics relevant to general situational awareness.

Examples of state and local output for this topic are shown here. The same 5 criteria are used in both the state and local scopes. See below the screen shots for notes describing each criterion and its specific purpose.
### Hurricane Risk Profile (State) for New York

#### Tropical Cyclone: SANDY    Advisory # 25    Date/Time: SUN 10/28/12 11 EDT

#### A - Trajectory and Strength

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is a NY/Northern NJ jurisdiction within the NHC 120-hour average forecast error cone? 37 hours</td>
<td>Red= Within 72 hours  Yellow= Within 120 hours  Green= Within 120 hours but not in error cone</td>
<td><img src="false" alt="Red" /> <img src="false" alt="Yellow" /> <img src="true" alt="Green" /></td>
</tr>
<tr>
<td>Storm's prevailing bearing at closest approach to NY/Northern NJ coastline? NW</td>
<td>Red= WNW/NW/NNW  Yellow= N/NNE/NE  Green= All other (or N/A)</td>
<td><img src="true" alt="Red" /> <img src="false" alt="Yellow" /> <img src="false" alt="Green" /></td>
</tr>
<tr>
<td>What is the forecast storm intensity at closest approach? Category 1 hurricane</td>
<td>Red= Hurricane  Yellow= Tropical Storm  Green= Outside of error cone and fringe winds area</td>
<td><img src="false" alt="Red" /> <img src="false" alt="Yellow" /> <img src="true" alt="Green" /></td>
</tr>
<tr>
<td>Difference in central pressure from last advisory? No change 0 millibars (951 mb to 951 mb)</td>
<td>Red= Decrease by more than 5 mb  Yellow= Decrease by less than 5 mb or Same  Green= Increase</td>
<td><img src="false" alt="Red" /> <img src="true" alt="Yellow" /> <img src="false" alt="Green" /></td>
</tr>
<tr>
<td>Average forward speed over 72-hour forecast period or until closest approach? Average forward speed 12 mph</td>
<td>Red= 40 mph or greater  Yellow= 20 to 39 mph  Green= Less than 20 mph</td>
<td><img src="false" alt="Red" /> <img src="false" alt="Yellow" /> <img src="false" alt="Green" /></td>
</tr>
</tbody>
</table>

### Hurricane Risk Profile (Local) for NYC Metro County NY

#### Tropical Cyclone: SANDY    Advisory # 25    Date/Time: SUN 10/28/12 11 EDT

#### A - Trajectory and Strength

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Severity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this jurisdiction within the NHC T20-hour average forecast error cone? 37 hours</td>
<td>Red= Within 72 hours  Yellow= Within 120 hours  Green= Within 120 hours but not in error cone</td>
<td><img src="false" alt="Red" /> <img src="false" alt="Yellow" /> <img src="true" alt="Green" /></td>
</tr>
<tr>
<td>Storm's prevailing bearing at closest approach to NY/Northern NJ coastline? NW</td>
<td>Red= WNW/NW/NNW  Yellow= N/NNE/NE  Green= All other (or N/A)</td>
<td><img src="true" alt="Red" /> <img src="false" alt="Yellow" /> <img src="false" alt="Green" /></td>
</tr>
<tr>
<td>What is the forecast storm intensity at closest approach? Category 1 hurricane</td>
<td>Red= Hurricane  Yellow= Tropical Storm  Green= Outside of error cone and fringe winds area</td>
<td><img src="false" alt="Red" /> <img src="false" alt="Yellow" /> <img src="true" alt="Green" /></td>
</tr>
<tr>
<td>Difference in central pressure from last advisory? No change 0 millibars (951 mb to 951 mb)</td>
<td>Red= Decrease by more than 5 mb  Yellow= Decrease by less than 5 mb or Same  Green= Increase</td>
<td><img src="false" alt="Red" /> <img src="true" alt="Yellow" /> <img src="false" alt="Green" /></td>
</tr>
<tr>
<td>Average forward speed over 72-hour forecast period or until closest approach? Average forward speed 12 mph</td>
<td>Red= 40 mph or greater  Yellow= 20 to 39 mph  Green= Less than 20 mph</td>
<td><img src="false" alt="Red" /> <img src="false" alt="Yellow" /> <img src="false" alt="Green" /></td>
</tr>
</tbody>
</table>

---

**Notes on the 'Trajectory and Strength' Criteria**
1. **Is there a chance that the storm might pass directly over this area?** Error cones and hourly ellipses encompass the area in which the storm is most likely to track.

2. **Could there be greater risk due to the direction from which the storm is approaching?** As a general rule, storms having a more perpendicular angle of approach to the Northeast coastline carry greater risk than those that curve along (and parallel) the East Coast. The reason for this is that a paralleling storm is more likely to first make landfall elsewhere (therefore diminishing its intensity before reaching the New York area). Additionally, the angle of approach when combined with local geography can impact the severity of storm surge experienced.

3. **What is the forecasted storm category at the time when the storm is closest?** The storm category at closest approach may be a more appropriate assumption for New York's Evacuation Options settings than the default choice of the maximum category over the entire forecast period.

4. **Is the storm intensifying?** Central pressure is inversely proportional to storm intensity. A storm observed to drop in pressure or maintain a low pressure over several approaching advisories is cause for concern and may warrant selection of a higher storm category for New York's Evacuation Options than the category forecasted at closest approach.

5. **How fast is the storm tracking toward the area?** Average forward speed over the entire track is meant to provide guidance on potential timing for evacuation operations. Fast tracking means that actions might need to be initiated when the storm is still well to the south.

Since storms typically pick up forward speed as they move further north, the average speed over the entire forecast may differ significantly from the speed near landfall. Therefore, average speed should not be used as an indicator of hazard conditions at landfall such as the extent of storm surge, rainfall amounts, and duration of winds.

**Topic B - Winds**

The purpose of this topic is to give guidance on the potential for hazardous winds.

Screen shots of state and local output for this topic are shown here. The same 4 criteria apply to both the state and local scopes. See below for notes describing each criterion and its specific purpose.
Notes on the 'Winds' Criteria

1. How high are the winds estimated to get in this area? Focus on this criterion and its specific wind forecasts only when a storm is close and threatening (48 hours or less). A storm's precise track and intensity over a longer period has a high degree of uncertainty.

2. What are the odds of this area experiencing hurricane-force winds? Wind probabilities at point locations along the coast quantify the potential for hurricane winds within a 5-day period.

3. What are the odds of this area experiencing tropical storm-force winds? Wind probabilities at point locations along the coast quantify the potential for tropical storm winds within a 5-day period.

4. Are the odds of hurricane-force winds increasing? Differences in wind probabilities from one advisory to the next indicate increasing or decreasing risk. Probabilities from
distant storms are typically low due to the high degree of uncertainty and increase as the storm gets closer and continues to threaten.

Topic C - Tide/Rainfall
This topic considers threats posed by heavy rainfall and storm surge brought about by an approaching storm.

Screen shots of state and local output for this topic are shown here. The same three criteria apply to both the state and local scopes, however an additional tide station location is considered in the local scope for item #2. See below for notes describing each criterion and its specific purpose.

**Hurricane Risk Profile (State) for New York**
Tropical Cyclone: SANDY  Advisory # 25  Date/Time: SUN 10/28/12 11 EDT

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 What is the highest astronomical tide predicted within the 24-hour period prior to closest approach? <strong>Higher than average</strong></td>
<td>Red= Higher than average (spring tide)  Yellow= Near average  Green= Lower than average (neap tide)</td>
</tr>
<tr>
<td>2 Timing of storm's closest approach with diurnal tide cycle at Sandy Hook? <strong>Closest approach 10/30/12 5 AM</strong> <strong>High tide 10/30/12 5 AM (2.51 ft)</strong></td>
<td>Red= Near high tide  Yellow= Near mid tide  Green= Near low tide</td>
</tr>
<tr>
<td>3 Greatest rainfall forecasted for NY/Northern NJ county in the next 72 hours? <strong>Data not available for advisory &gt;24 hours old</strong></td>
<td>Red= Greater than 6 inches  Yellow= 3 to 6 inches  Green= Less than 3 inches (or N/A)</td>
</tr>
</tbody>
</table>

**Hurricane Risk Profile (Local) for NYC Metro County NY**
Tropical Cyclone: SANDY  Advisory # 25  Date/Time: SUN 10/28/12 11 EDT

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Are tides higher than normal within the 24-hour period prior to closest approach? <strong>Higher than average</strong></td>
<td>Red= Higher than average (spring tide)  Yellow= Near average  Green= Lower than average (neap tide)</td>
</tr>
<tr>
<td>2 Timing of storm's closest approach with diurnal tide cycle at the Battery? <strong>Closest approach 10/30/12 2 AM</strong> <strong>High tide 10/30/12 2 AM (2.46 ft)</strong></td>
<td>Red= Near high tide  Yellow= Near mid tide  Green= Near low tide</td>
</tr>
<tr>
<td>3 Timing of storm's closest approach with diurnal tide cycle at Kings Point? <strong>Closest approach 10/30/12 1 AM</strong> <strong>High tide 10/30/12 5 AM (3.06 ft)</strong></td>
<td>Red= Near high tide  Yellow= Near mid tide  Green= Near low tide</td>
</tr>
<tr>
<td>4 Amount of rainfall forecasted for this jurisdiction in the next 72 hours? <strong>Data not available for advisory &gt;24 hours old</strong></td>
<td>Red= Greater than 6 inches  Yellow= 3 to 6 inches  Green= Less than 3 inches</td>
</tr>
</tbody>
</table>
Notes on the 'Tide/Rainfall' Criteria

1. *Is this a period of especially low or high tides?* Spring tides are about 20% higher than average. Neap tides are about 20% less than average. A spring tide may exacerbate surge flooding while a neap tide could mitigate.

2. *Is the storm approach projected to coincide with high tide?* Tide fluctuates as much as 5 feet in the New York area (along the Hudson River and Atlantic Ocean shorelines) and as much as 8 feet in the New York Sound area and can make a difference in the severity of storm surge water levels. However, it is difficult to make a tide timing determination until a storm very close to landfall since only 6 hours of time separate high and low tides.

3. *Could this storm generate a large amount of rainfall over the area?* This calculation is made using the WPC 3-day quantitative rainfall forecast. Note that this item cannot be answered for archived storms since there is no rainfall forecast available for the historic period.

**Topic D - Evacuation Decisions**
This topic considers the evacuation start time and deadlines for other actions.

Screen shots of state and local output for this topic are shown here. The state and local scopes each have three criteria; however items #2 & #3 differ and are therefore discussed separately in the notes below.

---

**Hurricane Risk Profile (State) for New York**

<table>
<thead>
<tr>
<th>Tropical Cyclone: SANDY</th>
<th>Advisory # 25 Date/Time: SUN 10/28/12 11 EDT</th>
</tr>
</thead>
</table>

**D - Evacuation Decisions**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Severity:</th>
<th>R</th>
<th>Y</th>
<th>G</th>
</tr>
</thead>
</table>
| Number of hours until onset of tropical storm force winds (39 mph) in NY/Northern NJ based on the forecast track? 14 hrs in Suffolk 10/29/12 1 AM | Red= Within 24 hours  
Yellow= Between 24 and 36 hours  
Green= Greater than 36 hours or none | ![Red](image) | ![Yellow](image) | ![Green](image) | ![N/A](image) |
| Earliest evacuation start time for jurisdictions based on the forecast track? 6 hours PAST NYC Metro 10/28/12 6 AM | Red= Evac start time has passed  
Yellow= 12 hours or less to evac start  
Green= Greater than 12 hours to evac start | ![Red](image) | ![Yellow](image) | ![Green](image) | ![N/A](image) |
| Earliest evacuation start time for jurisdictions based on a direct hit track? 13 hours PAST NYC Metro 10/27/12 11 PM | Red= Evac start time has passed  
Yellow= 12 hours or less to evac start  
Green= Greater than 12 hours to evac start | ![Red](image) | ![Yellow](image) | ![Green](image) | ![N/A](image) |
Notes on the 'Evacuation Decisions' Criteria

1. **Using the official forecast track (closest point of approach), are tropical storm-force winds forecast in the area and if so, when?** In this calculation, the Hourly Wind Ranges are advanced along the forecast track and a time is noted when tropical storm-force winds first enter the area.

2. **Of all counties within the 72-hour wind swath, which one would first need to consider evacuation action?** Forecast track timing reported in Item #1 is used, along with the county scenario that has the longest clearance times. Remember that by default HURREVAC will use the highest storm category predicted over the forecast period in its selection from the clearance time tables. Storms typically decrease in intensity as they head north and encounter cooler waters, so this may or may not be the most appropriate selection for New York's purposes. The default selections can be adjusted as described in Evacuation Options.

   **(Local) If this county is within the 72-hour wind swath, what is the timing window for actions that need to be initiated 48 hours before the start of wind hazards?** Forecast track timing reported in Item #1 is used in this calculation.

3. **Of all counties within the error swath, which one would first need to consider evacuation action?** A worst-case direct hit is used in this calculation as described in HURREVAC's methods for Evacuation Start Timing. Direct hit timing factors in forecast uncertainty and possible earlier impacts than with official forecast track timing. For storms with a curved forecast track (such as Hurricane Sandy), the timing difference between this and the forecast track calculation used in Item #2 can be as much as 12 hours.

   **(Local) If this county is within the 72-hour wind swath, how soon might an evacuation need to be initiated?** Forecast track timing reported in Item #1 is used,
along with the county scenario that has the longest clearance times. Remember that by default HURREVAC will use the highest storm category predicted over the forecast period in its selection from the clearance time tables. Storms typically decrease in intensity as they head north and encounter cooler waters, so this may or may not be the most appropriate selection for your county. The default selections can be adjusted as described in Evacuation Options. You can also override HURREVAC’s selection of the scenario with the longest clearance times by picking an alternate scenario from the drop-down list for that county.

State and Local Summaries
For more information on summaries, see the description under the general Risk Profile section.
### Risk Profile Summary (Local) for NYC Metro County NY

**Tropical Cyclone:** SANDY  
**Advisory #:** 25  
**Date/Time:** SUN 10/28/12 11 EDT

#### Severity:
- **Red:** High
- **Yellow:** Moderate
- **Green:** Low
- **Gray:** N/A

<table>
<thead>
<tr>
<th>Advy</th>
<th>Trajectory</th>
<th>Winds</th>
<th>Tides/Rain</th>
<th>Evacuation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3 4</td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 2 3</td>
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<td>25</td>
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<tr>
<td>14</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>
Hurricane Forecast Summary

When the profile scope is set to a local jurisdiction, information for that jurisdiction can be exported in New York City OEM’s Hurricane Forecast Summary format. After right-clicking on the NY Risk Profile tab and choosing 'Export Report to Excel', you will be prompted to save a file in .xlsx format.

*Note: The map graphic in the example below was manually inserted from a HURREVAC screenshot after the export to spreadsheet operation.*
Virginia Risk Profile

This series of images shows an example of the Virginia Risk Profile from Tropical Storm Hanna Advisory #34 (2008).
# State and Local Topics

## Hurricane Risk Profile (State) for Virginia

**Tropical Cyclone:** HANNA  
**Advisory #:** 34  
**Date/Time:** FRI 09/05/08 05 EDT

### A - Risk Area Definition

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Condition</th>
<th>Indicator Level</th>
<th>Critical</th>
<th>Of Concern</th>
</tr>
</thead>
</table>
| 1. Is a Virginia Locality within NHC 72 or 120 hour average forecast error cone? In 28 hr Error Ellipse | Red= Within 48 hours  
Yellow= Within 96 hours  
Green= >96 hrs or not in Error Cone | | | |
| 2. Are NHC Watch or Warnings in effect for Virginia coast? Trop Storm Warning | Red= Hurricane Warning  
Yellow= TS Warning or Hurricane Watch  
Green= TS Watch or None | | | |
| 3. Highest Coastline NHC 64kt wind probability from Cape Lookout NC to Chincoteague VA? 2% (12% for 50kt, 50% for 34kt) | Red= Greater Than 18%  
Yellow= 11% to 18%  
Green= Less Than 11% | | | |
| 4. Increase or decrease of maximum probability since last advisory? Decreased 3% to 2% | Red= Increased in Percent  
Yellow= Remained Same Percent  
Green= Decreased in Percent | | | |
| 5. Storm's steepest forecast angle of approach to VA coastline 207 degrees / 7 O'clock | Red= 90-140 degs (3 to 4 o'clock)  
Yellow= 141-180 degs (4 to 6 o'clock)  
Green= 181-270 degs (or NONE) | | | |
| 6. Forecast peak wind in Virginia based on the 72 hr forecast track? 56 mph in Southampton | Red= Hurricane Force winds  
Yellow= Between 58 and 74mph  
Green= Less than 58mph | | | |
## A - Risk Area Definition

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
<th>R</th>
<th>Y</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is this Locality within NHC 72 or 120 hour average forecast error cone?</td>
<td>Red=</td>
<td>Within 48 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yellow=</td>
<td>Within 36 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green=</td>
<td>&gt;96 hrs or not in Error Cone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are NHC Watch or Warnings issued for your county CR if inland county...</td>
<td>Red=</td>
<td>Hurricane Warning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nearby coast?</td>
<td>Yellow=</td>
<td>TS Warning or Hurricane Watch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green=</td>
<td>TS Watch or None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the NHC 64kt wind probability nearest your locality?</td>
<td>Red=</td>
<td>Very High Risk &gt;13%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2% (12% for 50kt, 50% for 34kt)</td>
<td>Yellow=</td>
<td>High Risk 11 to 18%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green=</td>
<td>Med or Low Risk &lt;11%</td>
<td></td>
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</tr>
<tr>
<td>Have the wind probabilities nearest your location increased or decreased</td>
<td>Red=</td>
<td>Increased in Percent</td>
<td></td>
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<tr>
<td>since the last advisory?</td>
<td>Yellow=</td>
<td>Remained Same Percent</td>
<td></td>
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<tr>
<td></td>
<td>Green=</td>
<td>Decreased in Percent</td>
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</tr>
<tr>
<td>Storm's steepest forecast angle of approach to VA coastline</td>
<td>Red=</td>
<td>90-140 degs (3 to 4 o'clock)</td>
<td></td>
<td></td>
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<tr>
<td>207 degrees / 7 O'clock</td>
<td>Yellow=</td>
<td>141-180 degs (4 to 6 o'clock)</td>
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<tr>
<td></td>
<td>Green=</td>
<td>181-270 degs (or NONE)</td>
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<tr>
<td>Forecast peak wind in your locality based on the 72 hr forecast track?</td>
<td>Red=</td>
<td>Hurricane Force winds</td>
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<tr>
<td>52Mph (45Kt)</td>
<td>Yellow=</td>
<td>Between 59 and 74mph</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Green=</td>
<td>Less than 59mph</td>
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</table>
### Hurricane Risk Profile (State) for Virginia

**Tropical Cyclone:** HANNA  
**Advisory #:** 34  
**Date/Time:** FRI 09/05/08 05 EDT

#### B - Storm Intensity and Evacuation Scenario

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
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</thead>
</table>
| What is the current intensity of the storm? | Red= Major Hurricane (Cat 3/4/5)  
Yellow= Hurricane (Cat 1 or 2)  
Green= Tropical Storm or lower | ⚠️ Critical |
| How is the storm intensity forecast to change before landfall? | Red= Increase in Category  
Yellow= No increase in Cat  
Green= Decrease in Cat | 🚨 Of Concern |
| Difference in central pressure from last advisory? 1 millibars (mb) RISE | Red= Decrease by more than 5 mb  
Yellow= Decrease by less than 5 mb or Same  
Green= Increase | 🚨 Of Concern |
| Number of hours left to intensity before landfall on projected track? 25 hrs | Red= Greater than 72 hours  
Yellow= 37 to 72 hours  
Green= 36 hours or less | 🚨 Of Concern |
| Planning Assumption for determination of Evacuation Category: if B2 is Red, use NHC Forecast Cat.  
If B3 and B4 are Red, increase one Category from that of B1.  
No evacuation category should remain for Cat 0 | Red= Assume Evacuation Category higher  
Yellow= Not used  
Green= Evacuation Category remains same | 🚨 Of Concern |
**B - Storm Intensity and Evacuation Scenario**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
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</thead>
<tbody>
<tr>
<td>What is the current intensity of the storm?</td>
<td>Red= Major Hurricane(Cat 3/4/5) Yellow= Hurricane (Cat 1 or 2) Green= Tropical Storm or lower</td>
<td>![Green]</td>
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<tr>
<td>How is the storm intensity forecast to change before landfall?</td>
<td>Red= Increase in Category Yellow= No increase in Cat Green= Decrease in Cat</td>
<td>![Yellow]</td>
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<tr>
<td>Difference in central pressure from last advisory? 1 millibars (mb) RISE</td>
<td>Red= Decrease by more than 5 mb Yellow= Decrease by less than 5 mb Green= Increase</td>
<td>![Green]</td>
</tr>
<tr>
<td>Number of hours left to intensity until landfall of eye? 25 hrs</td>
<td>Red= Greater than 72 hours Yellow= 37 to 72 hours Green= 36 hours or less</td>
<td>![Green]</td>
</tr>
<tr>
<td>Planning Assumption for determination of Evacuation Category: If B2 is Red, use NHC Forecast Cat. If B3 and B4 are Red increase One Category from that of B1. No Evac Category should remain for Cat 0</td>
<td>Red= Assume Evacuation one Category higher Yellow= Not used Green= Evacuation Category remains same</td>
<td>![Green]</td>
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### Hurricane Risk Profile (State) for Virginia

**Tropical Cyclone:** HANNA  
**Advisory #:** 34  
**Date/Time:** FRI 09/05/08 05 EDT

#### C - Evacuation Characteristics

<table>
<thead>
<tr>
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<th>Y</th>
<th>G</th>
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<tbody>
<tr>
<td>Predicted forward speed over 72 hour forecast period or until landfall?</td>
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<td>Red= 25 MPH or greater</td>
<td></td>
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<tr>
<td>Avg. Forward Speed To Landfall 18 mph</td>
<td></td>
<td>Yellow= 15 to 25 MPH</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Green= Less than 15 MPH</td>
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<tr>
<td>Highest Clearance time for Virginia HES Risk</td>
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<td>Red= Locality with 24 hrs or greater</td>
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<tr>
<td>Locality within 72 hr average forecast error cone?</td>
<td></td>
<td>Yellow= Locality with 16 to 23 hrs</td>
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<td></td>
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<tr>
<td>York, 22.25 hrs for Cat 1</td>
<td></td>
<td>Green= Less than 16 hours</td>
<td></td>
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</tr>
<tr>
<td>Number of hours until onset of Tropical Storm</td>
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<td>Red= Within 24 hours</td>
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<tr>
<td>force winds in Virginia based on the forecast</td>
<td></td>
<td>Yellow= Between 24 and 36 hrs</td>
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<tr>
<td>track, 19 hrs in Greensville</td>
<td></td>
<td>Green= Greater than 36 hrs or none</td>
<td></td>
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<tr>
<td>Earliest NHC Forecast Track (CPA) Decision Time for localities within</td>
<td></td>
<td>Red= Decision time has passed</td>
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<tr>
<td>the 72 hr average forecast error cone?</td>
<td></td>
<td>Yellow= 12 Hrs or less to Decision time</td>
<td></td>
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</tr>
<tr>
<td>PAST DECISION TIME (2.25hrs) Chesapeake</td>
<td></td>
<td>Green= Greater than 12 hrs from Decision time</td>
<td></td>
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<tr>
<td>Earliest Direct-To-Point (DTP) Decision Time for localities within the</td>
<td></td>
<td>Red= Decision time has passed</td>
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<tr>
<td>72 hr average forecast error cone?</td>
<td></td>
<td>Yellow= 12 Hrs or less to Decision time</td>
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<td></td>
</tr>
<tr>
<td>PAST DECISION TIME (2.25hrs) Va Beach</td>
<td></td>
<td>Green= Greater than 12 hrs from Decision time</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period of day when Forecast Track Decision Time for the above occurs</td>
<td></td>
<td>Red= 11PM to 6AM or 9AM to 4PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Probability of public emergency decisions being received and acted on)</td>
<td></td>
<td>Yellow= 4PM to 11PM</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2AM Fri</td>
<td></td>
<td>Green= 6AM to 9AM or 9AM to 4PM</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Hurricane Risk Profile (Local) for Va Beach County VA

**Tropical Cyclone:** HANNA  
**Advisory #** 34  
**Date/Time:** FRI 09/05/08 05 EDT

## C - Evacuation Characteristics

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
</tr>
</thead>
</table>
| Predicted forward speed over 72 hour forecast period or until landfall? Avg Forward Speed To Landfall 18 mph | Red= 25 MPH or greater  
Yellow= 15 to 25 MPH  
Green= Less than 15 MPH | ![Red](Warning)  
![Yellow](Caution)  
![Green](Information) |
| Clearance time for your locality (If non-HES risk locality then standard 6 hrs used) 22.25 hrs for Cat 1 Medium Occ / Medium Resp. | Red= Locality within 24 hrs or greater  
Yellow= Locality with 16 to 23 hrs  
Green= Less than 16 hours | ![Red](Warning)  
![Yellow](Caution)  
![Green](Information) |
| Number of hours until onset of Tropical Storm force winds on the forecast track...? 21 hrs | Red= Within 24 Hours  
Yellow= Between 24 and 36 hrs  
Green= Greater than 36 hrs or none | ![Red](Warning)  
![Yellow](Caution)  
![Green](Information) |
| Assuming a Direct-To-Point (DTP) track... Calculated Decision Time for this locality? PAST DECISION TIME( 2.25 hrs) | Red= Decision time has passed  
Yellow= Within 6 hrs of decision time  
Green= 12 hrs or greater from decision time | ![Red](Warning)  
![Yellow](Caution)  
![Green](Information) |
| Period of day when Decision Time for your locality occurs? 2 AM Fri | Red= 11PM to 6AM or 9AM to 4PM Mon-Fri  
Yellow= 4PM to 11PM  
Green= 6AM to 9AM or 9AM to 4PM Sat-Sun | ![Red](Warning)  
![Yellow](Caution)  
![Green](Information) |
### Hurricane Risk Profile (State) for Virginia

**Tropical Cyclone:** HANNA  
**Advisory #:** 34  
**Date/Time:** FRI 09/05/08 05 EDT

#### D - Other Considerations

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
</tr>
</thead>
</table>
| Inland extent of hurricane force winds based on MEOWs for forecast intensity and forward speed? (see References for MEOW) Coastal localities only | Red= Several Inland Localities  
Yellow= A few Inland Localities affected  
Green= Coastal Localities only | ![Critical](https://example.com)  
[![Of Concern](https://example.com)](https://example.com) |
| Special Events or Holiday Weekend Considerations? (+/- 1 week of Labor Day) | Red= Hurricane occurring within 1 week of July 4 or Labor Day Weekend  
Yellow= Hurricane occurring after July 4 week and before Labor Day Weekend or local special event  
Green= No holiday or special event | ![Critical](https://example.com)  
[![Of Concern](https://example.com)](https://example.com) |
## D - Other Considerations

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 If your county is within the 72 hr average error cone, what is the peak wind in your county based on MEDW's max(adjusted) forecast intensity and forward speed? (*see References for MEDW)</td>
<td>Red= Hurricane Force 64 knot(74mph) or greater&lt;br&gt;Yellow= 50 knots to 63 knots (58 to 73mph)&lt;br&gt;Green= less than 50 knots(58mph)</td>
<td>![Yellow]</td>
</tr>
<tr>
<td>2 Special Events or Holiday Weekend Considerations? +/- 1 week of LaborDay</td>
<td>Red= Hurricane occurring within 1 week of July 4 or Labor Day Weekend&lt;br&gt;Yellow= Hurricane occurring after July 4 week and before Labor Day Weekend or local special event&lt;br&gt;Green= No holiday or special event</td>
<td>![Red]</td>
</tr>
<tr>
<td>3 Which Virginia Regions are in the 72 hr Average Forecast Error Cone (Heavy coastal evacuation traffic likely)? (2) Coast / Central /</td>
<td>Red= Tidewater/Bay/EShore&lt;br&gt;Yellow= Central&lt;br&gt;Green= Western</td>
<td>![Red]</td>
</tr>
<tr>
<td>Criteria</td>
<td>Conditions</td>
<td>Indicator Level</td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
<td>----------------</td>
</tr>
<tr>
<td>1 Which Virginia Regions are in the 72 hr Average Forecast Error Cone? (2) Coast / Central / Tidewater/Say/EShore</td>
<td>Red= Central Yellow= Western Green=</td>
<td>R Y G</td>
</tr>
<tr>
<td>2 Is the hurricane forecast to be a Category 4 or 5 within 72 hrs or before landfall? Forecast Cat 1 or less</td>
<td>Red= Is now or forecast Cat4/5 Yellow= Forecast Cat3, BUT &gt; 48 hrs away so could intensify Green= Forecast only Cat 1/2</td>
<td>R Y G</td>
</tr>
<tr>
<td>3 Are there enough hours left before Trop Storm Winds to prepare and execute the I-64 Lane Reversal Option? 19 hrs left till TS Winds at 09/06/0612 AM</td>
<td>Red= Yes At least 48 hours Yellow= Maybe if storm slows (36 to 47 hrs) Green= No unless storm slows</td>
<td>R Y G</td>
</tr>
<tr>
<td>4 Are there at least 12 continuous hours of daylight after 24 hour mobilization and setup time? not enough time for Setup</td>
<td>Red= At least 12 daylight hrs after setup Yellow= Almost 9 to 11 hours Green= No. 8 or less hours</td>
<td>R Y G</td>
</tr>
</tbody>
</table>
### Risk Profile Summary (State) for Virginia

Tropical Cyclone: HANNA  
Advisory #: 34  
Date/Time: FRI 09/05/08 05 EDT

**Indicator Level:**
- ⚠️ = Critical
- ⚠️ = Of Concern

<table>
<thead>
<tr>
<th>Advy</th>
<th>Risk Area Definitive</th>
<th>Storm Intensity</th>
<th>Evacuation Characteristic</th>
<th>Other</th>
<th>One Way Characteristic</th>
<th>R</th>
<th>Y</th>
<th>G</th>
<th>C</th>
<th>Oc</th>
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<tbody>
<tr>
<td>34</td>
<td>⚠️ ⚠️ ⚠️ ⚠️ ⚠️ ⚠️</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
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<td>⚠️ ⚠️ ⚠️ ⚠️ ⚠️ ⚠️</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
<td>★1</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
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<td>2</td>
<td>15</td>
<td>1</td>
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<tr>
<td>23</td>
<td>⚠️ ⚠️ ⚠️ ⚠️ ⚠️ ⚠️</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
<td>★1</td>
<td>★1 ★1 ★1 ★1 ★1 ★1</td>
<td>6</td>
<td>2</td>
<td>15</td>
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</tr>
</tbody>
</table>
Risk Profile Summary (Local) for Va Beach County VA
Tropical Cyclone: HANNA  Advisory # 34  Date/Time: FRI 09/05/08 05 EDT

<table>
<thead>
<tr>
<th>Advisory</th>
<th>Risk Area Definition</th>
<th>Storm Intensity and Evacuation Character</th>
<th>Other Conditions</th>
<th>Y</th>
<th>G</th>
<th>Cr</th>
<th>Oc</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

Indicator Level: ▲ = Critical  □ = Of Concern
Florida Risk Profile

This series of images shows an example of the Risk Profile for Florida from Hurricane Ida Advisory #21 (2009).
# State and Local Topics

## Hurricane Risk Profile (State) for Florida

**Tropical Cyclone:** IDA  
**Advisory #:** 21  
**Date/Time:** SUN 11/08/09 22 EST

### A - Risk Area Definition

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
<th>R</th>
<th>Y</th>
<th>G</th>
</tr>
</thead>
</table>
| 1. Where is Florida located with respect to NHC 72hr or 120 hour average forecast error cone? In 25 hr Error Ellipse |                  | Red = Within 48 hours  
Yellow = Within 96 hours  
Green = >96 hrs or not in Error Cone | ![Critical]      | ![Of Concern] | ![Of Concern] |
| 2. Are NHC Watch or Warnings issued for Florida? Hurricane Warning |                  | Red = Hurricane Warning  
Yellow = TS Warning or Hurricane Watch  
Green = TS Watch or None | ![Critical]      | ![Of Concern] | ![Of Concern] |
| 3. Highest NHC 64kt wind probability for the Florida coastline? 18% (45% for 50kt, 86% for 34kt) PENSACOLA FL |                  | Red = Greater Than 18%  
Yellow = 11% to 18%  
Green = Less Than 11% | ![Critical]      | ![Of Concern] | ![Of Concern] |
| 4. Increase or decrease of maximum probability since last advisory? Increased 14% to 18% |                  | Red = Increased in Percent  
Yellow = Remained Same Percent  
Green = Decreased in Percent | ![Critical]      | ![Of Concern] | ![Of Concern] |
| 5. What is the forecast peak wind in Florida based on the 72 hour forecast track? 75 mph in Santa Rosa |                  | Red = Hurricane Force winds or greater  
Yellow = Between 58 mph and 74 mph  
Green = Less than 58 mph | ![Critical]      | ![Of Concern] | ![Of Concern] |
| 6. Compared to the previous 3 advisories, how is the current forecast track closest point of approach moving relative to Florida? On.m. -> 0-> 0> 0 |                  | Red = Consistently moving closer to Florida over at least 3 advisories  
Yellow = Inconsistent trend or moving closer to Florida last advisory  
Green = Consistently moving away from county over last 3 advisories | ![Critical]      | ![Of Concern] | ![Of Concern] |
# Hurricane Risk Profile (Local) for Santa Rosa County FL

**Tropical Cyclone:** ICA  
**Advisory #:** 21  
**Date/Time:** SUN 11/08/09 22 EST

## A - Risk Area Definition

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
</tr>
</thead>
</table>
| 1 Is this county within the NHC 120-hour average forecast error cone?  25 hours  
2 Are NHC Watches or Warnings in effect for your county OR if inland county... nearby coast?  
Hurricane Warning  
3 What is the NHC 64kt wind probability nearest your county? 17% for 64kt (43% for 50kt, 84% for 34kt)  
4 Have the wind probabilities nearest your county increased or decreased since the last advisory? Increased 14% to 17%  
5 Forecast peak wind in your county based on the 72-hour forecast track? 75 mph (65kt)  
6 Compared to the previous 3 advisories... how is the current forecast track? Closest Point of Approach...moving relative to your county's center? 36m.m. -> 26 -> 22 -> 19 | Red= Within 48 hours  
Yellow= Within 36 hours  
Green= >96 hrs or not in error cone  
Red= Hurricane Warning  
Yellow= TS Warning or Hurricane Watch  
Green= TS Watch or None  
Red= Greater than 18%  
Yellow= 11% to 18%  
Green= Less than 11%  
Red= Increased in percent  
Yellow= Remained same percent  
Green= Decreased in percent or <3%  
Red= Greater than 110 mph  
Yellow= Between 74 mph and 110 mph  
Green= Less than 74 mph  
Red= Consistently moving toward county over at least 3 advisories OR consistently close (50nm)  
Yellow= No Consistent trend  
Green= Consistently moving away from county over last 3 advisories OR consistently far (>300nm) | Yellow  
Yellow  
Green  
Yellow  
Green  
Green  
Green  
Yellow  
Green  
Green
### Hurricane Risk Profile (State) for Florida

**Tropical Cyclone: ICA**  **Advisory #: 21**  **Date/Time: SUN 11/08/09 22 EST**

#### B - Storm Intensity and Evacuation Scenario

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. What is the current intensity of the storm?</strong></td>
<td><strong>Cat 2 hurricane</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2. How is the storm intensity forecast to change before landfall?</strong></td>
<td><strong>No change</strong></td>
<td></td>
</tr>
<tr>
<td><strong>3. How close is the storm maximum forecast wind to the next highest Saffir/Simpson category?</strong></td>
<td><strong>7 mph from Cat 3</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4. Number of hours left for storm to intensify before landfall of eye on projected track?</strong></td>
<td><strong>72 hrs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>5. Planning assumption for determination of evacuation zones</strong> (Any red or yellow boxes in B3 or B4 above)?</td>
<td><strong>Yes, Evac Zones Up 1 to Cat 3</strong></td>
<td></td>
</tr>
<tr>
<td><strong>6. What is the tourist population in the region at risk (counties in the error cone)?</strong></td>
<td><strong>Medium</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Conditions</th>
<th>indicator Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Red</strong></td>
<td><strong>Yellow</strong></td>
</tr>
<tr>
<td>Major hurricane (Cat 3/4/5)</td>
<td>No increase in category</td>
</tr>
<tr>
<td>Hurricane (Cat 1 or 2)</td>
<td>Decrease in category</td>
</tr>
<tr>
<td>Tropical storm or lower</td>
<td></td>
</tr>
<tr>
<td>Increase in category</td>
<td></td>
</tr>
<tr>
<td>No increase in category</td>
<td></td>
</tr>
<tr>
<td>Within 5 mph of next category</td>
<td></td>
</tr>
<tr>
<td>Within 10 mph of next category</td>
<td></td>
</tr>
<tr>
<td>10 mph or more from next category</td>
<td></td>
</tr>
<tr>
<td>Yes... Assume evac zones one category higher</td>
<td></td>
</tr>
<tr>
<td>Not used</td>
<td></td>
</tr>
<tr>
<td>No... Evac zones remain same</td>
<td></td>
</tr>
<tr>
<td>High occupancy</td>
<td></td>
</tr>
<tr>
<td>Medium occupancy</td>
<td></td>
</tr>
<tr>
<td>Low occupancy</td>
<td></td>
</tr>
<tr>
<td>Criteria</td>
<td>Conditions</td>
</tr>
<tr>
<td>----------</td>
<td>------------</td>
</tr>
<tr>
<td><strong>Cat 2 hurricane</strong></td>
<td>Major hurricane (Cat 3/4/5)</td>
</tr>
<tr>
<td><strong>No change</strong></td>
<td>Increase in category</td>
</tr>
<tr>
<td><strong>7 mph from Cat 3</strong></td>
<td>Within 5 mph of next category</td>
</tr>
<tr>
<td><strong>72 hrs</strong></td>
<td>49 or more hours</td>
</tr>
<tr>
<td><strong>Yes...Assume evac zones one category higher</strong></td>
<td>High occupancy</td>
</tr>
<tr>
<td><strong>Evac Zones Up 1 to Cat 3</strong></td>
<td>Medium occupancy</td>
</tr>
<tr>
<td><strong>Low occupancy</strong></td>
<td>Not used</td>
</tr>
</tbody>
</table>
## Hurricane Risk Profile (State) for Florida

**Tropical Cyclone:** ICA  
**Advisory #:** 21  
**Date/Time:** SUN 11/08/09 22 EST

### C - Evacuation Characteristics

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Conditions</th>
<th>Indicator Level</th>
<th>Color</th>
</tr>
</thead>
</table>
| 1. Is the forward speed of the storm forecast to increase, decrease or stay same?  
   Decrease 5 to average 12 mph before CPA | Red= Increase  
   Yellow= Remain same  
   Green= Decrease | | |
| 2. Number of hours until onset of tropical storm force wind (33 mph) in Florida based on the forecast track  
   19 hrs in Escambia | Red= Within 24 hours  
   Yellow= Between 24 and 36 hours  
   Green= Greater than 36 hours or none | | |
| 3. Maximum clearance time for a Florida county within the NHC 72-hour average error cone?  
   Hillsborough 33.5 hrs for Cat 3 | Red= Greater than 24 hours  
   Yellow= Between 12 and 24 hours  
   Green= Less than 12 hours | | |
| 4. Earliest NHC Forecast Track (CPA) Decision Time for counties within the 72-hour average forecast error cone?  
   PAST DECISION TIME (6.2 hrs) Escambia | Red= Decision time has past  
   Yellow= 12 hours or less to decision time  
   Green= Greater than 12 hours to decision time | | |
| 5. Earliest Direct Hit Decision Time for counties within the 72-hour average forecast error cone?  
   PAST DECISION TIME (21.5 hrs) Manatee | Red= Decision time has past  
   Yellow= 12 hours or less to decision time  
   Green= Greater than 12 hours to decision time | | |
| 6. For the Florida county with earliest Decision Time...period of day when the decision time occurs?  
   12 AM Sun | Red= 11PM-6AM or 9AM-4PM  
   Yellow= 4PM-11PM  
   Green= 6AM-9AM or 9AM-4PM Sat-Sun | | |
**Hurricane Risk Profile (Local) for Santa Rosa County FL**

**Tropical Cyclone: IDA**  
**Advisory #: 21**  
**Date/Time: SUN 11/08/09 22 EST**

### C - Evacuation Characteristics

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
<th>R</th>
<th>Y</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Is the forward speed of the storm forecast to increase, decrease or stay same? Decrease-2 to average 15 mph before CPA</td>
<td>Red= Increase</td>
<td>Yellow= Remain same</td>
<td></td>
<td></td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>Green= Decrease</td>
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</tr>
<tr>
<td><strong>2.</strong> Number of hours until onset of tropical storm force winds (39 mph) in county based on the forecast track? 19 hrs</td>
<td>Red= Within 24 hours</td>
<td>Yellow= Between 24 and 36 hours</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Green= Greater than 36 hours or none</td>
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</tr>
<tr>
<td><strong>3.</strong> Greatest clearance time for county based on the maximum forecast intensity (as adjusted in Topic B)? 9 hrs for Cat 3 Medium Occ. / Medium Resp</td>
<td>Red= Greater than 24 hours</td>
<td>Yellow= Between 12 and 24 hours</td>
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<tr>
<td></td>
<td>Green= Less than 12 hours</td>
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<tr>
<td><strong>4.</strong> NHC Forecast Track (CPA) Decision Time for this county if within the 72-hour wind swath (Item 1 minus Item 2)? 10 hrs 11/09/09 7 AM</td>
<td>Red= Decision time has passed 12 hours or less to decision time</td>
<td>Yellow= Greater than 12 hours to decision time</td>
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<tr>
<td></td>
<td>Green= Less than 12 hours to decision time</td>
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<tr>
<td><strong>5.</strong> Assuming a Direct Hit track...what is the Decision Time for this county? 9 hrs 11/09/09 6 AM</td>
<td>Red= Decision time has passed 12 hours or less to decision time</td>
<td>Yellow= Greater than 12 hours to decision time</td>
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<td></td>
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<tr>
<td></td>
<td>Green= Less than 12 hours to decision time</td>
<td></td>
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</tr>
<tr>
<td><strong>6.</strong> Period of day when Decision Time for your county occurs? 6 AM Mon</td>
<td>Red= 11PM-6AM or 9AM-4PM Mon-Fri</td>
<td>Yellow= 4PM-11PM 6AM-9AM or 9AM-4PM Sat-Sun</td>
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</tbody>
</table>

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### Hurricane Risk Profile (State) for Florida

**Tropical Cyclone:** IDA  
**Advisory #:** 21  
**Date/Time:** SUN 11/08/09 22 EST

#### D - Other Considerations

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
<th>R</th>
<th>Y</th>
<th>G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greatest rainfall forecasted for a Florida county in the next 72 hours?</td>
<td></td>
<td>Red= Greater than 6 inches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data not available for advisory &gt; 24 hours old</td>
<td></td>
<td>Yellow= 3 to 6 inches</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Green= Less than 3 inches (or N/A)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>What is the maximum clearance time for a Florida county within the 120-hour forecast error cone?</td>
<td></td>
<td>Red= Greater than 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hillsborough 33.5 hrs for Cat 3</td>
<td></td>
<td>Yellow= Between 12 and 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green= Less than 12 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any special events or holiday weekend considerations in evacuation planning?</td>
<td></td>
<td>Red= around July 4 / Labor Day / DR</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>after Oct 20 high occupancy S/SW FL</td>
<td></td>
<td>Yellow= Oct 20: Nov 30 S or SW FL</td>
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<td></td>
<td></td>
<td>Green= after July 4 week to Labor Day</td>
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<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>No holiday or special event</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>What is the inland extent of hurricane force winds based on MEDV/s for (adjusted) forecast intensity and forward speed?</td>
<td></td>
<td>Red= Exit FL as hurricane</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extend to Inland Counties</td>
<td></td>
<td>Yellow= Extends to inland counties</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Green= Coastal Counties only</td>
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<td></td>
</tr>
<tr>
<td>Which Florida RIFC Regions are in the 72 hour average forecast error cone?</td>
<td></td>
<td>Red= SW / S / TPA Bay</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) W / Apalas / NCent / NE / Withla / ECent / Cent / TPABay / TreaCat /</td>
<td></td>
<td>Yellow= TreaCat / ECent / NW / W</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green= Withlacoo / NCent / Apalach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the state qualify for pre-landfall declaration?</td>
<td></td>
<td>Red= 3 or more counties in error cone and Cat storm major (3/4/5)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Likely.. 13 Counties with hurricane warning</td>
<td></td>
<td>Yellow= 3 to 6 counties in hurricane warning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Green= Less than 3 counties in hurricane warning</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### D - Other Considerations

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
<th>Red</th>
<th>Yellow</th>
<th>Green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of rainfall forecasted for this county in the next 72 hours?</td>
<td></td>
<td>Greater than 6 inches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data not available for advisory &gt; 24 hours old</td>
<td></td>
<td>3 to 6 inches</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less than 3 inches (or N/A)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the maximum clearance time for a Florida county within the 120-hour forecast error cone?</td>
<td></td>
<td>Greater than 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hillsborough 34 hrs for Cat 3</td>
<td></td>
<td>Between 12 and 24 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less than 12 hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are there any special events or holiday weekend considerations in evacuation planning?</td>
<td></td>
<td>Hurricane occurring within 1 week of July 4 or Labor Day Weekend</td>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>Alter Oct 20 high occupancy S/SW FL</td>
<td></td>
<td>Hurricane occurring after July 4 week...before Labor Day Weekend or local special event</td>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td></td>
<td></td>
<td>No holiday or special event</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do hurricane force winds normally reach this county in a storm with this strength and forward speed?</td>
<td></td>
<td>Hurricane force...64 kts (74 mph) or greater</td>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50 to 63 kts (58 to 73 mph)</td>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Less than 50 kts (58 mph) or not in error cone</td>
<td></td>
<td></td>
<td>!</td>
</tr>
<tr>
<td>Which Florida RPC Regions are in the 72-hour average forecast error cone?</td>
<td></td>
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### Hurricane Risk Profile (State) for Florida

**Tropical Cyclone:** IDA  
**Advisory #:** 21  
**Date/Time:** SUN 11/08/09 22 EST

#### E - One-Way Concerns

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Indicator Level</th>
<th>Conditions</th>
<th>R</th>
<th>Y</th>
<th>G</th>
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</table>
| 1. Is the hurricane forecast to be a Category 4 or 5 within 72 hrs or before landfall?  
*Forecast Cat 2* | Red= | Is now forecast Cat 4/5  
*Forecast Cat 3. BUT at least 48 hours away so could intensify*  
*Forecast only Cat 1/2* | | | |
| 2. Are Southeast, Southwest, Tampa Bay, Northeast or West in 72 hr hurricane Wind Swath?  
*West / [partial]* | Red= | Yes, entire RPC region or more than one region  
*Yes, one region is partially in hurricane wind swath*  
*None of the regions are in hurricane wind swath* | | | |
| 3. Are there enough hours left before tropical storm winds to prepare and execute the One-Way option in Florida?  
*11 hrs left till TS Winds at 11/09/09 5 PM* | Red= | Yes, at least 37 hours  
*Maybe if storm slows (30 to 36 hrs)*  
*No unless storm slows* | | | |
| 4. Are there at least 12 continuous hours of daylight after 25-hour setup time?  
*not enough time for Setup* | Red= | Yes, at least 12 daylight hours after setup  
*Almost, 9 to 11 hours*  
*No, less than 9 hours* | | | |
| 5. If One-Way setup is to be done WITH 12 HFS DAYLIGHT AFTER 25 hr setup...are we close to the required One-Way decision time?  
*38 hrs past OneWay Decision time at 11/07/09 8 AM* | Red= | Yes, within 2 hours of One-Way decision time  
*Yes, between 2 and 6 hours of One-Way decision time*  
*No, more than 6 hours from One-Way decision time* | | | |
State and Local Summaries

Risk Profile Summary (State) for Florida
Tropical Cyclone: IDA  Advisory #: 21  Date/Time: SUN 11/08/09 22 EST

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## Risk Profile Summary (Local) for Santa Rosa County FL

**Tropical Cyclone:** Ida  
**Advisory #:** 21  
**Date/Time:** SUN 11/08/09 22 EST

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Glossary

A

**actual track:** A line created from multiple advisories by connecting the storm center's initial position at each old advisory. Also referred to as the 'past track.'

**advisory:** A collection of various forecast products issued by the tropical cyclone forecast center on a single storm at a single point in time. Advisory packages are sequentially numbered and typically issued at 6 hour intervals. Additional advisories (intermediate A and sometimes A and B) are issued whenever watches or warnings are in effect.

**AHPS:** Advanced Hydrologic Prediction Service; a National Weather Service clearinghouse for various water forecasts and flood warnings.

B

**basins:** Oceanographic regions used to describe the general locations of tropical systems. Hurrevac2010 organizes tropical systems into the following basins: Atlantic, East Pacific, Central Pacific, West Pacific and North Indian Ocean, and South Pacific and South Indian Ocean.

**basins (SLOSH):** Local coastal regions delineated and mapped for storm surge modeling (SLOSH).

C

**closest point of approach:** This refers to the calculation by HURREVAC of the direction, distance, and time at which the storm will pass closest by a specified county. CPA calculations are based upon the official NHC forecast track. The parameters for your county are presumably near their peak at the Closest Point of Approach.

**CPHC:** Central Pacific Hurricane Center. This National Weather Service office, located in Honolulu, Hawaii, is responsible for tropical cyclone forecasts from 140 to 180 degrees West. It is the source of Central Pacific advisory data in HURREVAC.

D

**deterministic forecast:** A forecast presenting a single 'best guess' estimate without any representation of the likelihood of that outcome. The NHC's forecast advisory is deterministic.

**direct hit:** Scenario in which the storm center passes directly over the area specified. HURREVAC takes a straight-line direct hit approach to evacuation decision timing. That is, from the
time the advisory is issued, the storm is assumed to head straight for your county using the forecast speed from the NHC.

**direct to point:** see direct hit definition

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**E**

**evacuation clearance time:** The amount of time (number of hours) it takes to move a vulnerable population to safety. Hurricane Evacuation Studies determine these for an area based on various storm parameters and local conditions.

**evacuation start time:** The last possible time at which an evacuation of the prescribed scenario should be started to allow sufficient time to complete the relocation of the vulnerable population before tropical storm winds begin.

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**F**

**FEMA:** Federal Emergency Management Agency

**forecast period:** Length of forecast. Beginning at synoptic time, tropical cyclone tracks are forecasted to 120 hours (5 days), while wind extents are forecasted only to 72 hours (3 days).

**forecast track:** A line created for a single advisory by connecting the storm center’s initial position with its 12, 24, 36, 48, 72, 96, and 120-hour forecast positions.

**forward speed:** Speed at which the storm center is moving along either its forecast or actual track.

**fringe winds:** Winds of 34kts (tropical storm strength) or greater surrounding the storm’s core.

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**G**

**GIS:** Geographic Information System; a class of software programs that manipulate, analyze, and present map-based information. HURREVAC includes a GIS Export Tool for transferring storm related information into GIS programs.

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**H**

**HES:** Hurricane Evacuation Study; a program of FEMA and USACE to assist local emergency managers in determining who should evacuate when a hurricane threatens and when they should leave.

**hurricane:** A tropical system with maximum sustained winds greater than 64 knots (74 mph). Term used for systems occurring in the Atlantic, East Pacific, and Central Pacific basins.
**initial position:** Position of the storm center at the time of advisory issuance.

**intensity:** Synonomous with 'maximum sustained winds' or SS Category.

**J**

**JTWC:** Joint Typhoon Warning Center. This US Navy office, located on the Naval Base at Pearl Harbor in Hawaii, is responsible for all tropical cyclone forecasts west of 180 degrees. It is the source of West Pacific, South Pacific, and Indian Ocean advisory data in HURREVAC.

**M**

**MEOW (surge):** Maximum Envelope of Water is a SLOSH model output describing the maximum storm surge value produced by parallel tracks of storms with the same forward speed, strength, and angle of approach.

**MEOW (wind):** Maximum Envelope of Winds is a wind decay model describing the maximum distance certain categories of wind can penetrate inland given the storm strength and forward speed.

**MOM:** Maximum of Maximums is a SLOSH model output describing the maximum storm surge value produced by storms of a single Safir Simpson category, taking into account all angles of approach and forward speeds.

**N**

**NHC:** National Hurricane Center. This National Weather Service office, located in Miami, FL, is responsible for tropical cyclone forecasts for the Atlantic and East Pacific (to 140 degrees West). It is the source of Atlantic and East Pacific advisory data in HURREVAC.

**NOAA:** National Oceanic and Atmospheric Administration; parent organization to the National Weather Service (NWS).

**NWS:** National Weather Service; the official US government agency for weather, hydrologic, and climate forecasts.

**P**

**past track:** A line created from multiple advisories by connecting the storm center's initial position at each old advisory. Also referred to as the 'actual track.'

**probabilistic forecast:** A forecast presenting the likelihood of various outcomes. The NHC's Wind Probabilities is probabilistic.

**S**

**SLOSH:** Sea, Lake, and Overland Surge from Hurricanes; the official storm surge model of the National Hurricane Center.
**state plug-ins:** State-specific data necessary for certain HURREVAC operations such as evacuation decision timing. After initial program installation, plug-ins must be added using Hurrevac2010’s Setup Panel.

**STM file:** HURREVAC’s native file format for storing all forecast advisory information from a single storm.

**storm category:** Saffir-Simpson Hurricane Wind Scale, a 1 to 5 ranking of hurricane wind strength where categories 3, 4, and 5 are considered ‘major’ hurricanes.

**synoptic time:** Time that data is collected. Weather data is collected around the world at 00 Zulu, 06 Zulu, 12 Zulu, and 18 Zulu. Zulu is also known as GMT or UTC time.

**T**

**tropical cyclone:** Generic term for hurricanes and typhoons—tropical systems with maximum sustained winds greater than 64 knots (74 mph). Indian Ocean and South Pacific basin systems are typically referred to as topical cyclones.

**tropical depression:** A tropical system with maximum sustained winds of less than 34 knots (39 mph).

**tropical storm:** A tropical system with maximum sustained winds greater than 34 knots (39 mph) but less than 64 knots (74 mph).

**typhoon:** A tropical system with maximum sustained winds greater than 64 knots (74 mph). Term used for systems occurring in the West Pacific basin.

**U**

**USACE:** Abbreviation for US Army Corps of Engineers

**W**

**warning:** A hurricane or tropical storm warning means that those conditions could affect the area within 24 hours.

**watch:** A hurricane or tropical storm watch means that those conditions could affect the area within 36 hours.

**wind ranges:** The extent of 34kt, 50kt, and 64kt winds surrounding the storm center. Advisories from NHC, CPHC, and JTWC provide wind extents by quadrant (NE, SE, SW, NW) for the initial position and 12, 24, 36, 48, and 72-hour forecast positions.

**WPC:** Weather Prediction Center (formerly known as the Hydrometeorological Prediction Center), a National Weather Service office that prepares maps and forecast guidance products related to precipitatio