

HURREVAC PROGRAM FIVE-YEAR STRATEGIC PLAN

Baltimore, MD
August 2008



Prepared for: Federal Emergency Management Agency
National Hurricane Program

Prepared by: Planning Center of Expertise
for Coastal Storm Damage Reduction
National Hurricane Program Office
North Atlantic Division/Baltimore District



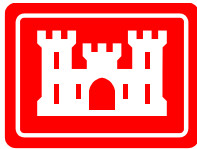
FEMA



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FINAL

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1. HURREVAC PROGRAM OVERVIEW

HURREVAC (short for Hurricane Evacuation) is a storm tracking and decision assistance computer software tool for government emergency managers. The program tracks hurricanes, using the National Weather Service's National Hurricane Center Forecast/Advisory product, and combines this information with data from the various state Hurricane Evacuation Studies (HES) to assist local emergency managers in determining a proper evacuation decision time and the arrival time of various storm effects such as wind and storm surge.

1.1. Program Funding and Administration

HURREVAC is a joint program of the Federal Emergency Management Agency (FEMA) and the U.S. Army Corps of Engineers (USACE). Private contractors Dewberry and Sea Island Software are 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.

1.2. History

The HURREVAC program began in 1988 with a grant from FEMA Region IV to the South Carolina Emergency Management Agency. With the initial grant, a DOS-based tool called 'Decide' that had been developed by John Townsend of the Charleston Office of the National Weather Service (NWS) was expanded for use by state and local emergency managers. The first major use of the HURREVAC software came in 1989 during Hurricane Hugo in South Carolina and Georgia.

Iterations of this early DOS-based program were eventually developed for 13 states, the U.S. Virgin Islands and Puerto Rico. Because the program uses evacuation clearance times specific to a community, large portions of the program had to be designed specifically for each area and had to await data from a federal Hurricane Evacuation Study (HES) for the area in question.

In 1998, Sea Island Software released a new version of HURREVAC, dubbed HurWin95 for the Windows 95/98/NT platform. HurWin95 incorporated features developed over the previous 10 years in HURREVAC and HURREVAC Inland Winds (1994) and could be generically utilized by all states and counties. State and local customization could be accomplished by installing specific data and map plug-ins along with the main program.

In 2000, HURREVAC2000 was introduced. This upgrade added the NWS official 3-day rainfall forecasts and the capability to track tropical cyclones in the East and Central Pacific. Over the next 8 years, other functions were added to the HURREVAC2000 program platform, including West and South Pacific tracking capability, NOAA-funded river gage, tide gage, and SLOSH components and numerous other enhancements.

1.3. Current Status

1.3.1. Program Position

HURREVAC has been widely adopted in federal, state, and local government emergency management. The program has more than 7,000 registered users; however, in actual practice there are likely two or three times as many users, since registration is only required of one contact person per site. HURREVAC is generally regarded as an indispensable tool for monitoring hurricane threats and determining evacuation and other operational decision deadlines.

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. Commercial products are available to the private sector that contain many similar storm tracking and timing functions. Some government emergency managers subscribe to both HURREVAC and these other decision assistance software programs, but the vast majority use HURREVAC exclusively.

Emergency managers also utilize several other federally-funded software tools that are similarly tied to hurricane threat assessment. HURREVAC and these programs currently complement one another, with very little overlap in function.

1. **HAZUS** is FEMA's multi-hazards loss estimation tool. The program is built upon ESRI's ArcGIS software and employs large datasets of regional and local data. The HAZUS Hurricane Winds module can be used to estimate economic and other losses based upon hypothetical, historical, and live storm scenarios. HAZUS imports hurricane wind extents from STM files that are a part of HURREVAC's live datafeed of NHC forecast/advisories.
2. **SLOSH (Sea, Lake, and Overland Surge from Hurricanes)** is a storm surge model employed by NOAA. The SLOSH Display Program is distributed to emergency managers to illustrate surge build-up over time from landfalling storms as well as worst-case storm surge (Maximum Envelope of Water-MEOWS and Maximum of Maximums-MOMS) from numerous model runs of hypothetical storms. SLOSH is used as the basis of the Hazards Analysis in the Hurricane Evacuation Study (HES) process which ultimately determines evacuation clearance times for HURREVAC's computations. Additionally, HURREVAC has the capability of displaying real-time SLOSH model output as an added component of its tide charts.

1.3.2. Program Strengths and Core Functions

HURREVAC's long and successful history is largely attributed to its ease-of-use and the critical nature of the decision timing functions of the program.

Usability - Storm tracking is a straightforward operation: One click to the DATA download button and the latest forecast/advisory for a storm is plotted on the map. Storm and map manipulations such as zooming/panning and moving the storm along its forecast track are simple

to operate. Map annotation, storm track labeling, and legend display can be quickly configured for briefing purposes.

HURREVAC can accommodate users with only basic computer skills and works well on most all Windows computer, including dated systems still running Windows95.

Decision Timing - In an evacuation decision timing calculation, HURREVAC subtracts the number of hours contained in a county's evacuation clearance time (projected by the HES study) from the computed arrival time for tropical storm force winds. It then reports an Evacuation Decision Time, which is the deadline for decision-making and possible initiation of an evacuation. Local emergency managers rely on HURREVAC to make this critical calculation. This Evacuation Decision Time is not provided by any program other than HURREVAC.

1.3.3. Program Challenges and Weaknesses

Funding - One of HURREVAC's biggest challenges throughout its 20-year history has been a lack of regular and adequate funding. The 2007/8 budget contained a significant increase in program funding to accommodate the migration to VB.NET and various other new initiatives. Prior to that, however, annual funding was consistently below \$200,000 and even lapsed for a 4-month period in 2003.

Due to these budgetary constraints, Sea Island Software has only two full-time staff dedicated to the program for user tech support, software coding, datafeed maintenance, etc. Additional backup personnel with full working knowledge of the operation are needed and training of such personnel is currently underway during the 2007/8 season.

Technology – HURREVAC must be continually modified and completely rewritten every 10 years or so in order to keep pace with changes in computer operating systems, programming environments, and the NWS's forecast products and file formats.

Currently, the most pressing technology challenge is the need to migrate the program code from Visual Basic 5, for which Microsoft is phasing out support, to Visual Basic.NET (VB.NET). Migrating to VB.NET is a labor-intensive process that requires altering numerous program variables and routines. This migration is currently underway in a two-phased process that will port all of the current functions of HURREVAC2000 over to VB.NET platform in a new program entitled HURREVAC2010.

Forecast product changes have also necessitated the need for occasional modifications to HURREVAC. In 2006, NWS switched to an XML format for river gage data and HURREVAC's datafeed had to be modified to digest this new format. Since XML is far more verbose than the previous tabbed-text format, an additional server had to be added to the datafeed system in order to process data from the roughly 1,000 river gages covered by the HURREVAC program. In another example, both the datafeed and HURREVAC desktop program required modifications a few years ago when the NHC switched from strike probabilities to wind probabilities.

Program Complexity – The complexity of both the HURREVAC software and the datafeed have grown tremendously over the past 20 years. While new features have been welcome

enhancements to the program, they also have potential downsides. Some new HURREVAC users have reported being overwhelmed by the number of functions in the software and many only use a fraction of the program's full capability. Also, the software maintenance requirements have increased because the desktop application has grown to over 80,000 lines of code and the datafeed software to over 18,000 lines of code.

HURREVAC Training – FEMA and USACE were able to fund and complete multiple HURREVAC training courses from Texas to New York including Puerto Rico between April 2008 and July 2008. Training to support the current and future HURREVAC will need to occur on an annual basis in the spring time frame to assist State and local emergency managers' preparations for the upcoming hurricane season.

1.4. Summary of the HURREVAC Users Survey

Late in 2007, registered users were invited to participate in an online survey regarding their experience with the current Hurrevac2000 software, plus desires for changes and added functionality in future versions of the program. The questionnaire asked users to rate various aspects of Hurrevac operation and allowed for free-form text responses as well. The online survey generated responses from 1,236 Hurrevac users.

Additionally, a 'Hurrevac Focus Group' consisting of approximately 40 core users and key stakeholders in the Hurrevac program was established. This group held initial meetings on November 1, 2007 via a web-based forum to initiate dialogue on all aspects of the program's future. The Hurrevac Focus Group will continue to meet and participate in online discussions as the revision and upgrade of Hurrevac progresses.

Many survey participants left favorable comments regarding the current features of Hurrevac. A common thread was seen throughout, which one user summed up as *"I think it's a great program; I hope any new additions -- while welcome -- won't dramatically increase the complexity of the software. Its simplicity is part of its usefulness."*

Members of the Hurrevac Focus Group also echoed this sentiment during their initial teleconference and online discussions. They stressed that Hurrevac is primarily a tool for the local government emergency manager and should never lose that focus. The group also concluded that far more should be done in terms of user training—a point that is driven home by the number of survey respondents who stated that they don't use and/or understand many of Hurrevac's What-If and Timing functions.

Overall, users seemed enthusiastic about having new and improved features incorporated into future versions of Hurrevac and agreed that the program must evolve to keep pace with changing computer technologies.

2. MISSION AND VISION FOR HURREVAC

Mission and vision statements for HURREVAC have been developed to provide the program with clear context and direction. Goals and objectives outlined in the final section of this document will serve to further the program's mission and vision.

2.1. Mission Statement

“The primary mission of the HURREVAC program is to assist emergency managers in making timely decisions for communities under threat from a hurricane or tropical storm.”

The program shall accomplish this mission by providing emergency managers with tools and training to: 1) monitor potential wind, surge, and flooding threats from approaching tropical cyclones; and 2) determine key decision deadlines based on FEMA/USACE Hurricane Evacuation Study clearance times and other community preparation/planning benchmarks.

2.2. Vision Statement

“The vision for HURREVAC is a program that is user-friendly, comprehensive in scope of hurricane threat assessment and decision timing and is utilized to assist emergency management decision makers at all levels of Government.”

2.3. Program Goals and Objectives

The following is a detailed list of HURREVAC Program goals and objectives for the next five years (2008 – 2013). Implementation of many of these goals will only be feasible, if additional agency resources are committed to the program. Rough estimates are provided for costs of objectives not already included in the current contract for HURREVAC modernization.

2.3.1. Goal #1: Improve Training and User Support

Expand HURREVAC's training programs and help system to ensure that users are getting full use of the program's functionality.

Objective 1.1 – Increase HURREVAC Training (Priority: HIGH)

Increase the number of onsite training sessions prior to the start of each hurricane season. In-depth training should include storm scenario exercises in which participants practice tracking a storm and making decisions based on program analysis and the use of the FEMA/USACE study products and outputs.

Objective 1.2 – Offer Internet Based Training (Priority: HIGH)

Develop a robust, distance learning-interactive training module to supplement training needs.

Objective 1.3 – Improve the Help Function in HURREVAC (Priority: MEDIUM)

Integrate a more comprehensive and interactive help system into future version of the program. The main help system should be internet-based so that edits can be made without the need to distribute new versions to all users. Within the software, tool tips and wizards should be developed that direct the user to logical 'next steps' or 'other considerations.'

Objective 1.4 – Improve HURREVAC Website (Priority: LOW)

Overhaul the support website (www.hurrevac.com) to include discussion forums for user input and collaboration.

2.3.2. Goal #2: Complete HURREVAC Software Modernization

Make enhancements to HURREVAC to modernize and improve program usability as part of Phases 1 and 2 of the migration to VB.NET.

Objective 2.1 – Develop a New Data Distribution System (Priority: HIGH)

Develop a new data distribution system for HURREVAC that is more robust and user friendly. The new system should be based on http protocols, rather than FTP that has been problematic for HURREVAC users in restrictive networks. This would eliminate many of the security issues surrounding the use of the FTP process. Future versions of HURREVAC should provide users with the option to automatically receive data of interest and be alerted of its availability.

Objective 2.2 – Streamline the Program Installation Process (Priority: MEDIUM)

Streamline HURREVAC's installation, setup, and customization procedures into a single wizard-driven installation process. All necessary evacuation data and map plug-ins should be automatically installed along with the core program based on the users' indication of their area of interest.

Objective 2.3 – Create User-Friendly Analysis Functions (Priority: HIGH)

Retool HURREVAC's What-If and Timing functions to be more intuitive to operate and interpret results. 'Local Areas of Interest' and Decision Time Alert' settings should be more obviously integrated into the menus and tools for these functions. Tabular reports generated by these functions should include more explanatory text and legends for colors and symbols used within.

2.3.3. Goal #3: Transition to New HURREVAC

Provide users with a smooth transition from HURREVAC2000 to HURREVAC2010

Objective 3.1 – Promote HURREVAC2010 (Priority: MEDIUM)

Develop and implement a promotional plan for the new program version. The plan should include a series of e-mail communications with registered users to explain program enhancements/changes, training options, and the implementation schedule for HURREVAC2010. Additional documentation (FAQs, program screenshots, etc.) should be posted on the support website (www.hurrevac.com). This promotional campaign should commence well in advance of HURREVAC2010 release dates.

Objective 3.2 – Release Beta Version HURREVAC2010 (Priority: HIGH)

Release a beta version of HURREVAC2010 during the 2009 hurricane season. The beta version should be rolled out in phases, with a small group of users invited to participate initially followed by a full release to all registered users. Hurrevac2000 will need to run concurrently with the new beta version.

Objective 3.3 – Release Final Version HURREVAC2010 (Priority: HIGH)

Release an operational version of HURREVAC2010 in advance of the 2010 hurricane season. Users may opt to discontinue use of HURREVAC2000 at this time, although datafeed and support for this program version will continue for at least one year. HURREVAC2000 will not be supported during the 2011 hurricane season.

Objective 3.4 – Create and Administer a Transitional Training Plan (Priority: HIGH)

Develop a transitional training plan to assist users in making the switch to the new HURREVAC program. At a minimum the training plan should incorporate the following tasks:

- Develop a training curriculum with all appropriate training materials (i.e., presentations, student training guide, instructor training guide, and online training application). This training material should be in a distributable format such as a video or online tutorial in order to reach the greatest number of users.
- The first round of HURREVAC2010 transitional training should occur immediately prior to the beta version release to the selected user group. The second round of HURREVAC2010 transitional training should occur starting January 2010 until July 2010.

2.3.4. Goal #4: Continual HURREVAC Software Enhancements

Add capacity for new program features as part of Phases 1 and 2 of the migration to VB.NET. Prioritize and implement these new features as funding allows following initial release of HURREVAC2010.

Objective 4.1 – Enhance HURREVAC GIS Capabilities (Priority: MEDIUM)

Enhance HURREVAC's interoperability with GIS programs through expansion of its data input and output capabilities. Export of storm track and windfield data to shapefile format should be a one-step process that creates a package of data layers. A significant new feature would be to allow users to import their own point, line, polygon, and raster (i.e., image and grid formats) GIS data for overlay on HURREVAC's basemaps. Certain imported data (shelter, critical facility and other facilities locations, as well as demographic data, for example) could possibly be included in program for additional analyses. Use of the U.S. National Grid as a data layer should be considered.

Objective 4.2 – Expand HURREVAC's Analysis and Reporting Capabilities (Priority: MEDIUM)

Executive or summary reports are recommended that would combine output from multiple What-If and Timing functions. Timeline options should be expanded to handle action items from operations plans of multiple counties, facilities, and organizational units.

Objective 4.3 – Incorporate Additional NHC Products into HURREVAC (Priority: MEDIUM)

Current products to be considered include wind and surge probability regions, the graphical tropical outlook, guidance model tracks, and satellite images.

Objective 4.4 – Integrate Additional Information from the Comprehensive Hurricane Emergency Management Studies (CHEMS) into HURREVAC's State Plug-Ins (Priority: MEDIUM)

Users should have the option to display local area data such as storm surge inundation and evacuation zones from their HES directly on HURREVAC's tracking map. Documentation from the studies could also be build directly into HURREVAC. For example, if a user clicked on a single clearance time matrix, a description of that particular storm scenario would appear.

2.3.5. Goal #5: HURREVAC Program Visibility

Boost HURREVAC's visibility and legitimacy as a vital FEMA/USACE program.

Objective 5.1 – Maintain HURREVAC Funding (Priority: HIGH)

Establish avenues of regular funding for annual maintenance and operation of the program and to provide program enhancements as needed.

Objective 5.2 – Review and Update Strategic Plan (Priority: LOW)

Fully document and report on the HURREVAC Program. Continue to update the strategic plan as necessary to document completed and newly added objectives.

Objective 5.3 – Improve Back-Up Capability (Priority: MEDIUM)

Provide an annual training event to train existing and additional personnel (as needed) to have full working knowledge of the program's datafeed and other support duties. Similar to the training in March 2008, the training session should be provided to federal (USACE/FEMA) and

private (Dewberry and Sea Island Software) personnel. Also, it is highly recommended that the trained federal and private personnel be given an opportunity throughout the hurricane season to practice their ability to maintain the data feed.

2.3.6. Summary Table

Goal	Objective (*)
Goal 1: Improve Training and User Support	<i>1.1 – Increase HURREVAC Training(1)</i>
	<i>1.2 – Offer Internet Based Training(1)</i>
	<i>1.3 – Improve the Help Function in HURREVAC(2)</i>
	<i>1.4 – Improve HURREVAC Website(3)</i>
Goal 2: Complete HURREVAC Software Modernization	<i>2.1 – Develop a New Data Distribution System(1)</i>
	<i>2.2 – Streamline the Program Installation Process(2)</i>
	<i>2.3 – Create User-Friendly Analysis Functions(1)</i>
Goal 3: Transition to New HURREVAC	<i>3.1 – Promote HURREVAC2010(2)</i>
	<i>3.2 – Release Beta Version HURREVAC2010(1)</i>
	<i>3.3 – Release Final Version HURREVAC2010(1)</i>
	<i>3.4 – Create and Administer a Transitional Training Plan(1)</i>
Goal 4: Continual HURREVAC Software Enhancements	<i>4.1 – Enhance HURREVAC GIS Capabilities(2)</i>
	<i>4.2 – Expand HURREVAC’s Analysis and Reporting Capabilities(2)</i>
	<i>4.3 – Incorporate Additional NHC Products into HURREVAC(2)</i>
	<i>4.4 – Integrate Additional Information from the Comprehensive Hurricane Emergency Management Studies (CHEMS) into HURREVAC’s State Plug-Ins (2)</i>
Goal 5: HURREVAC Program Visibility	<i>5.1 – Maintain HURREVAC Funding (1)</i>
	<i>5.2 – Review and Update Strategic Plan(3)</i>
	<i>5.3 – Improve Back-Up Capability(2)</i>

* Includes a priority ranking of HIGH(1), MEDIUM(3), or LOW(3)