

# NATIONAL HURRICANE PROGRAM FACTBOOK



**FEMA**



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NATIONAL HURRICANE PROGRAM

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# National Hurricane Program Overview

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The National Hurricane Program (NHP) provides tools, training, and technical assistance to state, local, tribal, and territorial (SLTT) and federal government partners. Technical assistance is focused on hurricane evacuation and response, spanning from steady-state deliberate planning to operational decision support and crisis action planning when hurricanes threaten the United States.

## Authority

The Robert T. Stafford Disaster Relief and Emergency Assistance Act and the Post-Katrina Emergency Management Reform Act (PKEMRA Section 632) include the authorization language for the NHP. It authorizes and mandates FEMA to “provide evacuation preparedness technical assistance to state, local, and tribal governments, including the preparation of hurricane evacuation studies and technical assistance in developing evacuation plans, assessing storm surge estimates, evacuation zones, evacuation clearance times, transportation capacity, and shelter capacity.” While the primary focus of the technical assistance is in support of SLTT governments as required by the authorizing language, the NHP also supports federal planning and decision-making.

## Goals

The NHP has three main goals designed to meet the requirements of the legislative mandates:

- Provide data, resources, and technical assistance to support hurricane evacuation and response planning.
- Deliver comprehensive hurricane preparedness training to emergency managers and partners.
- Provide operational tools, information, and technical assistance to emergency managers to support their hurricane evacuation and response decisions during hurricane threats.

## Organizational Structure

The NHP is an interagency partnership, administered by FEMA with significant contributions from the U.S. Army Corps of Engineers (USACE) and the National Oceanic and Atmospheric Administration (NOAA) National Hurricane Center (NHC). FEMA provides an annual NHP budget to conduct mandated activities. USACE and NHC also contribute funding, staff time, and in-kind services that allow the NHP to greatly expand its impact. The three federal partners work together, with one mission, to save lives.



## Components

The NHP consists of seven major components to deliver on the three program goals:

- **Storm Surge Risk Products:** Sea, Lake, and Overland Surge from Hurricanes (SLOSH) storm surge modeling and associated planning and operational risk products identify areas at risk of storm surge flooding from hurricanes. SLOSH products are developed under an interagency agreement with NHC.
- **Hurricane Evacuation Studies and Evacuation Planning:** Hurricane Evacuation Studies (HES) provide critical planning factors and information that guide hurricane evacuation and response plans. These studies are produced under an interagency agreement with USACE.
- **Hurricane Decision Support Tool:** **HURREVAC** (<https://hurrevac.com/>) is free web-based platform available to government emergency managers and provides evacuation timing guidance. HURREVAC combines real-time NHC forecast products and storm surge modeling with evacuation clearance times from HES. HURREVAC operation, maintenance, and training are conducted under an interagency agreement with USACE.
- **Hurricane Preparedness Training for Emergency Managers:** NHP conducts a suite of Emergency Management Institute (EMI) training courses for emergency managers on hurricane preparedness and decision making. Training curriculum and instruction are provided by FEMA, USACE and NHC program staff. In addition, NHP provides training on the HURREVAC decision support tool.
- **Hurricane Liaison Team Operational Decision Support:** FEMA Hurricane Liaison Team (HLT) is the operational component of the NHP and facilitates the rapid exchange of forecast and risk information between the NHC and the emergency management community. The team assists emergency managers with the application of forecast products and risk information, HES information, and HURREVAC and other decision support tools during a hurricane threat.
- **Stakeholder Engagement:** NHP engages intergovernmental stakeholders to coordinate hurricane evacuation planning and response efforts. The Interagency Coordinating Committee on Hurricanes (ICCOH) is the primary mechanism for coordinating NHP goals, components, and priorities with SLTT partners.
- **Post-Storm Assessment:** Post-storm assessments can be used to evaluate the accuracy and usefulness of the NHP tools, products, and operational support to emergency managers. Assessment results are used to guide future improvements to the NHP.
- **For more information about the National Hurricane Program, visit [Hurricane Planning and Response | FEMA.gov](#) or email [NHP@fema.dhs.gov](mailto:NHP@fema.dhs.gov).**

# Storm Surge Risk Products

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Among NHP decision support tools is storm surge model development and risk products suite. The modeling helps identify areas at risk of storm surge inundation from tropical cyclones – critical information for planning and making operational evacuation decisions. Storm surge planning scenarios and operational storm surge products are available in HURREVAC.

## Planning: SLOSH MEOWs and MOMs

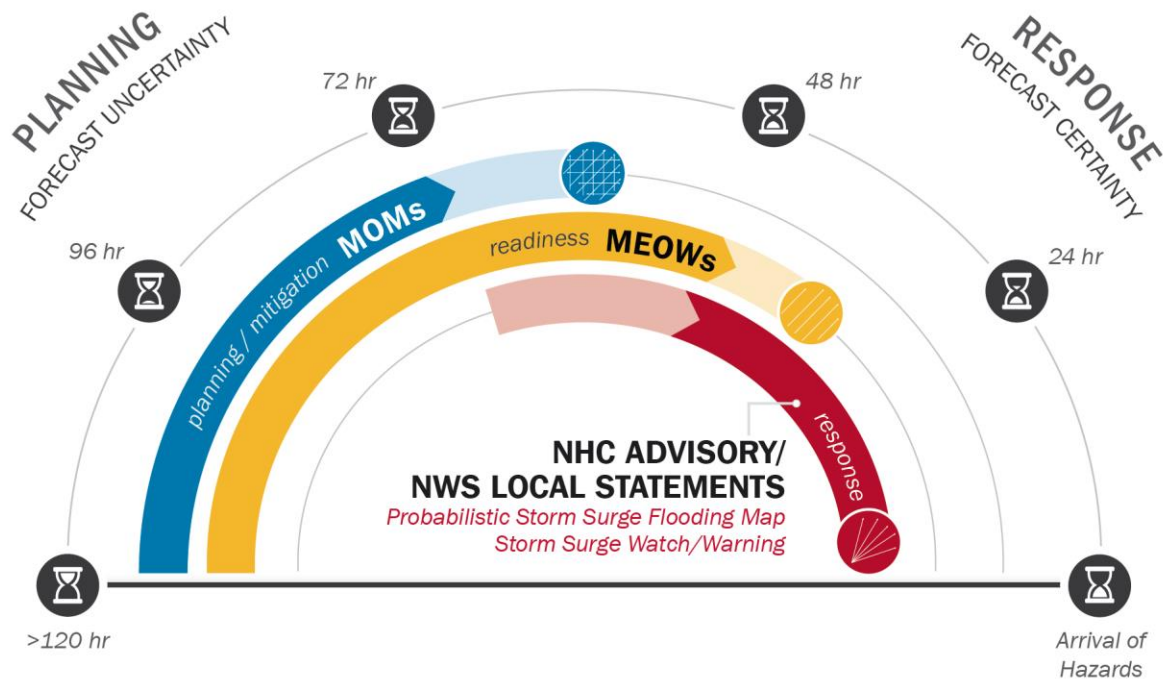
The SLOSH storm surge model and associated risk products are developed by NOAA NHC, an NHP partner, SLOSH output products help decision makers plan for hurricanes by estimating the potential extent and height of inundation from storm surge. The SLOSH model simulates many hurricane scenarios with various angles of approach, Saffir-Simpson categories, forward speeds, sizes, and tide levels. Each modeling run generates an envelope of high water showing the maximum inundation for each location within a coastal region called a basin. A product called Maximum Envelope of Water (MEOW) reflects the reasonable worst-case flooding potential for a particular combination of category, forward speed, and direction. Each MEOW incorporates many possible landfall locations. All MEOWs for a single category are then composited into a Maximum of MEOWs (MOM). MOMs serve as a long-range planning tool for assessing the worst-case storm surge for a given category at any location.

Through the NHP partnership, NHC develops MEOWs and MOMs for emergency managers to use in planning, training, and exercises. SLOSH output is available for the entire Atlantic and Gulf coastlines of the United States, along with Southern California, Hawaii, American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands.

## Operational Support

As a tropical cyclone approaches, decision-makers can use operational (real-time) inundation products to inform their risk assessment and decision-making. MOMs and MEOWs are not storm-specific but may be considered when the arrival of hazards is more than 48–72 hours away (see Figure 1). As forecast certainty increases, NHC uses SLOSH modelling to generate Potential Storm Surge Flooding map layers that show a reasonable worst-case inundation scenario based on current data. Storm Surge Watches and Warnings and Potential Storm Surge Flooding Maps are released by the NHC concurrently with hurricane watches and warnings. NHC advisories and products from local National Weather Service (NWS) offices also provide important details about expected storm surge hazards.





**Figure 1: Understanding When to Use SLOSH Risk Products**

## Storm Surge Explorer

HURREVAC contains several tools for evaluating the entire suite of storm surge risk products. In the Storm Surge (SLOSH) Explorer, users can view the National MOMs or create and blend MEOWs by selecting storm parameters. SLOSH layers can be exported for further analysis in GIS software. HURREVAC’s Surge Viewer allows MEOWs for a particular location to be analyzed in chart form by right-clicking on the map. Operational storm surge products (Storm Surge Watches and Warnings and Potential Storm Surge Flooding maps) can be found in the Storm Tools bar to the left of the tracking map. Potential Storm Surge Flooding requires additional processing time and is typically available in HURREVAC 45 minutes to one hour following the regular advisory time. Users can also apply custom labels to surge-related map layers by right-clicking to place Surge Flags. Learn more about these products and tools in the HURREVAC User Guide.

Storm Surge Risk Products create valuable inputs for additional NHP components. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

For more information about the National Hurricane Program, visit [Hurricane Planning and Response | FEMA.gov](https://www.fema.gov/hurricane-planning-and-response) or email [NHP@fema.dhs.gov](mailto:NHP@fema.dhs.gov).

# Hurricane Evacuation Studies and Evacuation Planning

HESs assess the vulnerability of a population to hurricane threats and provide information and critical planning factors that guide SLTT governments in hurricane evacuation and response plans. These critical planning factors support the NHP mission of using analytics to support informed decision making and saving lives.

The NHP provides technical assistance in partnership with USACE to conduct HES in more than 20 hurricane prone states and territories. HES are federally supported, state-managed, and locally-executed. The key to a successful HES is that it is coordinated and informed by state and local data, analysis, and expertise.

## HES Components

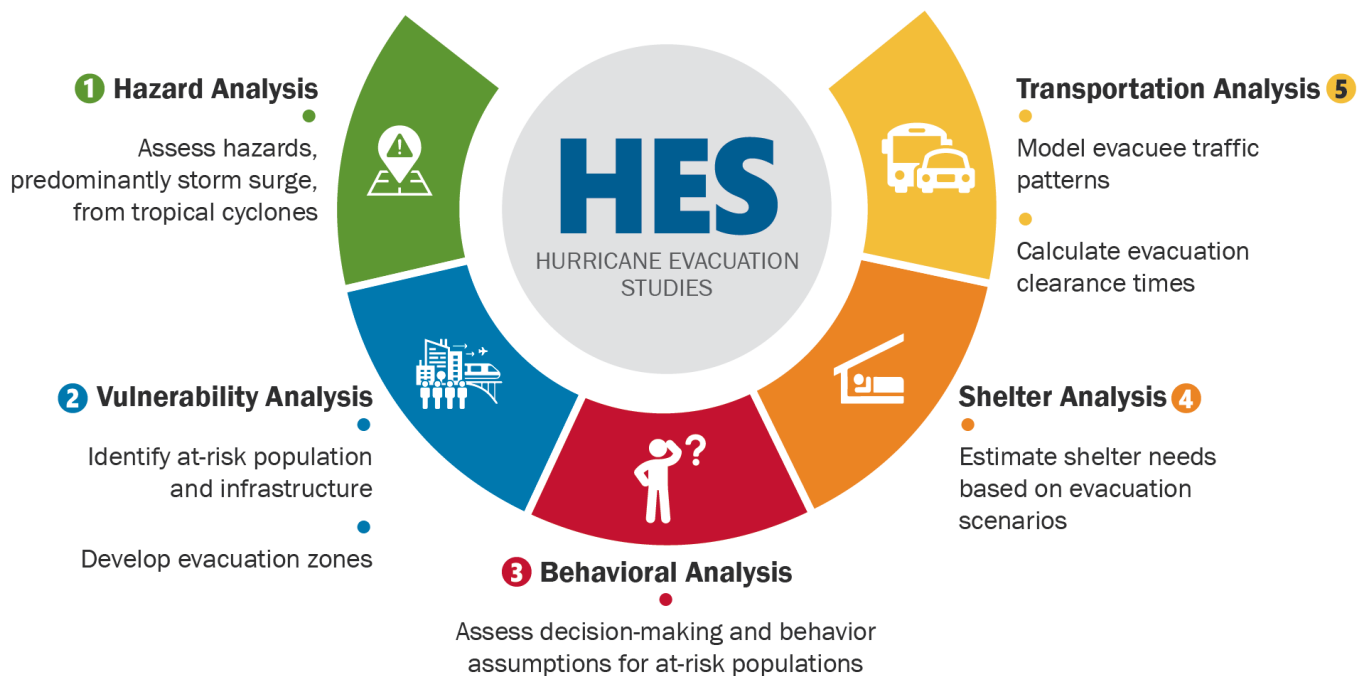
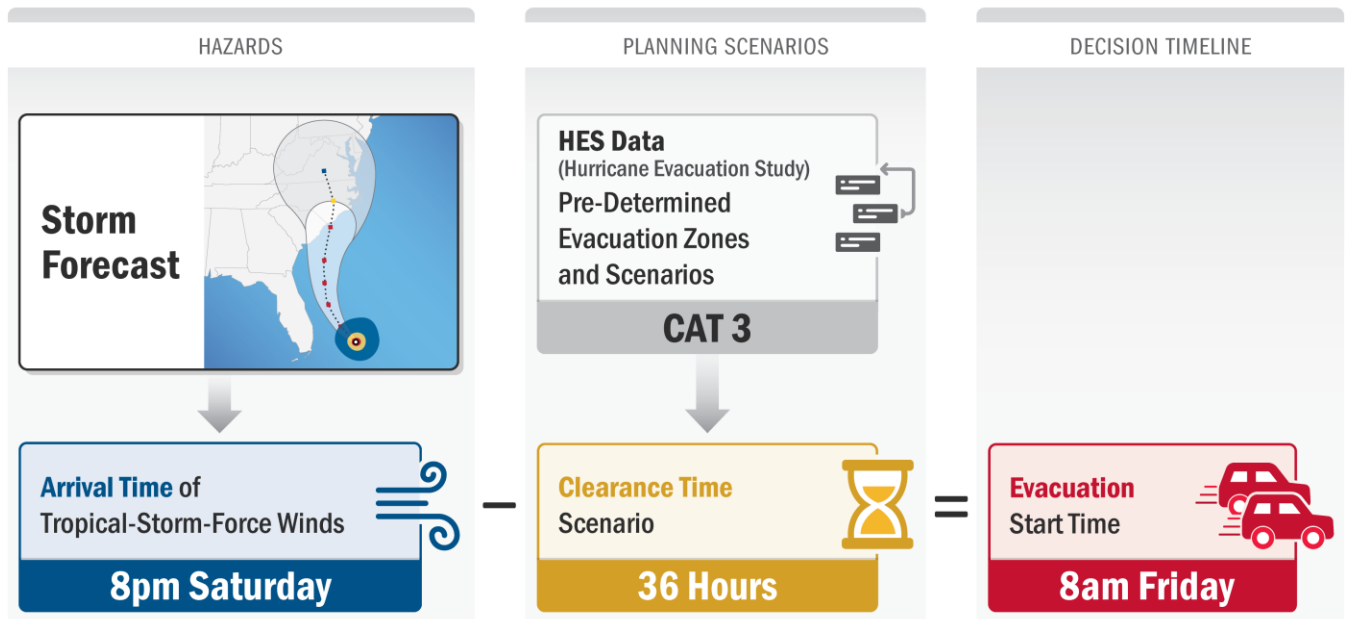


Figure 2: HES Components



The HES process produces several important deliverables including hurricane evacuation zones and evacuation clearance times. Clearance times estimate the number of hours it takes to move a threatened population to safety given various factors.

HES documents, evacuation zones and clearance times are available in HURREVAC (<https://hurrevac.com/>), the NHP’s hurricane evacuation decision support tool, free for government emergency managers. Emergency managers can use the “Evacuation Timing” features in HURREVAC to calculate clearance times, build out decision timeline actions, and deduce evacuation start times. Evacuation start times are calculated by subtracting produced clearance times from the arrival time of tropical-storm-force winds.



**Figure 2: Evacuation Start Time Calculation**

HES and Evacuation Planning plays a vital role in the program, producing valuable inputs for other program components. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

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# HURREVAC

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HURREVAC is the hurricane evacuation decision support tool of the NHP. This free, web-based tool assists emergency managers by providing hazard information and evacuation timing guidance ahead of threatening storms, along with year-round planning resources.

## Operational Decisions

[HURREVAC](https://www.hurrevac.com) (<https://www.hurrevac.com>), short for Hurricane Evacuation, is a storm tracking and decision support software tool for government emergency managers. The program combines real-time forecast products and storm surge modeling from NOAA NHC with evacuation clearance times from HES. The tool translates storm information from NHC and Central Pacific Hurricane Center advisories into interactive maps and reports. HURREVAC continually incorporates various products to show the timing and severity of storm effects such as wind, storm surge, and inland flooding.

HURREVAC unites the latest forecasts for the onset of wind hazards with local clearance time data to help emergency managers build a timeline for evacuation decisions and other preparation activities. Operational storm surge inundation products and watch and warning information are also available in HURREVAC.

## Planning Support

HURREVAC contains several key resources to support training, exercises, and hurricane preparedness and planning efforts. Users can quickly reference local evacuation zones and HES documents. The HES process provides critical planning factors and information to guide evacuation and response plans, which are the foundation of HURREVAC's evacuation decision support. The interactive Storm Surge Explorer lets users map, analyze, and export reasonable worst-case inundation scenarios based on SLOSH modeling. In addition, Storm Simulator lets users create a custom exercise hurricane with realistic forecast products and wind data. Users can engage with self-guided training modules, videos, a comprehensive User Guide, and year-round technical support.

For more information about HURREVAC, visit the HURREVAC support site at <https://www.hurrevac.com>. Access to the tool is provided free of charge to eligible users who register (<https://register.hurrevac.com>).

HURREVAC is one of seven NHP components. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

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# Training for Emergency Managers

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The hurricane readiness training curriculum brings the essential components of the NHP together to promote their application in hurricane planning and operational decision-making.

USACE, NOAA NHC, and FEMA collaborate on hurricane preparedness training for emergency managers. Significant contributions include the development of training curriculum and access to subject matter experts to instruct training delivery.

## Hurricane Readiness Training

NHP provides a series of classroom training courses on hurricane preparedness in partnership with the FEMA Emergency Management Institute (EMI). The most frequently offered course, L0311, Hurricane Readiness for Coastal Communities, provides an overview of tropical cyclone basics, hurricane hazards, NHC forecast and storm surge products, hurricane evacuation planning, and dealing with forecast uncertainty for decision makers. In addition, L0310, Hurricane Readiness for Inland Communities, follows a similar story line but focuses on the inland impacts of hurricane hazards, such as rain and inland flood events. These courses are offered at conferences and delivered in the field upon request.

The flagship course of the NHP is the week-long L0324, Hurricane Preparedness for Decision Makers. Conducted at the NHC for state and local emergency managers, this course expands on topics discussed in L0311. It includes basic use and application of the HURREVAC decision support tool, an exercise on building a hurricane evacuation zone, and concludes with a tabletop exercise focused on making an evacuation decision in response to a simulated hurricane threat.

For more information on hurricane readiness training, contact [NHP@fema.dhs.gov](mailto:NHP@fema.dhs.gov).

## HURREVAC Training

There are several training resources available for HURREVAC.

### Customized HURREVAC Training

Facilitated HURREVAC trainings are offered at national conferences and delivered in the field upon request. Facilitated HURREVAC trainings can be tailored to participants needs, ranging from a basic overview and demo of HURREVAC to applied usages and exercises within the tool. Facilitated HURREVAC trainings may be conducted in-person or via a virtual platform. Interested emergency managers can solicit facilitated HURREVAC training by contacting [support@HURREVAC.com](mailto:support@HURREVAC.com).



## Other HURREVAC Training Resources

The HURREVAC team also offers a yearly, week-long webinar series, covering the many different functionalities within the tool. Asynchronous HURREVAC training resources include self-paced training modules within HURREVAC, the HURREVAC User's Guide, and informative videos on the [HURREVAC YouTube Channel](https://www.youtube.com/@hurrevac) (<https://www.youtube.com/@hurrevac>), which include recordings of past HURREVAC Webinars.

More information is available at the [HURREVAC Support Site](https://www.hurrevac.com/learning-resources/user-guides-and-tutorials/) (<https://www.hurrevac.com/learning-resources/user-guides-and-tutorials/>).

Training for Emergency Managers combines all the different components of the NHP together to build capacity in program stakeholders. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

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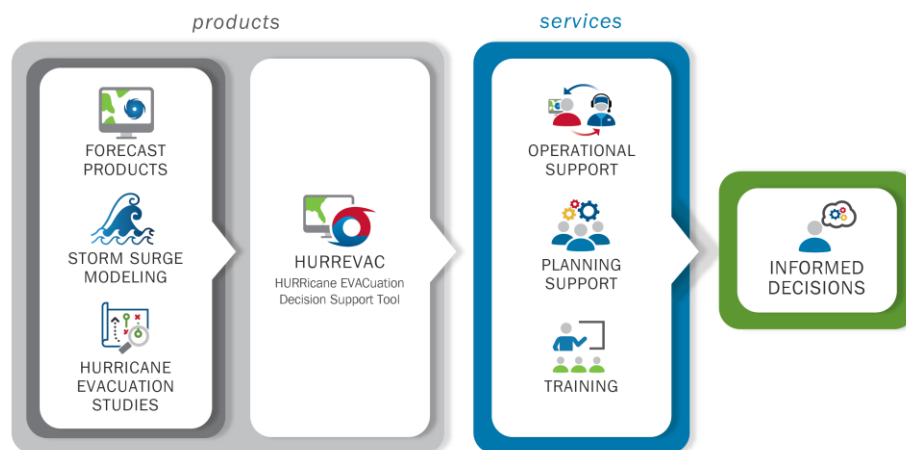
# Operational Decision Support: Hurricane Liaison Team

Operational decision support for the NHP is provided through the FEMA HLT to federal and SLTT emergency managers.

HLT is composed of two full-time FEMA Liaison Officers permanently embedded with forecasters at NOAA NHC to ensure integration with NHC operations and to maintain direct access to forecasters. This co-location promotes the necessary relationships to facilitate the rapid exchange of critical information between the NHC and the emergency management community.

The team works with the NHC to monitor potential threats in the tropics and answer questions from federal and SLTT emergency management partners. Once a credible threat is identified, HLT can deploy additional team members, including FEMA Regional Hurricane Program Managers (RHPMs), to the NHC to support an increased need for information. The FEMA RHPM for affected regions plays an important role in supporting their region, states, and local partners because of their unique local knowledge and relationships.

The HLT facilitates critical hurricane information sharing between the NHC and the emergency management community through video teleconferences and briefings with federal and SLTT partners. The team assists emergency managers with the application of forecast products, HES information, and HURREVAC. The support the HLT provides reinforces confidence in emergency management decisions and ensures a common forecast picture across FEMA, federal partners, and SLTT emergency managers involved in the hurricane response.



**Figure 3: NHP Products and Services lead to informed operational decisions by stakeholders**

Operational Decision Support and the HLT play a critical role in the application of NHP resources. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

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# Stakeholder Engagement

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NHP values stakeholder engagement as an effective and meaningful way to strengthen program tools and fulfill the NHP’s mission. This mission is facilitated by socializing the program and building relationships with those who have a vested interest in or influence on the use and development of NHP tools and technical assistance.

Stakeholders include federal and SLTT emergency managers who are the end users of the program’s tools, services, and decision-making support. Stakeholder engagement offers two-way communication for participants to provide their feedback. This feedback influences NHP strategic development.

## Interagency Coordinating Committee on Hurricanes

NHP leads the Interagency Coordinating Committee on Hurricanes (ICCOH). ICCOH is the primary mechanism for coordinating NHP’s goals, components, and priorities with federal and state partners focused on hurricane preparedness and response. ICCOH includes the three federal partner agencies of the NHP: FEMA, NOAA NHC, and USACE. In addition, ICCOH includes representatives from more than 20 hurricane prone states and territories. ICCOH assists the NHP with its programmatic policy development, stakeholder coordination, technology integration, and future direction. The NHP hosts, plans, and coordinates the ICCOH Annual Meeting.

## Conference Participation

The NHP participates in the planning and execution of the [National Hurricane Conference](https://hurricanemeeting.com) (https://hurricanemeeting.com). The annual National Hurricane Conference offers a national forum for education and professional training in hurricane and disaster preparedness. It aims to improve hurricane preparedness, response, recovery, and mitigation in the U.S. and islands in the Caribbean and Pacific. The National Hurricane Program Manager participates in the National Hurricane Conference Planning Committee, as well as the Evacuation Planning Topic Committee. In addition, the NHP delivers L0311, Hurricane Readiness for Coastal Communities, and HURREVAC training and participates in several sessions.

The NHP participates in state emergency management events, such as the Florida Governor’s Hurricane Conference, as invited. Engagement may include subject matter expert participation in panels, hurricane readiness training, and/or HURREVAC training.

## Quarterly Newsletter

In 2022, the NHP launched *The NHP Quarterly Newsletter*. *The NHP Quarterly Newsletter* highlights the important work of the NHP’s three federal partners and their stakeholders. Once a quarter, the program sends informative resources, technology, and training updates, HURREVAC tools and tips, program news and accomplishments, and



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important date reminders among other things. To receive future updates from the NHP, [sign up for FEMA Email Updates \(govdelivery.com\)](#).

Stakeholder engagement plays a vital role in program development and strategic planning. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

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# Post-Storm Assessments

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NHP may conduct post-storm assessments to analyze the accuracy and usefulness of its tools, products, and operational support to emergency managers.

Post-storm assessments are not conducted for all hurricane incidents. A storm event needs to have a unique impact or characteristics that warrant further study. Assessing a unique hurricane serves to improve the program's future planning, preparedness, and response support to its stakeholders at all levels of government.

The post-storm assessment process requires coordination and communication among state and federal agencies and a commitment of time and funding. The annual budget for the NHP does not include post-storm assessments. When a need for a post-storm assessment is identified, stakeholders and partners must work together to obtain support and funding for the analysis.

Partner coordination extends to the development of the post-storm assessment. A post-storm assessment may include a review of the following resources:

- Pre-existing HES
- Support given by HLT
- HURREVAC usage
- Timeline of actions taken by emergency managers
- Forecast products
- Storm surge risk products
- Traffic and transportation data
- Review of evacuation zones
- Data to approximate population movement
- Shelter and hotel statistics
- Impacts of the storm on buildings and infrastructure
- Community resilience indicators

Once compiled and reviewed, this information may be used to validate performance and identify areas for improvement of tools, methodologies, or training.

Post-Storm Assessments support the continuous improvement of NHP products and services. It is one of the seven components of the NHP: Storm Surge Risk Products; HES and Evacuation Planning; HURREVAC; Training for Emergency Managers; HLT Operational Decision Support; Stakeholder Engagement; and Post-Storm Assessments.

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# National Hurricane Program (NHP) Partners and Contacts

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NHP is a partnership of FEMA, USACE, and NOAA via the NHC.

## Federal Emergency Management Agency (FEMA)

### Program Responsibilities

- Administers the program as lead partner.
- Coordinates program management with NHC and USACE.
- Provides NHP administration, doctrine, and methodology.
- Coordinates hurricane readiness training courses for federal and SLTT emergency managers, including:
  - L0310, Hurricane Readiness for Inland Communities; L0311, Hurricane Readiness for Coastal Communities; L0320, Hurricane Preparedness for Decision Makers: State Specific; and L0324, Hurricane Preparedness for Decision Makers
  - HURREVAC, the hurricane evacuation decision support tool, training
- Provides Regional Hurricane Program Manager support that includes:
  - General technical assistance, training support, and coordination for HURREVAC and HES.
  - NHP engagements and communication with regional, state, and local stakeholders.
  - Coordination of evacuation operation support between regions, states, and local communities.
  - Deploy to the NHC to support HLT operations and liaise between the NHC and states during storms.
- Provides HLT as an advocate and liaison at the NHC for federal and SLTT emergency managers.

For more information about the National Hurricane Program, visit [Hurricane Planning and Response | FEMA.gov](#) or email [NHP@fema.dhs.gov](mailto:NHP@fema.dhs.gov).

## U.S. Army Corps of Engineers (USACE)

### Program Responsibilities

- Coordinates HES and Post-Storm Assessments.
- Contracts HURREVAC development and operations and maintenance.
- Delivers HURREVAC training.
- Supports logistics and planning for Interagency Coordinating Committee on Hurricanes (ICCOH) Annual Meeting.
- Provides District Study Manager (DSM) support.



# National Oceanic and Atmospheric Administration (NOAA) National Hurricane Center

## Program Responsibilities

- Provides storm forecasting, storm tracking, and public warnings.
- Ensures forecast product HURREVAC adaptability.
- Conducts storm surge modeling and simulation for both planning and real-time operational support using the SLOSH model.
- Updates content and contributes instructors for NHP training.

