Hazus Hurricane Model User Guidance

April 2018

FEMA

Document History

Affected Section or Subsection	Date	Description
First publication using this format	April 2018	Updated user manual from Hazus version 2.1 to Hazus version 4.2. Manual has been reorganized from prior version.

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1 Introduction

The Hazus hurricane loss estimation methodology (Hurricane Model) provides local, state, and regional officials with state-of-the-art decision support software for estimating potential losses in hurricane scenarios. The loss estimation capability will enable users to anticipate the consequences of future hurricanes, develop strategies for reducing risk, and mitigate the effects of hurricane winds. The software is Geographic Information System (GIS) based and can be applied to small and large geographic areas with a wide range of population characteristics.

The Hazus methodology was developed for the Federal Emergency Management Agency (FEMA) by the National Institute of Building Sciences (NIBS) to provide a tool for developing earthquake loss estimates. Hazus has been expanded to perform similar loss evaluations for wind and flood.

The Hurricane Model allows users to estimate the economic and social losses from hurricane winds. The model provides practitioners and policymakers with a tool to help reduce wind damage, reduce disaster payments, and make wise use of the nation's emergency management resources.

The Hurricane Model addresses only one major source of wind damage (hurricanes), but damaging winds are also produced by tornadoes, thunderstorms, extratropical storms, and hail. If a Hazus All-Wind Model is developed, it would need to include the wind hazard and the effects associated with all of the meteorological phenomena that produce damaging winds. A future goal for Hazus may be to analyze the wind hazards throughout the United States. If Hazus is applicable to all of the regions in the nation with windstorm risk, loss estimates would help guide the allocation of federal resources to stimulate risk mitigation efforts and plan for federal hurricane response.

This manual, *Hazus Hurricane Model User Guidance* (User Guidance), provides background and instructions on developing an inventory for a hurricane loss estimation study, how to use the model, run basic analyses, interpret results, and report model outputs.

The *Hazus Hurricane Model Technical Guidance* (Technical Guidance) comprises documents that are companions to the User Guidance and provides information on the default data, origin of each type of inventory, and methods of calculating losses by changing basic parameterizations.

Together, this User Guidance and the Technical Guidance provide a comprehensive overview of the Hurricane Model.

1.1 Hazus Users and Applications

Hazus can be useful for a variety users with a variety of data needs, including:

- A local or state government official may be interested in the costs and benefits of specific mitigation strategies and may want to know the expected losses if mitigation strategies have (or have not) been applied.
- Emergency response teams may use the results of a loss study in planning and performing emergency response exercises. In particular, they may be interested in the

operating capacity of emergency facilities such as fire stations, emergency operations centers, and police stations.

- Emergency planners may want to know how much temporary shelter would be needed and for how long.
- Utility company representatives and community planners may want to know the locations and durations of potential utility outages.
- Federal and state government officials may require an estimate of economic losses (both short term and long term) in order to direct resources toward the affected communities. In addition, government agencies may use loss studies to obtain quick estimates of impacts in the hours immediately following a hurricane so to best direct resources to the disaster area.
- Insurance companies may be interested in monetary losses so they can assess asset vulnerability.

1.2 Hurricane Model Outputs

Table 1-1 lists the Hurricane Model outputs. See Chapter 8 for details on each type of output.

Examples of possible pre-hurricane applications of the outputs are as follows:

- The development of hurricane hazard mitigation strategies that outline policies and programs for reducing the hurricane losses and disruptions. The strategies may involve upgrading existing buildings (e.g., addition of shutters) or the adoption of new building codes.
- Anticipation of the nature and scope of response and recovery efforts including identifying short-term shelter and debris management requirements.

Examples of possible post-hurricane applications of the outputs are as follows:

- Projection of immediate economic impact assessments for state and federal resource allocation and support including supporting the declaration of a state and/or federal disaster by calculating direct economic impact on public and private resources, local governments, and the functionality of the area.
- Activation of immediate emergency recovery efforts including provision of emergency housing shelters and initiating debris clean-up efforts.
- Application of long-term reconstruction plans including the identification of long-term reconstruction goals, the institution of appropriate wide-range economic development plans for the entire area, allocation of permanent housing needs, and the application of land use planning principles and practices.

Table 1-1: Hurricane Model Outputs

Output	Description
Maps of wind hazards	• Peak gust (3-second) wind speed for each census tract • Maximum sustained (1-minute) wind speed for each census tract
General Building Stock (GBS)	• Damage probabilities by occupancy • Damage probabilities by building type • Cost of building repair or replacement • Loss of contents • Business inventory loss • Loss of rental income • Relocation costs • Business income loss • Employee wage loss
Essential facilities	• Damage probabilities • Probability of functionality • Loss of beds in hospitals
Debris	• Building debris generated by weight and type of material • Tree debris generated by weight or volume
Social losses	• Number of displaced households • Number of people requiring temporary shelter
High potential loss facilities (HPLF)	• Locations of dams • Locations of nuclear plants • Locations of military facilities • Locations of other identified HPLF
Transportation and utility lifelines	• Locations of transportation facilities • Locations of lifelines
Hazardous material sites	• Location of facilities that contain hazardous materials

Once the inventory has been developed, making modifications and running new analyses are simple tasks. The ease with which reports and maps can be generated makes the software useful for a variety of applications.

1.3 Assumed User Expertise

Users can be divided into two groups: model users (those who perform the loss estimation study) and end users (those who use the results). References to users in this manual include both groups.

The two groups normally consist of different people but may consist of the same people. The more interaction between the groups, the better the study. End users should be involved from the beginning of the study to ensure that the results are as usable as possible.

The model users, who perform the study, should have a basic understanding of hurricanes and their consequences.

It is assumed that a loss study will be performed by a team consisting of the following:

- Severe storm experts
- Structural engineers or architects
- Economists
- Sociologists
- Emergency planners
- Loss estimate modelers

These individuals are needed to develop hurricane scenarios, develop and classify building inventories, provide and interpret economic data, provide information about the local population, and provide input on the types of loss estimates that are needed to fulfill the goals of the study.

If a local or state agency is performing the study, some of the needed expertise may be in-house. Personnel with relevant expertise are generally in departments such as building permits, public works, planning, public health, engineering, climatology, information technologies, finance, historic preservation, natural resources, and land records. Although in-house expertise may be readily available, the value of the participation of individuals from academic institutions, citizen organizations, and private industry cannot be underestimated.

1.4 When to Seek Help

The results of a loss estimation study should be interpreted with caution because default input values have a great deal of uncertainty. See Section 1.6.

If the loss estimation team does not include individuals with expertise in the areas listed in Section 1.3, one or more consultants will likely be needed to help interpret the results. It is also advisable to retain objective reviewers with relevant expertise to evaluate the map and tabular data outputs. A meteorologist or wind engineer will be needed to provide deterministic scenario data or review each storm's parameters.

If the user intends to modify the default inventory data or parameters, assistance will be required from an individual with relevant expertise. For example, if the user wishes to change the default percentages of model building types in a region, a structural engineer with knowledge of regional design and construction practices would be helpful. Modifications to defaults in the economic loss models would require input from an economist.

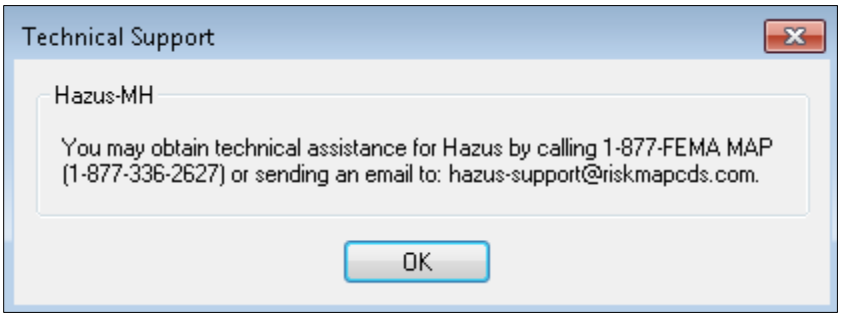
1.5 Technical Support

As shown in Figure 1-1 and provided in the Hazus application at **Help / Obtaining Technical Support**, technical assistance is available via the Hazus Help Desk at hazus-support@rismapcds.com or 1-877-FEMA-MAP (1-877-336-2627). The websites for agencies and organizations listed in this document provide Frequently Asked Questions, software updates, training opportunities, and user group activities.

The application's Help menu references the help files for ArcGIS. Because Hazus was built as an extension to ArcGIS functionality, knowing how to use the ArcGIS and ArcGIS Help Desk will help Hazus users.

Technical support on any of the four hazards is available at the contacts shown in Figure 1-1 and via **Help / Obtaining Technical Support**.

Figure 1-1: Hazus Technical Support



1.6 Uncertainties in Loss Estimates

Although the software offers users the opportunity to prepare comprehensive loss estimates, it should be recognized that even with state-of-the-art techniques, uncertainties are inherent in any estimation methodology. The Hurricane Model is only a tool for loss estimation from probabilistic or single event wind hazard data. Hazus does not compute uncertainties in the loss estimates, provide ranges for possible losses, or offer any confidence levels. The output of hard numbers is tied to the input data. Uncertainties may be estimated, but Hazus does not output such statistics.

1.7 Organization of User Guidance

This User Guidance provides information that will assist Hurricane Model users perform basic and advanced hurricane loss estimations.

Chapter 1: Introduction. Background on the Hurricane Model, Hazus applications, assumed user expertise, when to get help, technical support, and uncertainty in loss estimates.

Chapter 2: Overview of the Hurricane Model. Overview of the Hurricane Model for local, state, and regional officials contemplating a hurricane loss study. It describes hurricane-related hazards in the Hurricane Model (wind pressure, wind-borne debris missiles, tree blowdown, and rainfall); types of buildings, facilities, and lifeline system in the model; and the difference between a basic and advanced analysis.

Chapter 3: **Getting Started I: Hazus Startup Screen.** Description of the Hazus Startup Screen with information about creating a new study region and how to open, delete, duplicate, export, and import existing study regions.

Chapter 4: **Getting Started II: Basic Hazus Analysis.** Introductory walk through the Hurricane Model showing a user how to conduct a probabilistic hurricane analysis.

Chapters 5, 6, 7, and 8: Model Menus for Inventory, Hazard, Analysis, and Results. Walk through of the Hurricane Model menus related to inventory, hazard, analysis, and results.

Chapters 9, 10, 11, and 12: Advanced Hazus Analysis. How to conduct an advanced hurricane analysis including information on user-defined inventory data and storms, combined

wind and flood hurricane surge analysis, and how to modify the default hurricane analysis parameters.

Chapter 13: Acronyms and Abbreviations

Chapter 14: Glossary: Glossary of key terms.

Appendices A, B, and C: Information on the hurricane building classification system, model building types, and data model dictionary.

2 Overview of the Hurricane Model

Chapter 2 provides an overview of the hurricane loss estimation methodology (Hurricane Model) and is intended for local, state, and regional officials contemplating a hurricane loss study. For more information on hurricane modeling approaches and assumptions (along with how uncertainties are addressed), consult the Technical Guidance.

Using the methodology will generate an estimate of the consequences to a county or region of a scenario hurricane (i.e., a hurricane with a specified wind load effect and location). The loss estimate will generally describe the scale and extent of damage and the disruption that may result from a potential hurricane. The following information can be obtained:

- Quantitative estimates of losses in terms of direct costs for repair and replacement of damaged buildings and lifeline system components; direct costs associated with loss of function (e.g., loss of business revenue, relocation costs); casualties; people displaced from residences; quantity of debris; and regional economic impacts. Hazus does not output uncertainties statistically.
- Functionality losses in terms of loss-of-function and restoration times for critical facilities, such as hospitals and components of transportation and utility lifeline systems, and simplified analyses of loss-of-system function for electrical distribution and potable water systems.
- Extent of induced hazards in terms of exposed population and building value due to potential flooding and locations of hazardous materials.

To generate the above information, the methodology includes:

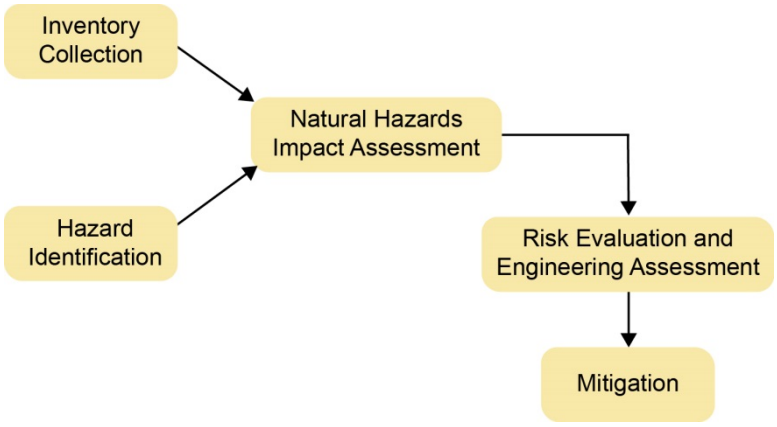
- Classification systems used in assembling inventory and compiling information on the General Building Stock (GBS), components of highway and utility lifelines, and demographic and economic data.
- Standard calculations for estimating type and extent of damage and for summarizing losses.
- National and regional databases containing information for use as default (built-in) data in the absence of user-supplied data. Default data are useable in the calculation of losses.

These systems, methods, and data have been combined in user-friendly GIS software for this loss estimation application. GIS technology facilitates the manipulation of data on GBS, population, and the regional economy.

The software uses GIS technologies for displaying and manipulating inventory and allowing the display of losses and consequences on applicable spreadsheets and maps. Collecting and entering the necessary information for analysis are the major tasks involved in generating a loss estimate. The methodology permits estimates to be made at several levels of complexity, based on the level of inventory entered for the analysis (i.e., default data versus locally enhanced data). The better and more complete the inventory information, the more accurate the results.

Figure 2-1 shows the conceptual steps that are typically performed in assessing and mitigating the impacts of a natural hazard such as a hurricane. The methodology incorporates inventory collection and hazard identification in the natural hazard impact assessment.

Figure 2-1: Conceptual Steps in Assessing and Mitigating Losses due to Natural Hazards



While Figure 2-1 shows the conceptual steps in a natural hazards analysis, the steps used in the Hurricane Model are as follows:

- Select the area to be studied. The region of interest is created based on the census tract, county, or state. The area generally includes a city, county, or group of municipalities. It is generally desirable to select an area that is under the jurisdiction of an existing regional planning group.
- Specify the hazard. In the Hurricane Model, the hazard can be specified as:
  - Single Historic (Deterministic): From a list of past storms, each with the observed parameters pre-loaded into the program.
  - User-defined Storm Scenario (Deterministic): Includes defining storm track manually, importing a scenario, importing a hurricane surface wind file (.dat format), or importing a Hurrevac tool storm advisory (from the National Hurricane Program, administered by FEMA; U.S. Army Corps of Engineers; and National Oceanic and Atmospheric Administration [NOAA]).
  - Complete Probabilistic Analysis: Default hazard option in the Hurricane Model, which executes a 100,000-year simulation of storms.

  When a single-event scenario is chosen, the option of developing coastal storm surge and wave estimates is available. The single-event results can be fed into the Hazus Flood Model to produce combined wind and surge loss estimates for the GBS.
- Provide additional information describing the building inventory, essential facilities, tree coverage, and surface roughness, if available.

Using formulas embedded in Hazus, Hazus computes damage probabilities, expected building losses, expected contents losses, and expected loss-of-use for different classes of buildings. Hazus also computes estimates of direct economic loss and short-term shelter needs.

Using the formulas embedded in Hazus, Hazus estimates the expected amounts and types of debris.

The user plays a major role in selecting the scope and nature of the output of a loss estimation study. A variety of maps can be generated for visualizing the extent of the losses. Numerical results may be examined at the level of the census tract or aggregated by county or region.

2.1 Hurricane Hazards in the Hurricane Model

The hurricane-related hazards considered in the Hurricane Model in the estimates of casualties, damage, and resultant losses are wind pressure, wind-borne debris missiles, tree blowdown, and rainfall. The effects of storm duration are also included in the model by accumulating damage over the life of each storm. When a single-event scenario is chosen, the option of developing coastal storm surge and wave estimates is available. These results can be fed into the Hazus Flood Model to produce combined wind and surge loss estimates for GBS (see Chapter 11 for more details). Coastal surge analysis has not been implemented for a probabilistic analysis.

Tree coverage and terrain (i.e., surface roughness) can have significant effects on the damage and loss estimates produced by the Hurricane Model. The default tree coverage and terrain data may be selected or the user may supply the data. When considering supplying the terrain data, consult the Technical Manual for the terrain discussions and examples of land use / land cover (LULC)-based roughness coefficients. Consulting a wind engineer prior to changing the parameters is also strongly recommended.

Planning for mitigation and disaster response generally is based on large, damaging events, but the probability that such events will occur should also be considered. Probabilistic hurricane analyses inherently account for the full spectrum of probable events, producing both annualized and return period loss estimates. In deterministic hurricane scenarios, consulting hurricane experts is recommended to develop a maximum credible hurricane scenario that is realistic for the area when maximum damage estimates are being considered. Consideration should be given to repeating loss calculations for several scenario hurricanes with different categories and locations and different probabilities of occurrence because these factors are a major source of uncertainty.

2.2 Types of Buildings, Facilities, and Lifeline Systems

The buildings, facilities, and lifeline systems considered by the methodology are listed below. See the Technical Guidance more information.

- General Building Stock (GBS) – Most commercial, industrial, and residential buildings are not considered individually when calculating losses. Instead, they are grouped into 39 building types and 33 occupancy classes. Degrees of damage and loss are computed for each group.

  Examples of building types are Wood, Single-Family, One Story (WSF1); Masonry Multi-Unit Housing, Two Story (MMUH2); and Steel, Engineered Commercial Building, High-Rise (SECBH). See Appendix A for the complete list of building classifications used in Hazus. Each building type is further defined by distribution-of-wind building characteristics such as roof shape, roof covering, and opening protection.

Examples of occupancy classes are single-family dwelling, retail trade, heavy industry, and churches.

All structures that are evaluated in this manner are referred to as GBS.

- Essential Facilities – Essential facilities, including medical care facilities, emergency response facilities, and schools, are those that are vital to emergency response and recovery following a disaster. School buildings are included in this category because of the role they often play in housing displaced people. Generally, there are few essential facilities in a Census Tract, making it easier to obtain site-specific information for each facility. Thus, damage and loss-of-function are evaluated on an individual building basis, even though the uncertainty in the estimate is large.
- User-Defined Facilities (UDF) – UDF are buildings at specific locations that are added to the inventory. Generally, there are few UDF in a Census Tract, making it easier to obtain specific information for each facility. Damage is evaluated on an individual building basis even though the uncertainty in each estimate is large.

2.3 Levels of Analysis

Hazus is designed to support two general types of analysis (Basic and Advanced) split into three levels of data updates (Levels 1, 2, and 3). Figure 2-2 provides a graphic representation of the various levels of analysis.

2.3.1 Basic Analysis

Level 1

A Basic Level 1 analysis is the simplest type of analysis requiring minimum effort by the user. It is based primarily on data provided with the software (e.g., census information, broad regional patterns of foundation distributions, no floodplain code adoption). The user is not expected to have extensive technical knowledge. While the methods require some user-supplied input to run, the type of input required could be gathered by contacting government agencies or by referring to published information. At this level, estimates are generalized and will be appropriate as initial loss estimates to determine where detailed analyses are warranted.

2.3.2 Advanced Analysis

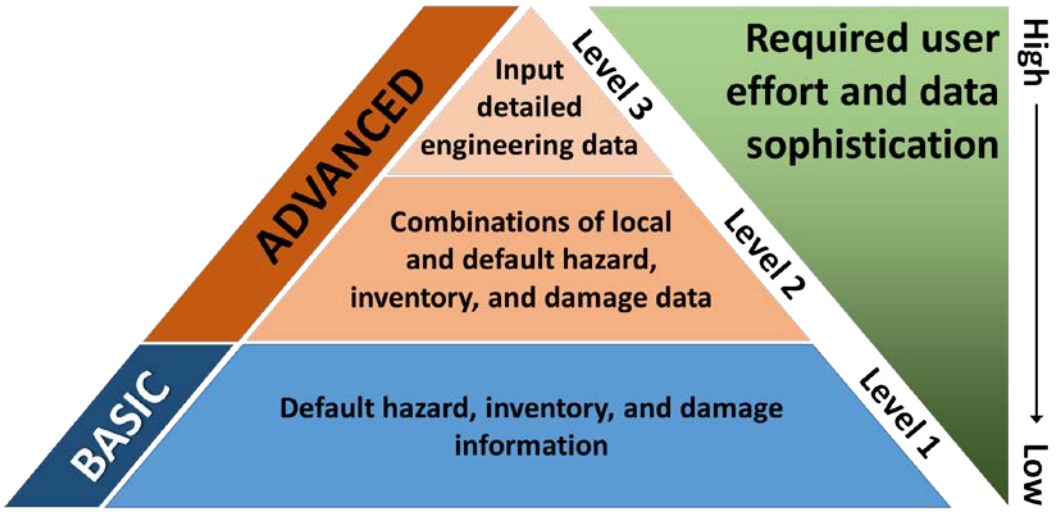
Level 2

An Advanced Level 2 analysis improves Level 1 results by considering additional data that are readily available or can be easily converted or computed to meet methodology requirements. In Level 2, the user may need to determine parameters from published reports or maps as input to the model. It requires more extensive inventory data and effort by the user than a Basic Level 1 Analysis. The purpose of this type of analysis is to provide the user with the best estimates of hazard input data that can be obtained using the standardized methods of analysis included in the methodology. For example, user-supplied flood depth grids should be used over the internal Hazus hydrology and hydraulics model. Hazus User Manuals provide detailed instructions on how to perform various type of Advanced Level 2 analysis.

Level 3

An Advanced Level 3 analysis requires effort by the user to develop and update information concerning the underlying engineering and loss analysis parameters in Hazus. This type of analysis incorporates results from engineering and economic studies carried out using methods and software not included within the methodology. At this level, one or more technical subject matter experts are required to acquire data, perform detailed analyses, assess damage/loss, and assist the user in gathering extensive inventory data. There are no standardized Advanced Level 3 analysis approaches. Users must understand where, within the Hazus software, to change the underlying engineering and loss parameters used for an analysis. The quality and detail of the results will depend on the level of effort.

Figure 2-2: Levels of Hazus Analysis



2.4 Analysis Considerations for Hurricane Model

2.4.1 Analysis Based on Default Information

The basic level of analysis uses the General Building Stock and Essential Facility databases that are built into the model and extracted for a specific Study Region. These databases are derived from national-level data sources for building square footage, building value, population characteristics, costs of building repair, and economic data. Default databases of surface roughness and tree coverage derived from national land-use data are used for the Study Region. Direct economic and social losses associated with GBS Stock are computed, along with Essential Facility functionality, short-term shelter requirements, and debris. Because the analysis involves only default data sources, the uncertainties are large.

In an analysis based on default data, the user's effort is limited to defining the Study Region, specifying the hazard (probabilistic or scenario), and deciding on the extent and format of the output. As indicated, however, since default rather than actual data are used to represent local conditions, the uncertainties in the estimated levels of damage and losses are large. An analysis

based on default data is suitable primarily for preliminary evaluations and crude regional comparisons.

2.4.2 Analysis with User-Supplied Inventory Data

The results from an analysis using only default data can be greatly improved by inputting at least a minimum amount of locally developed data. Such an analysis is generally what is intended. Improved results are highly dependent on the quality and quantity of improved inventories. The significance of the improved results also relies on the user's analysis priorities. The following inventory improvements impact the accuracy of analysis results:

- Use of locally available data or estimates concerning the square footage of buildings in different occupancy classes
- Use of local expertise to modify, primarily by judgment, the databases concerning percentages of model building types associated with different occupancy classes
- Preparation of a detailed inventory for all Essential Facilities
- Collection of detailed inventory and cost data to improve the evaluation of losses and lack of function in various transportation and utility lifelines
- Use of locally available data concerning construction costs or other economic parameters
- Development of inundation maps
- Gathering of information concerning high potential loss facilities and facilities housing hazardous materials
- Synthesis of data for modeling the economy of the Study Region used in the calculation of indirect economic impacts

3 Getting Started I: Hazus Startup Screen

The Hazus startup screen is the first screen users will see after launching Hazus.

3.1 Hazus Startup

Before running a loss estimation analysis, users must define a Study Region. The Study Region in Hazus is the geographic unit for which data are aggregated, the hurricane hazard is defined, and the analysis is carried out.

Hazus will prompt users to create a new region or import a previously created region. Users can also open, delete, duplicate, back up, and export an existing region.

3.2 Create New Region

In the Hazus startup screen (Figure 3-1), users will take the first step in defining the Study Region. In Figure 3-1, "Create a new region" has been selected. Select **OK** to activate the window shown in Figure 3-2. In this dialog, select the Study Region's hazard type for the analysis.

Click **Next** to open the window shown in Figure 3-3 and name the region and create a description. Click **Next**, which will open the window shown in Figure 3-4. Select Hurricane and click **Next**.

Figure 3-1: Select Create a New Region in Hazus Startup

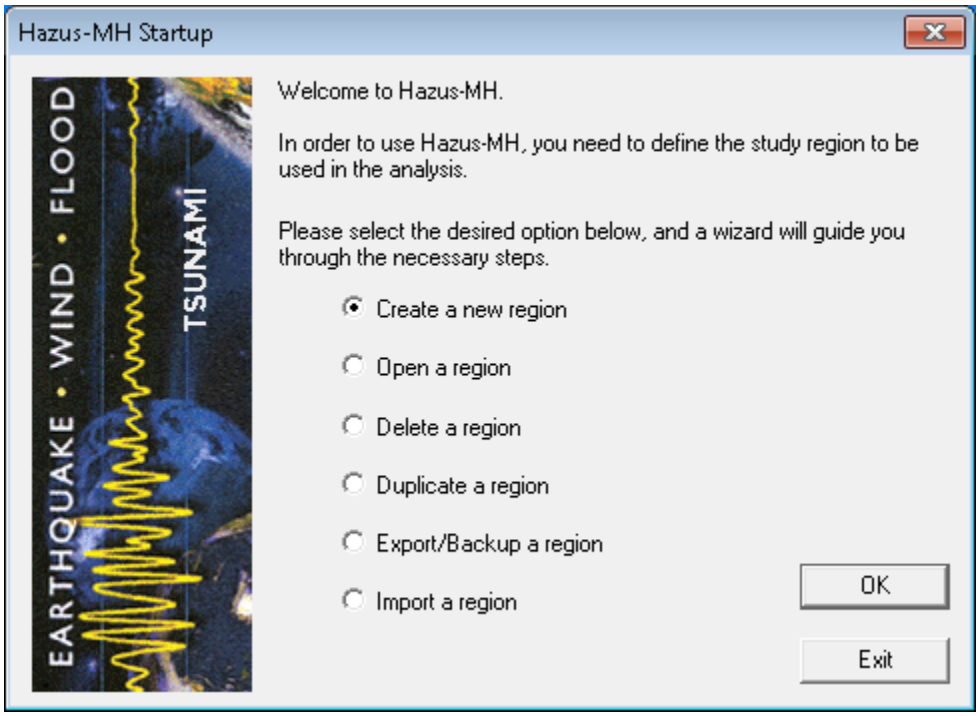


Figure 3-2: Select Create New Region in Wizard

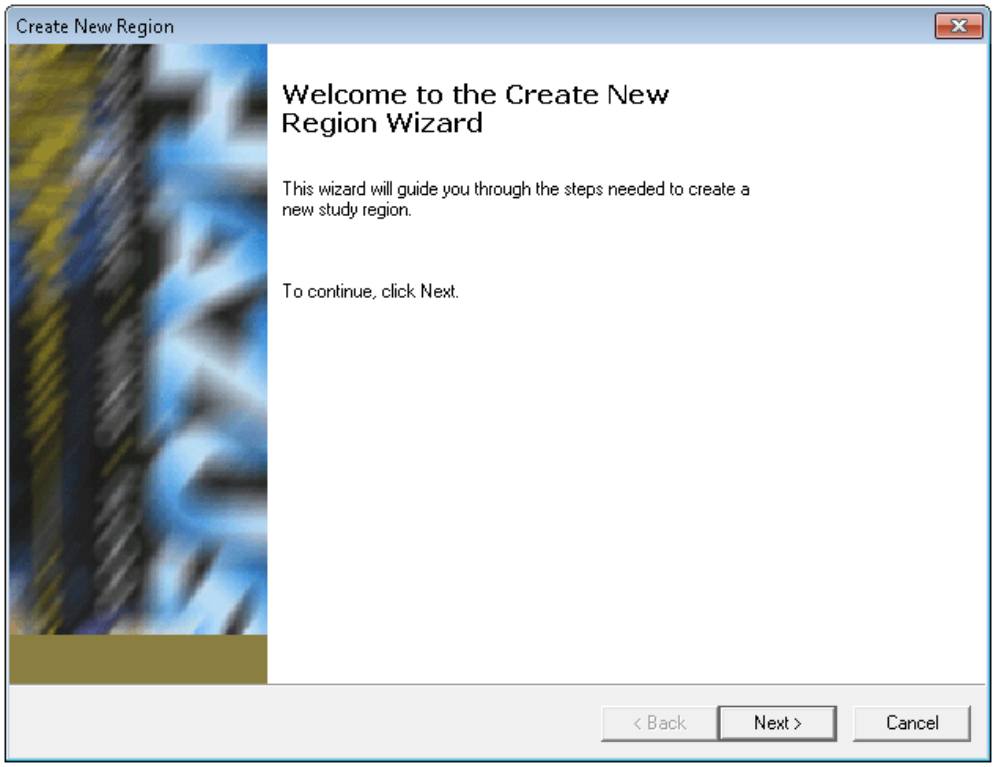


Figure 3-3: Create a Study Region Name

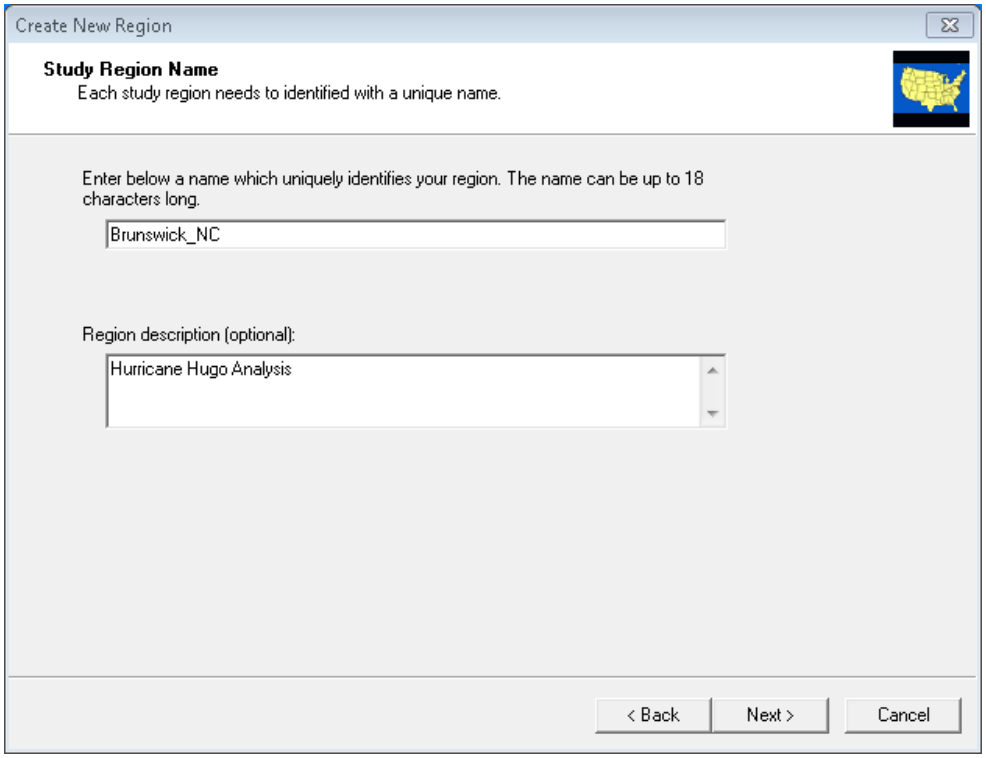
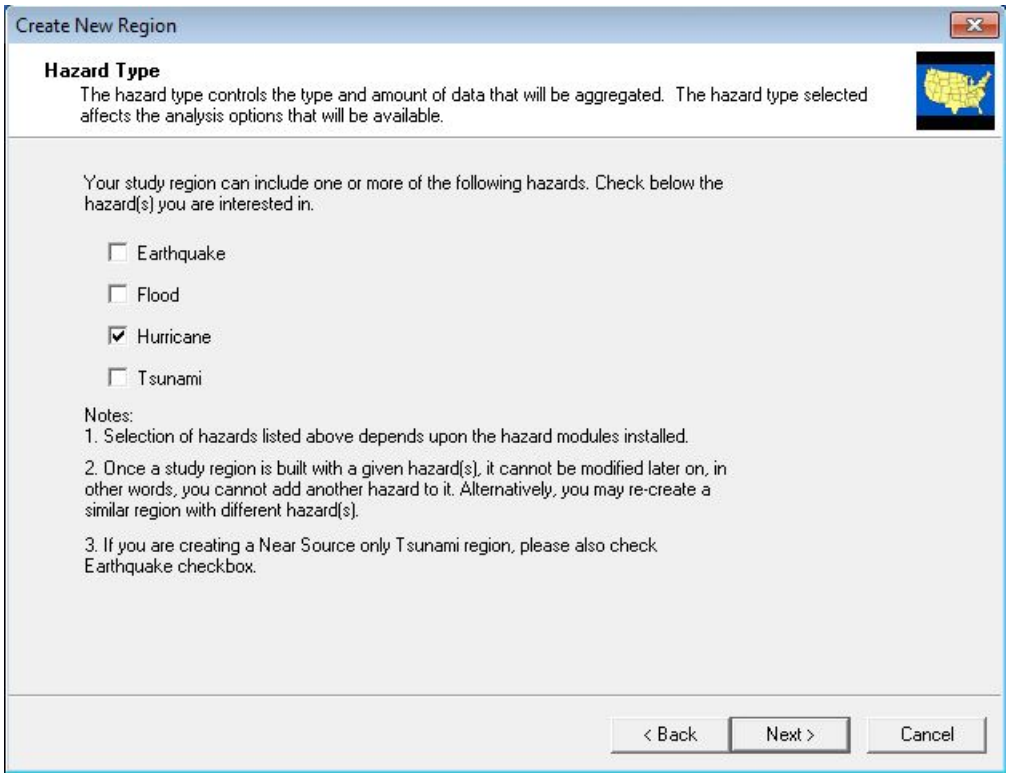


Figure 3-4: Select Hazard Type for New Region



3.2.1 Select the Scenario Operation

After creating the Study Region, select **Historic** or **<Create New Scenario>** under Scenario Operation (see Figure 3-5). Historic scenario is selected in Figure 3-5. Selecting the scenario operation and clicking **Next** will open the window shown in Figure 3-6**.**

Choose a scenario from the list of historic hurricane scenarios shown in Figure 3-6 and then click **Next**.

NOTE: If a new region was created, the probabilistic scenario will not appear as an option in Figure 3-5*. See Section 4.1 or 6.1 for how to select and run a probabilistic scenario.*

Figure 3-5: Select Historic for Scenario Operation

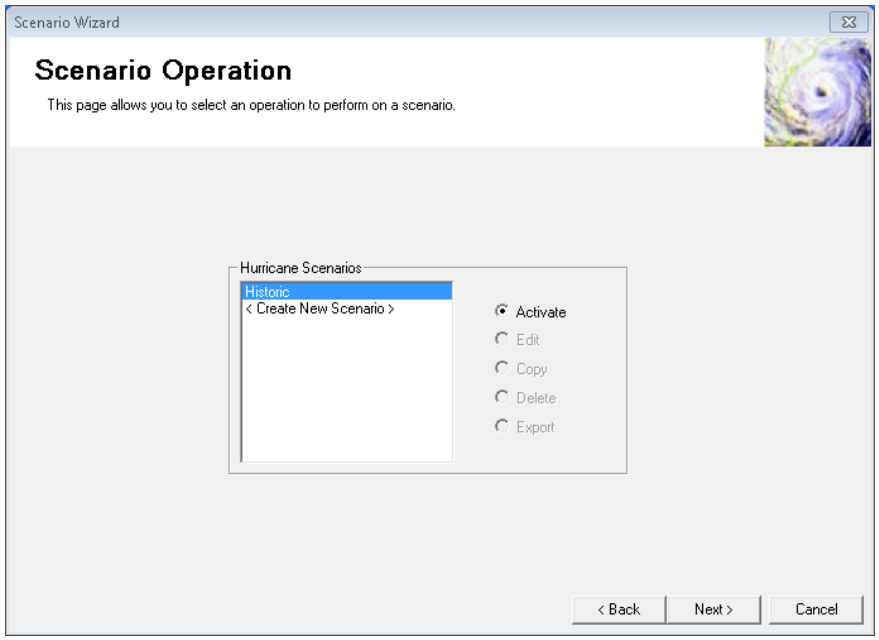
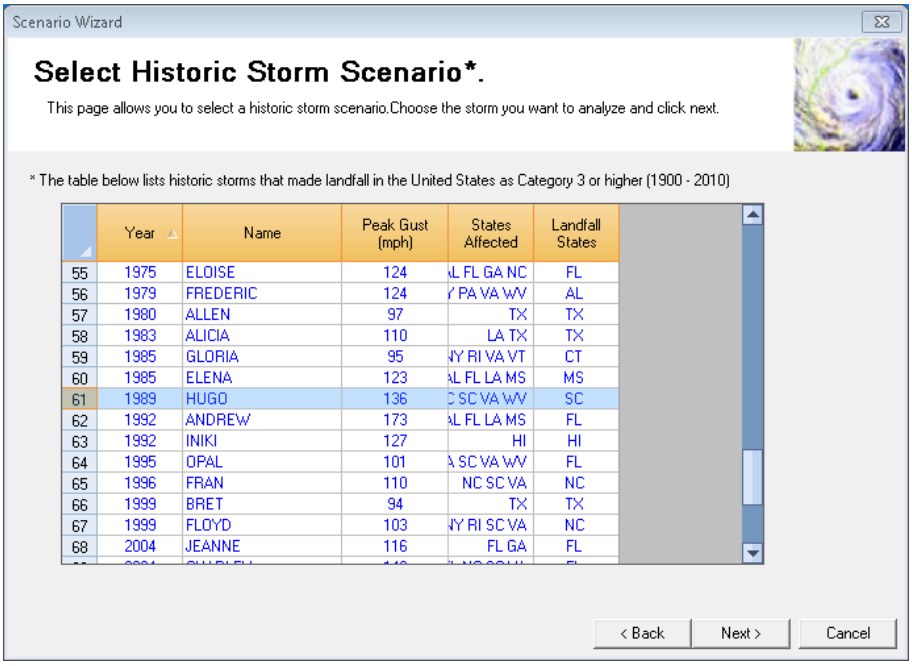


Figure 3-6: Select Specific Historic Storm Scenario



3.2.2 Select Aggregation Level

After selecting the scenario, define the new region by geographic level (state, county, or census tract), also called aggregation level. See Figure 3-7**.** Click **Next** to select the state (see Figure 3-8). Select the state, which will open county selection window shown in Figure 3-9. After selecting the county and clicking **Next,** begin aggregation by clicking **Finish** on the screen that will appear next (not shown). The program will process until the region has been created. Click **OK** in the pop-up window that confirms that the Study Region was created.

Figure 3-7: Select Desired Aggregation Level

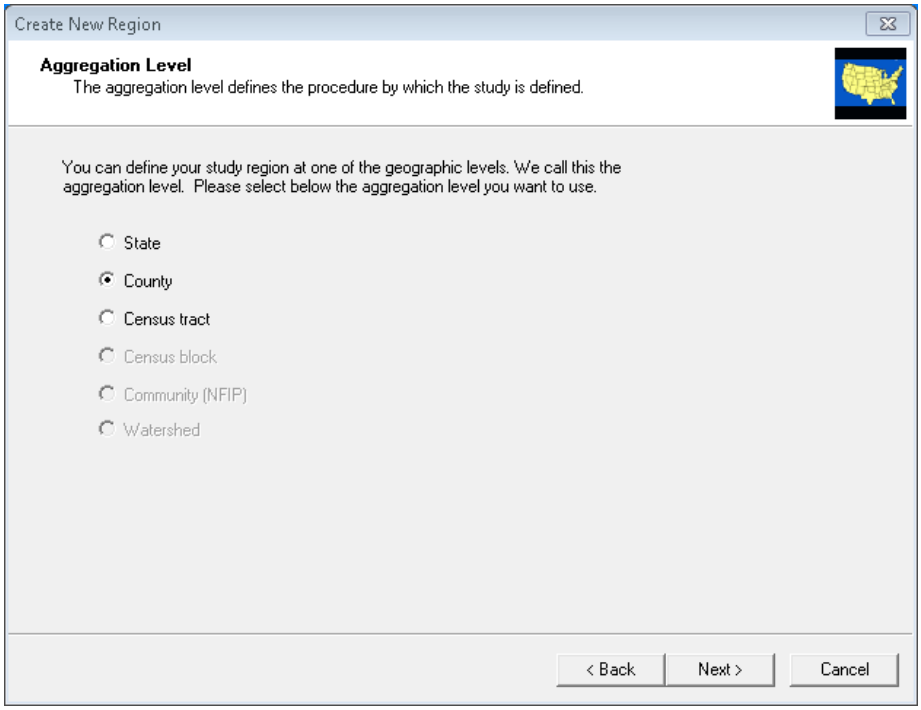


Figure 3-8: Select Appropriate State for the New Region

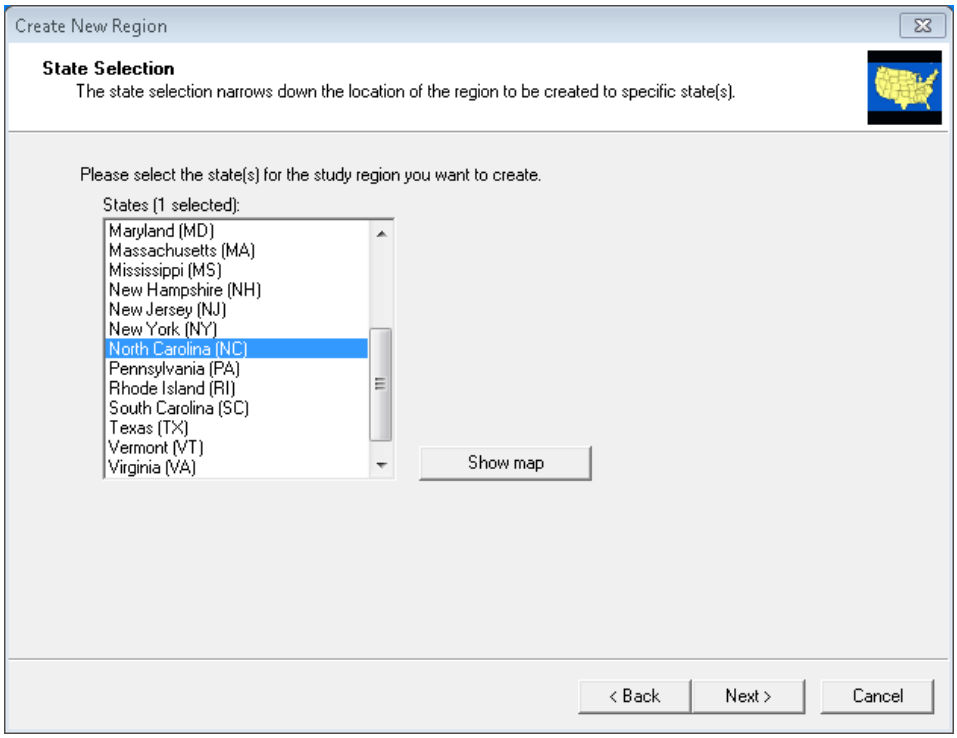
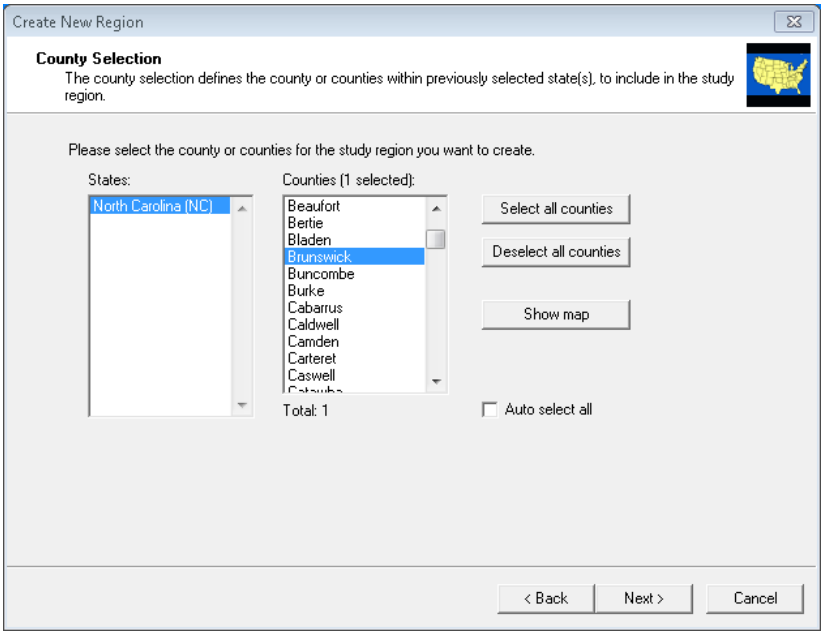


Figure 3-9: Select County for the New Region



3.3 Open Region

Open the newly created region in the Hazus startup, as shown in Figure 3-10. This will allow selection of the Study Region created in the previous steps. Select the region that was created in the previous steps, as shown in Figure 3-11, and click **Next**. Click **Finish** on the screen that will appear next (not shown) and the region will open.

Figure 3-10: Open a Region

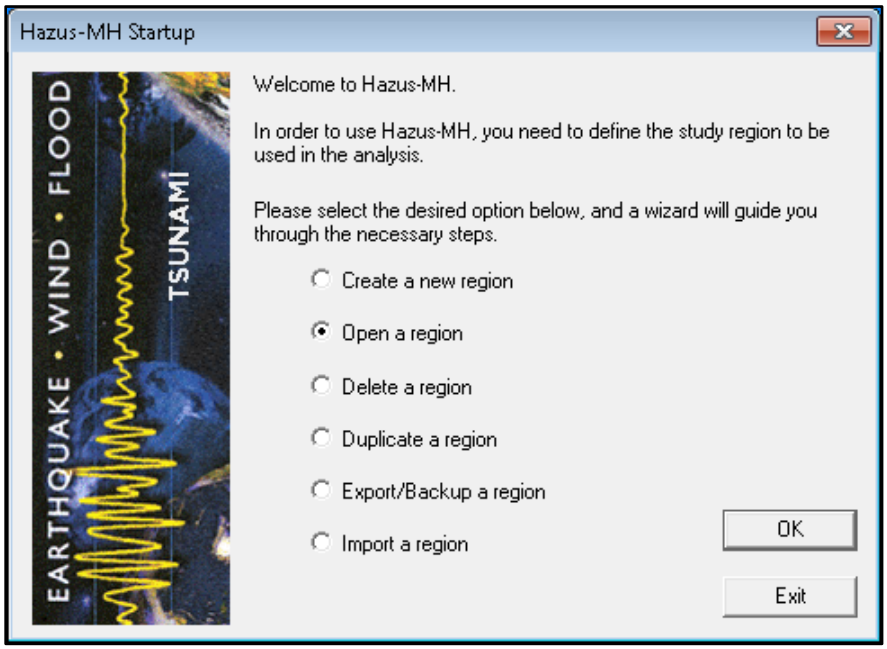
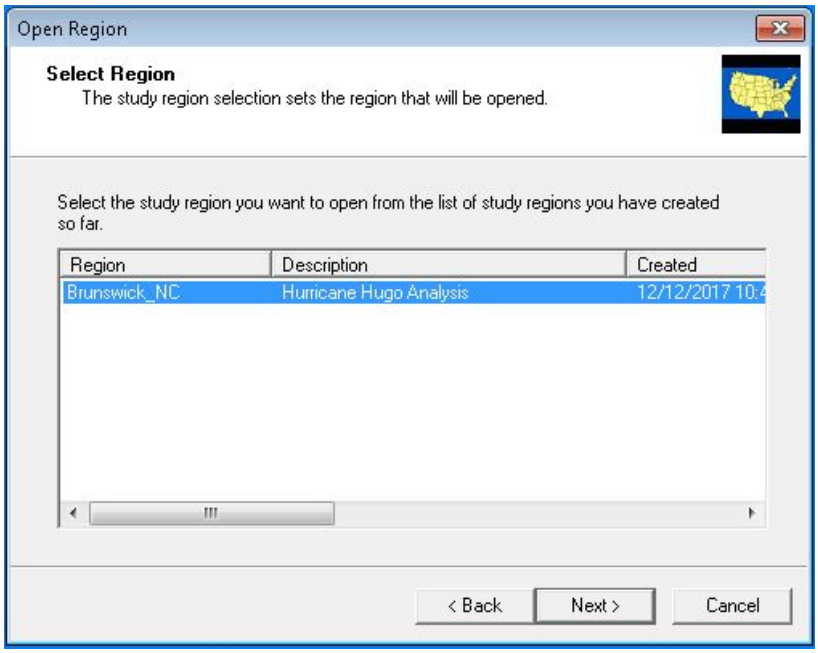


Figure 3-11: Select Region to Open



3.4 Delete Region

The **Delete Region** option shown in Figure 3-12 will not be available until a region has been created or imported. Select Delete Region and click **OK,** as shown in Figure 3-13.

Figure 3-12: Delete a Region

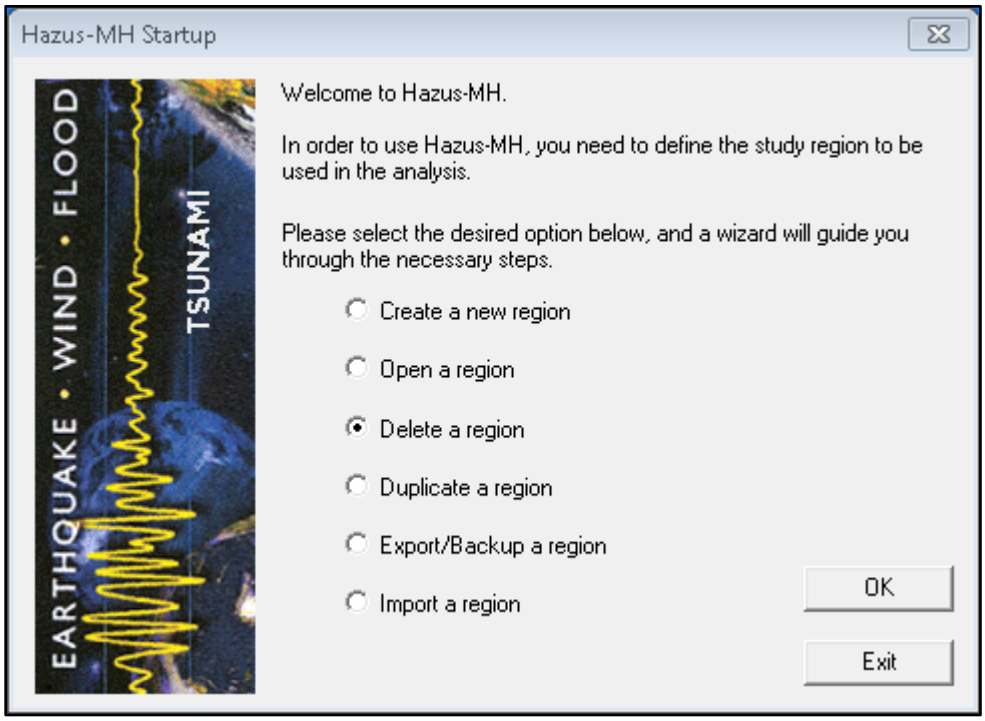
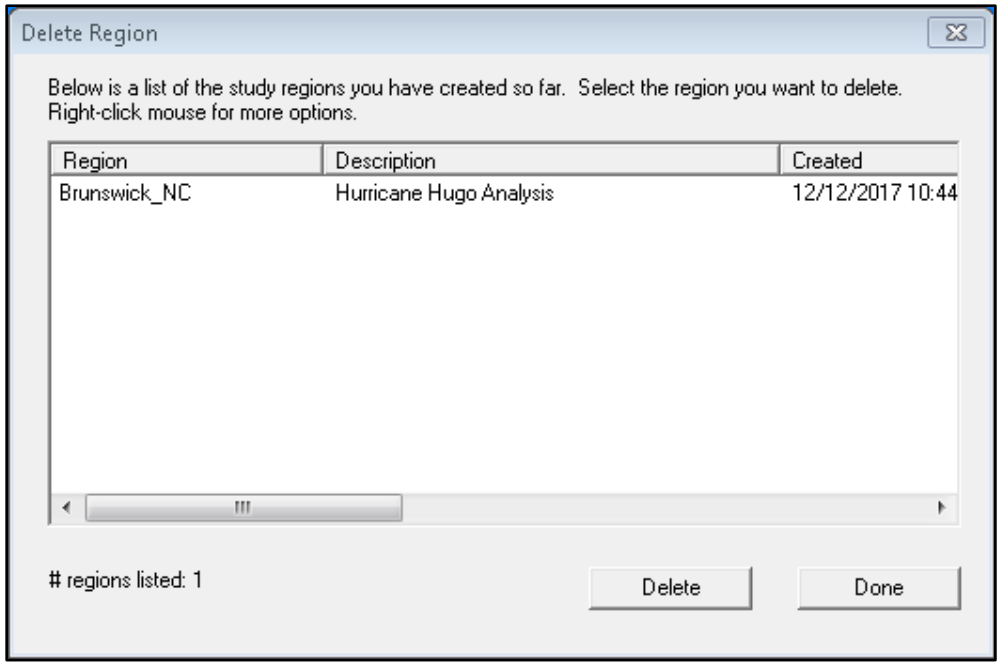


Figure 3-13: Select Region to Delete



3.5 Duplicate Region

The **Duplicate Region** option shown in Figure 3-14 will not be available until a region has been created or imported. Select Duplicate Region and click **OK**. The selected region can be duplicated, as shown in Figure 3-15**.**

Figure 3-14: Duplicate a Region

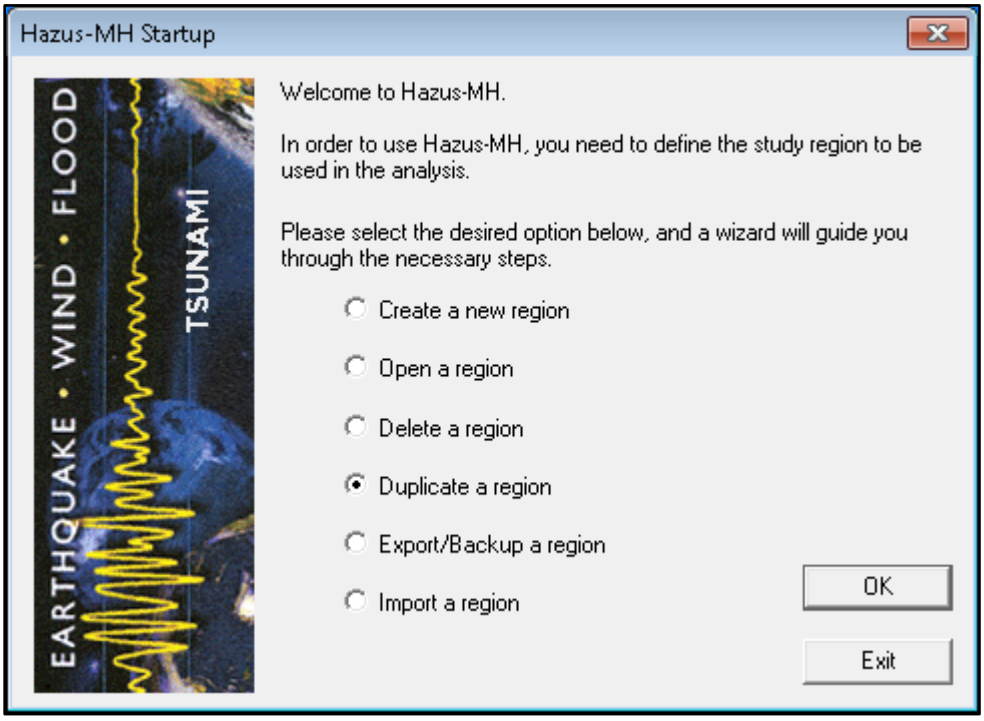
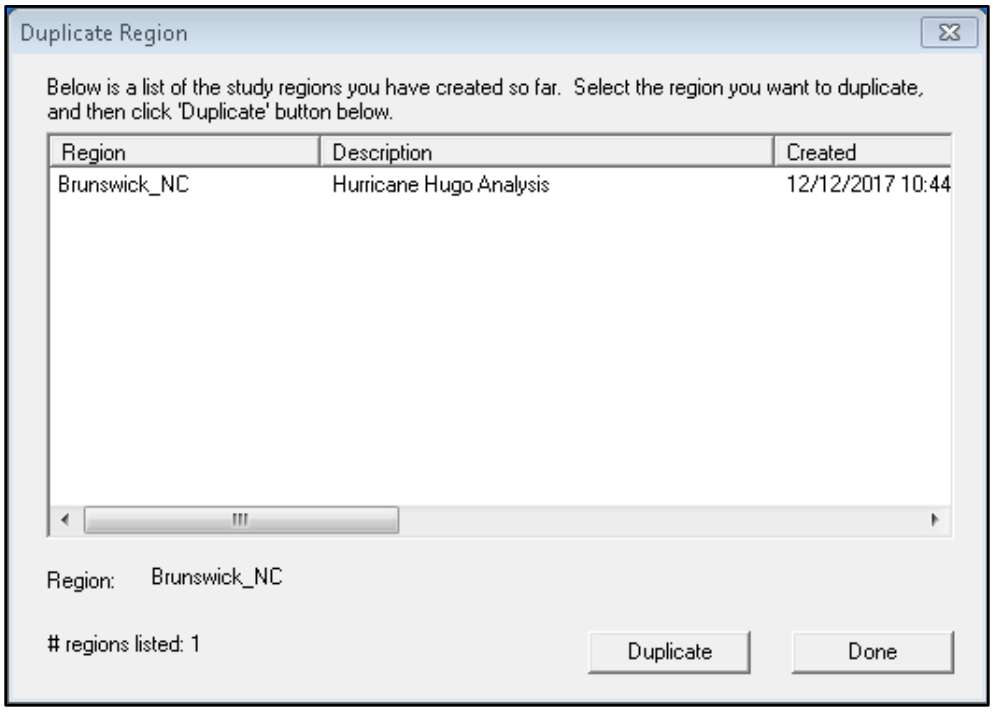


Figure 3-15: Select Region to Duplicate



3.6 Export Region

The **Export/Backup a Region** shown in Figure 3-16 will not be available until a region has been created or imported. Select Export/Backup a Region and click **OK**. The user can then export/backup a region, as shown in Figure 3-17.

Figure 3-16: Export or Backup a Region

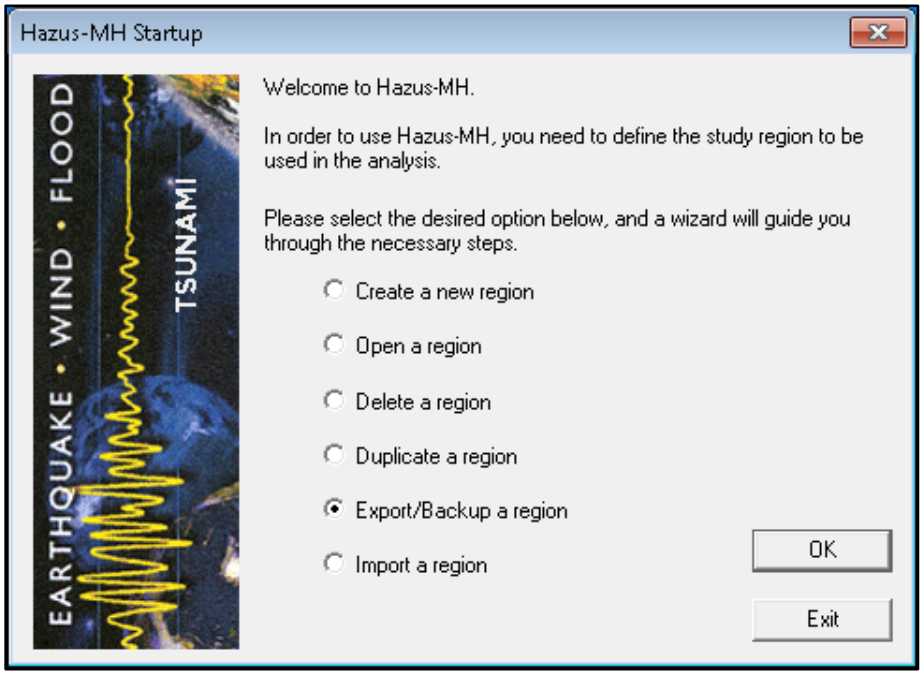
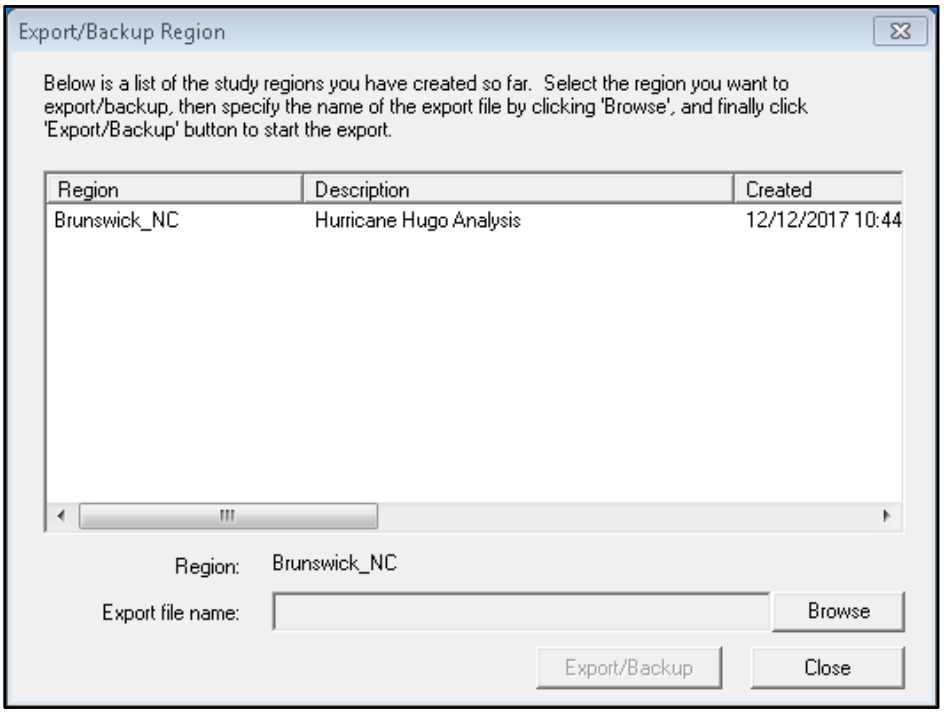


Figure 3-17: Select Region to Export or Backup



3.7 Import Region

Select **Import a Region** and click **OK**. A file explorer will open. Select an export Hazus file (.hpr) as shown in Figure 3-18. Name the imported region as shown in Figure 3-19. Hazus is designed to only allow importing Hazus files from the current Hazus version and the immediate previous version.

Figure 3-18: Import a Region

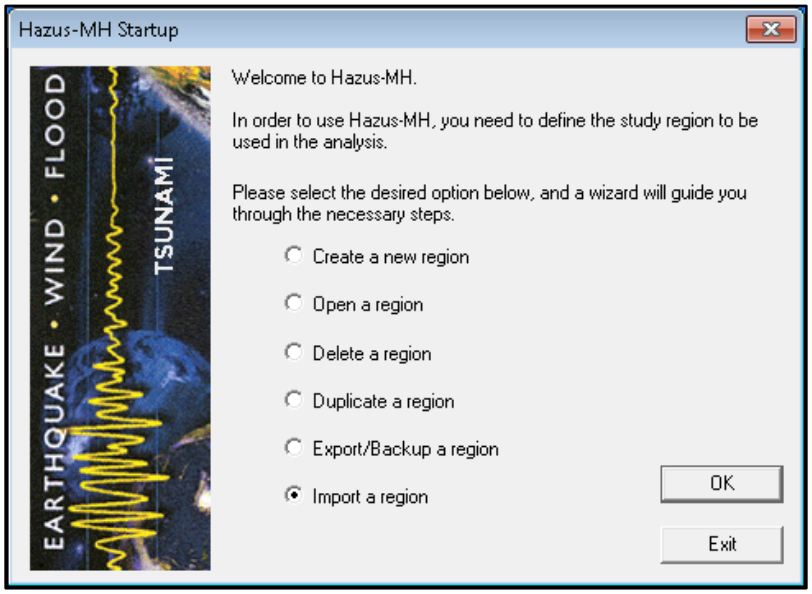
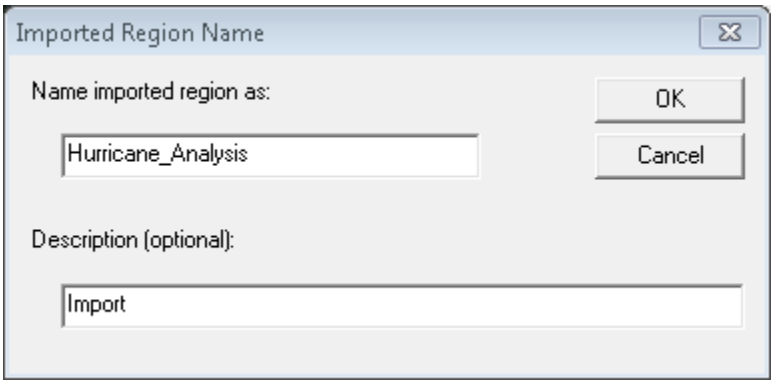


Figure 3-19: Provide the Name for the Imported Region



4 Getting Started II: Basic Hazus Analysis

The Hurricane Model allows practitioners to estimate the economic and social losses from hurricane winds. The information provided by the model will help state and local officials evaluate, plan for, and mitigate the effects of hurricane winds. The Hurricane Model provides practitioners and policy makers with a tool to help reduce wind damage, reduce disaster payments, and make wise use of the nation's emergency management resources.

Chapter 4 shows how to run a basic Hurricane Probabilistic Hurricane Level 1 GBS Analysis. Refer to the Technical Manual for information on the simulation modeling that produced the probabilistic wind field data used in the analysis.

Launch Hazus and select **Open a Region** (Figure 4-1). Information on the other options is provided in Chapter 3. Click **OK**, which will open the **Welcome to the Open Region Wizard** (Figure 4-2).

Figure 4-1: Open a Region

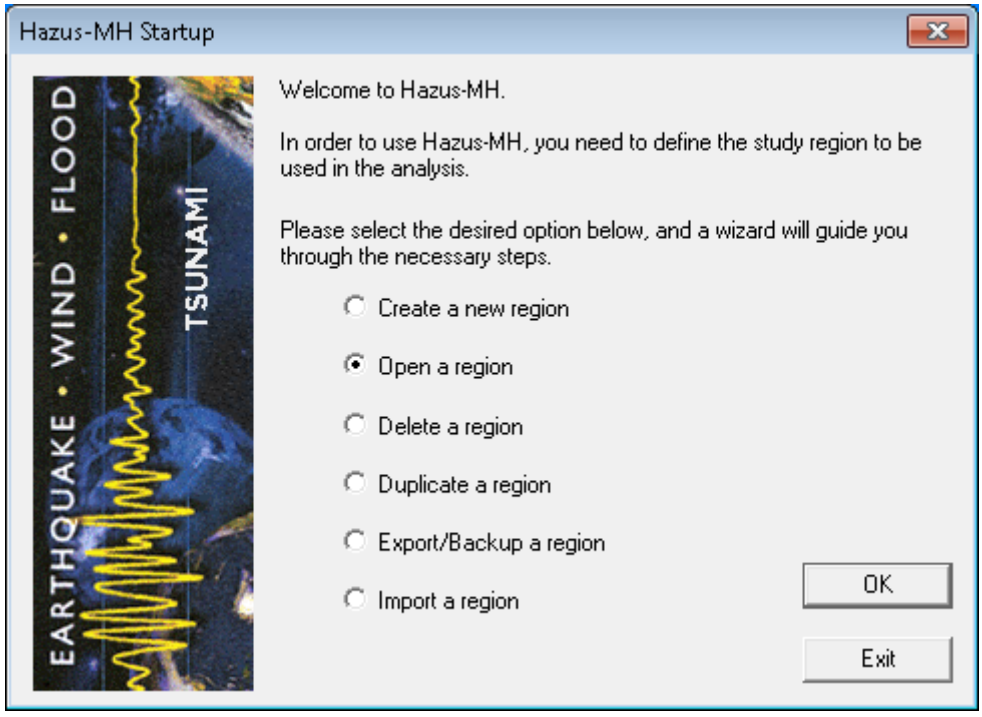
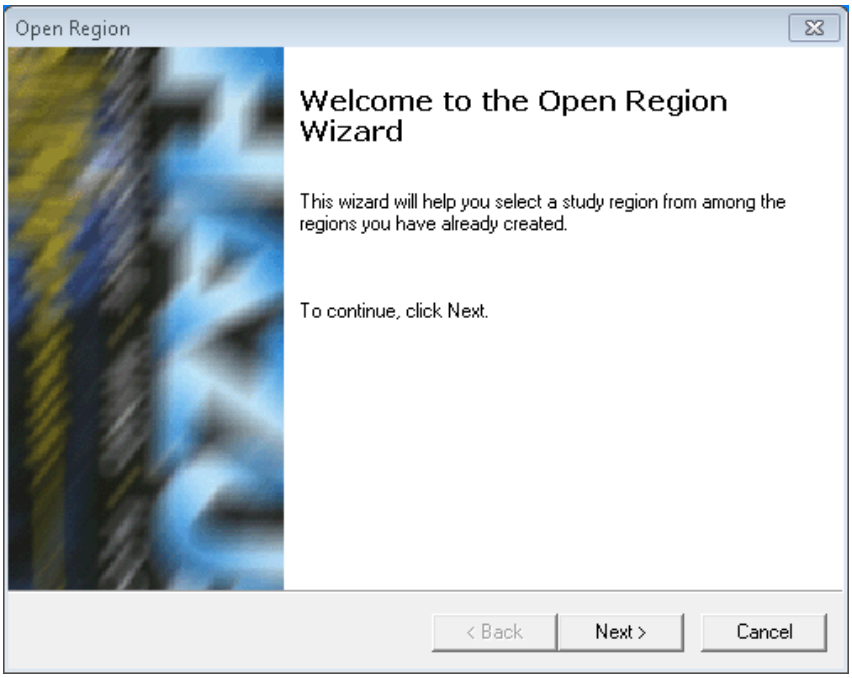
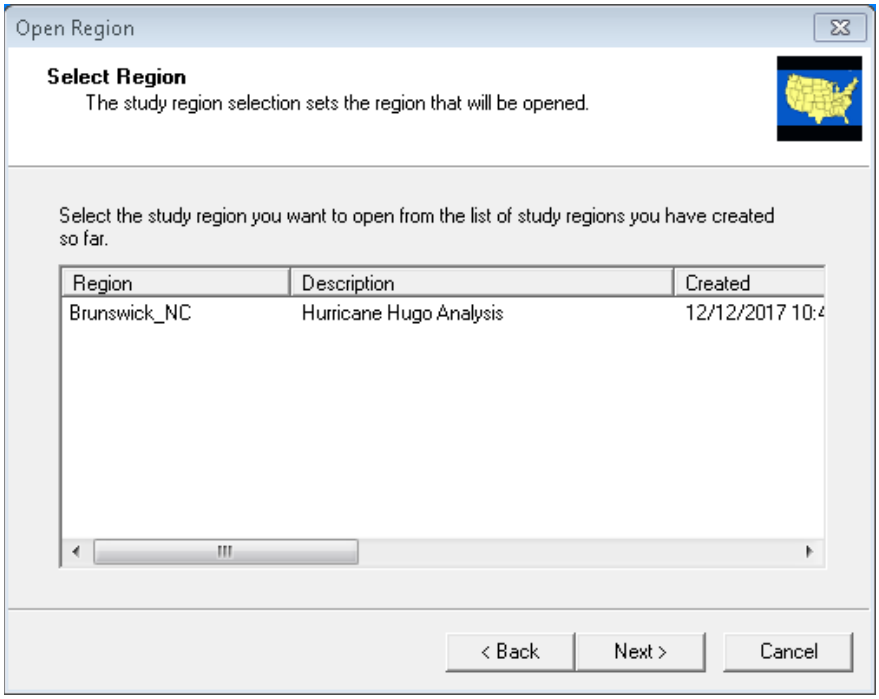


Figure 4-2: Open Region Wizard



Select **Next**. In the **Select Region** window (Figure 4-3), select the region.

Figure 4-3: Select the Region to Open



Click **Next,** which will open the **Completing the Region Review Wizard** (Figure 4-4). Here the user can review the region and hazard that the user selected. Select **Finish**. An ArcMap showing the Study Region will open (Figure 4-5**)**.

Figure 4-4: Confirm the Selected Region

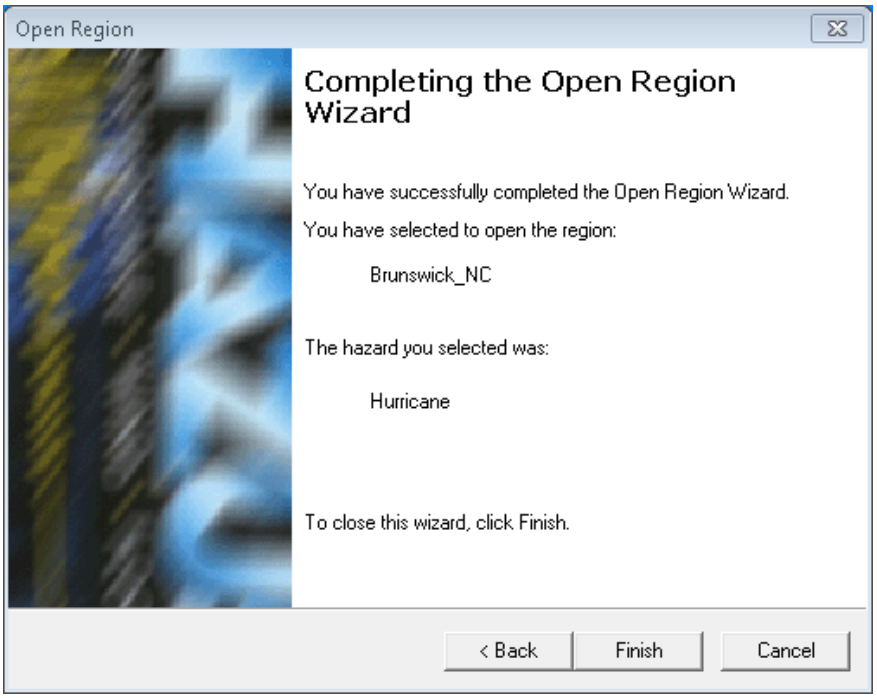
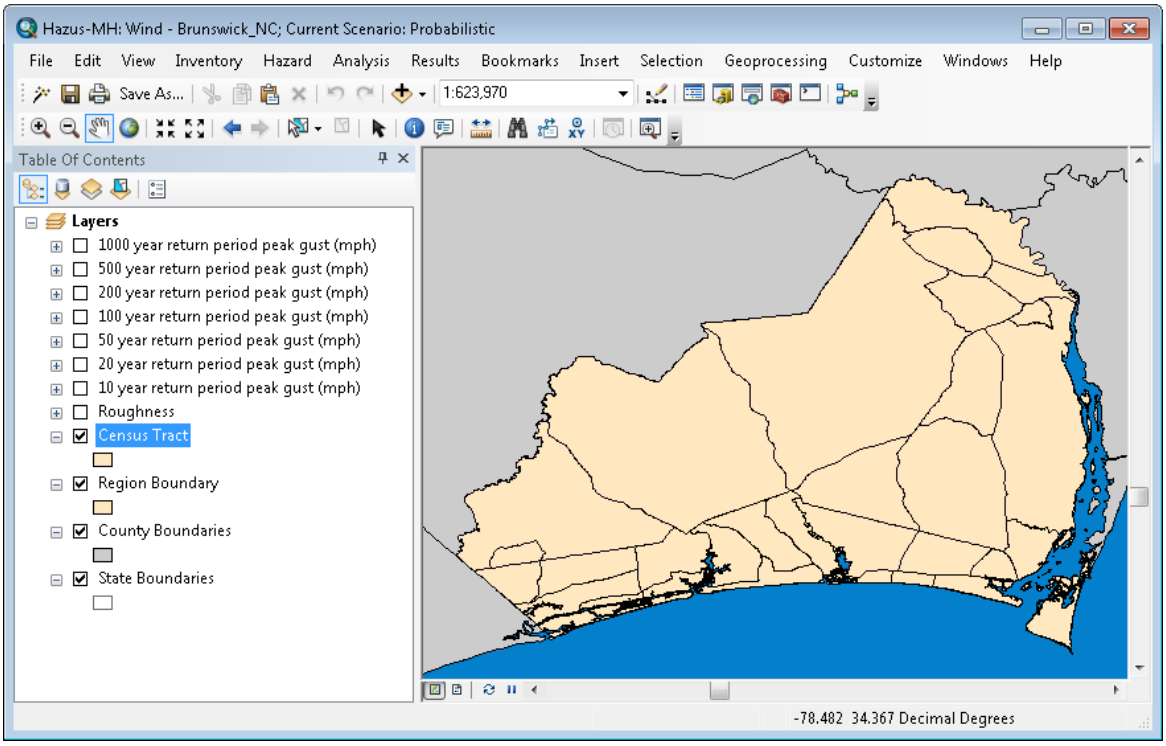
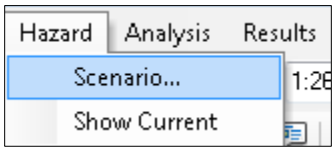


Figure 4-5: Example – Hurricane Model in ArcMap



To choose a probabilistic run, open the **Hazard** dropdown menu and select **Scenario** (Figure 4-6).

Figure 4-6: Select Scenario in Hazard Menu



Selecting **Scenario** will open the **Hurricane Scenario Management Wizard** (Figure 4-7). Select **Next**, which will open the **Scenario Operation** window (Figure 4-8). Choose the Probabilistic Option and choose **Next**.

Figure 4-7: Hurricane Scenario Management Wizard

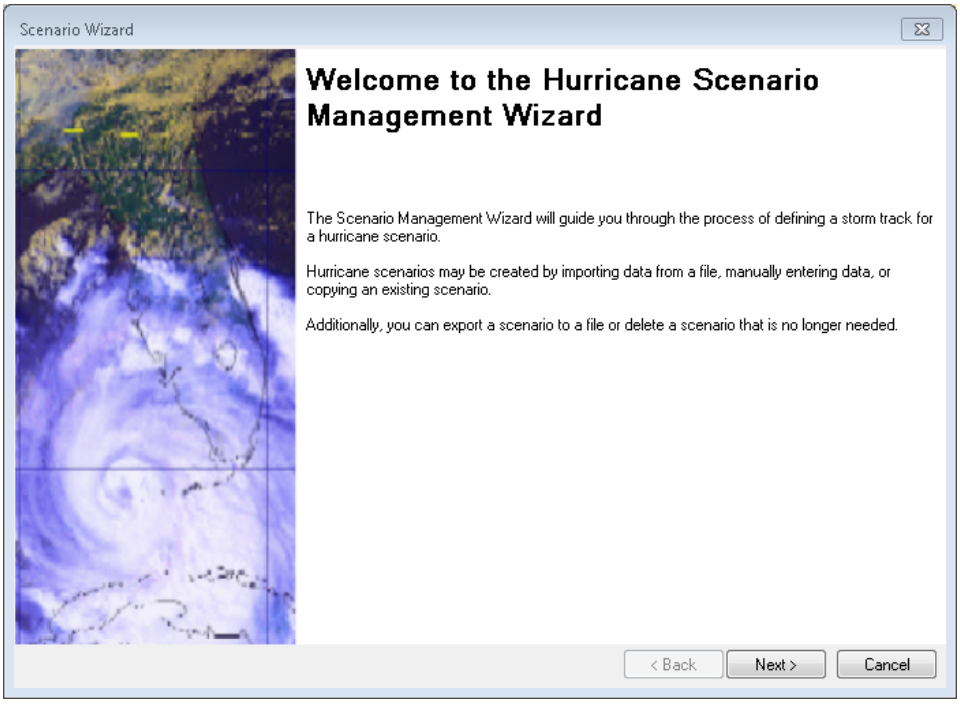
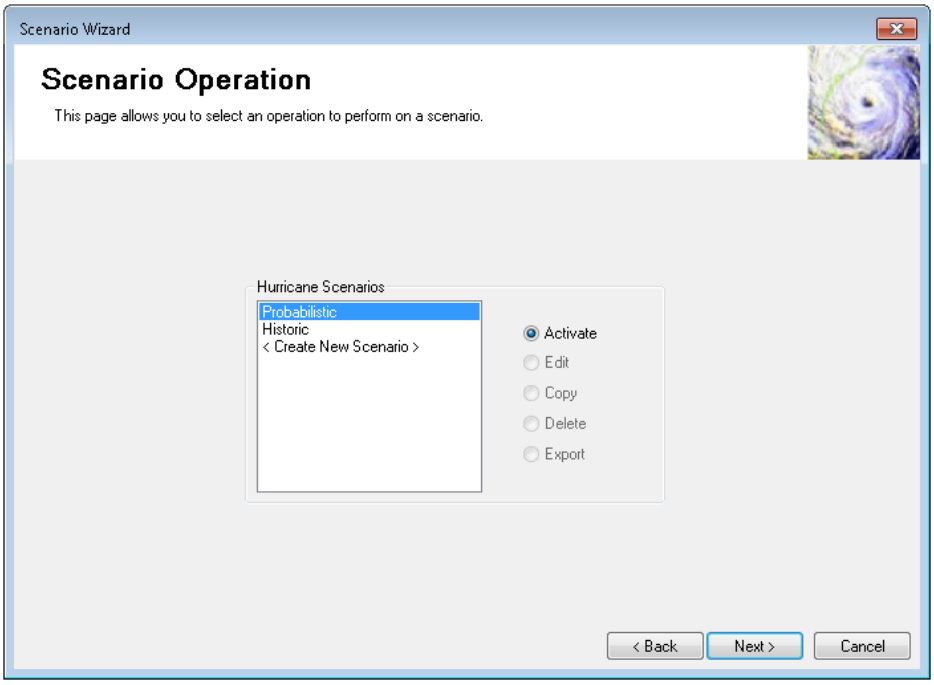
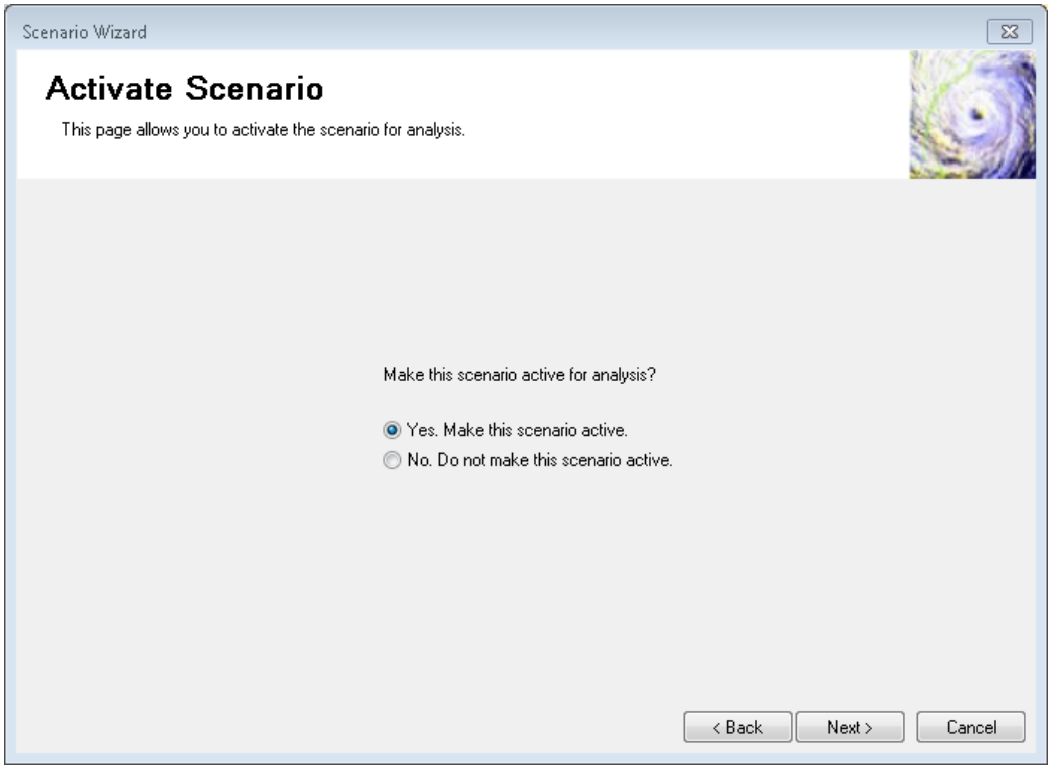


Figure 4-8: Select Probabilistic Hurricane Scenario



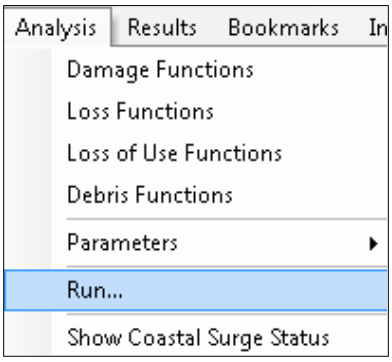
In the **Activate Scenario** window (Figure 4-9), select **Yes** and then choose **Next**, which will activate the probabilistic scenario.

Figure 4-9: Select Yes to Activate Scenario



Now that the scenario has been activated, the user can run the analysis. Open the **Analysis** dropdown menu and choose **Run** (Figure 4-10).

Figure 4-10: Select Run in Analysis Menu



The **Analysis Options** window (Figure 4-11) will allow the user to select the inventory items that will be analyzed for the Study Region. Select the inventory items and then select **Run Analysis**. The program will start the analysis and show a progress bar (Figure 4-12). When the run has finished, the **Analysis Completed** window (Figure 4-13) will appear. The user will now be able to access all of the information that is discussed in Chapter 8 through the Results Menu.

Figure 4-11: Select Inventory Items and Run Analysis

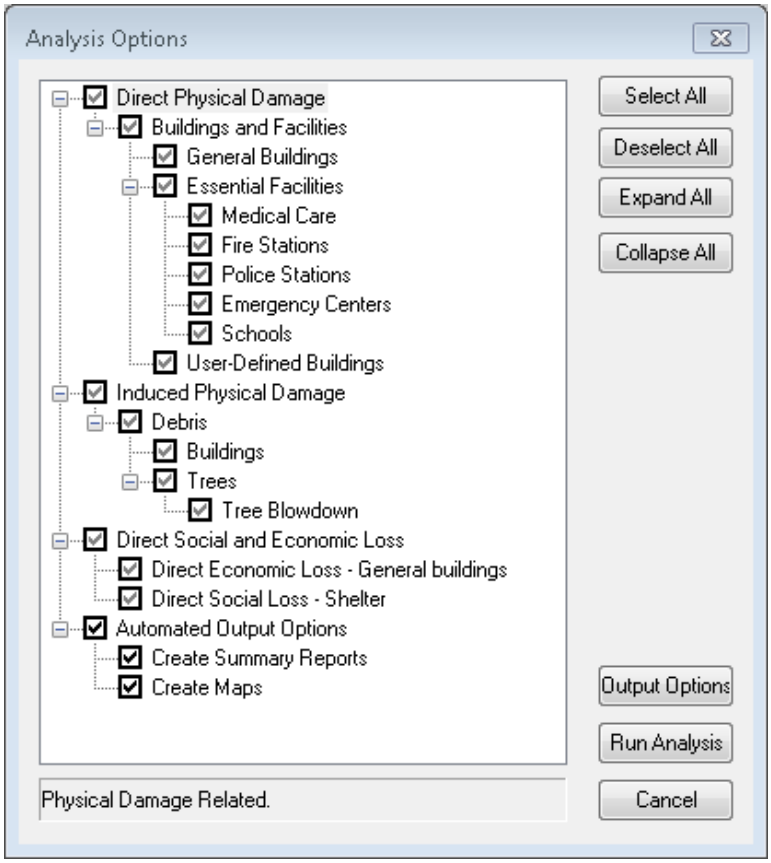


Figure 4-12: Analysis Progress

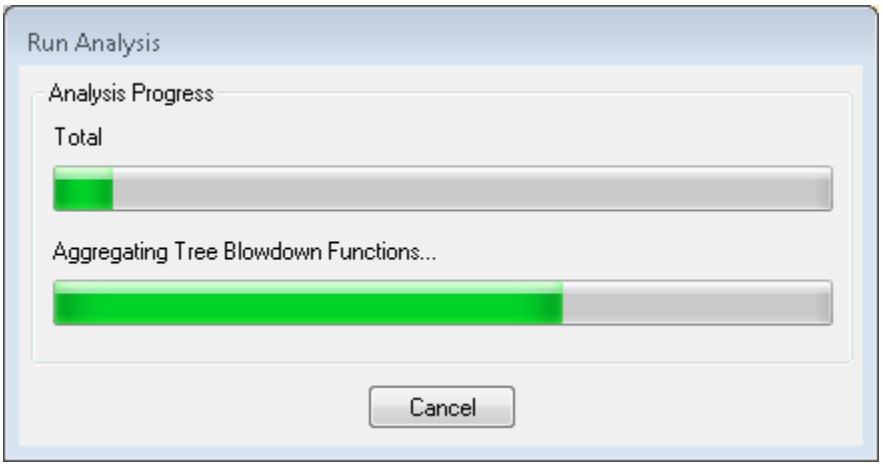
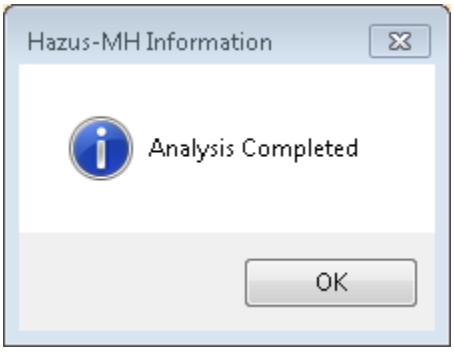


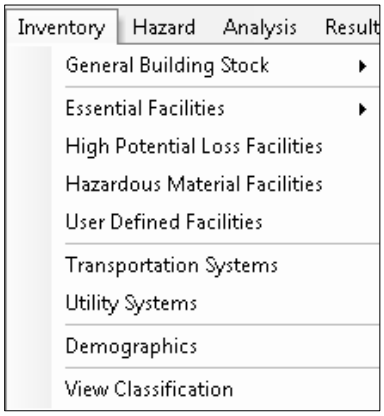
Figure 4-13: Analysis Completed



5 Model Menu: Inventory

The **Inventory** menu, shown in Figure 5-1, has inventory types and subtypes that allow the estimation of the amount of exposure and potential damage in the Study Region. The screenshots in this chapter show all of the options for the inventory menu.

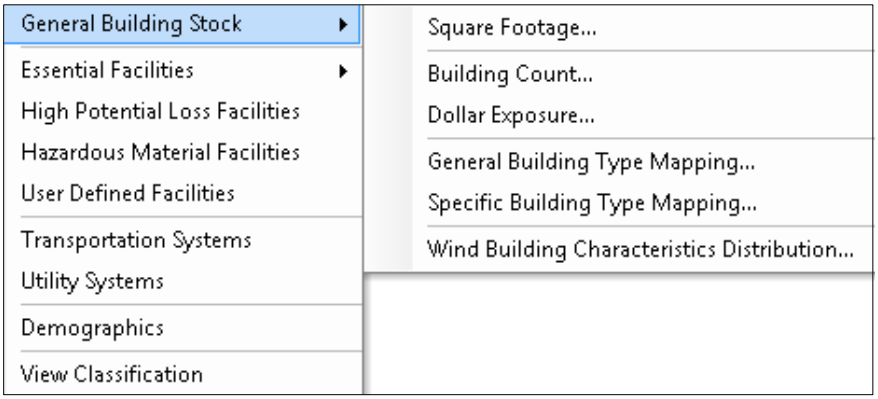
Figure 5-1: Inventory Menu



5.1 General Building Stock

The first type of inventory is **General Building Stock**. The subtypes are Square Footage, Building Count, Dollar Exposure, General Building Type Mapping, Specific Building Type Mapping, and Wind Building Characteristics Distribution, as shown in Figure 5-2.

Figure 5-2: Inventory / General Building Stock Menu



5.1.1 Square Footage

Square Footage, opened through the menu shown in Figure 5-3, allows the user to see the type of square footage distribution in thousands of square feet per the census tracts, as shown in Figure 5-4.

Figure 5-3: General Building Stock / Square Footage Menu

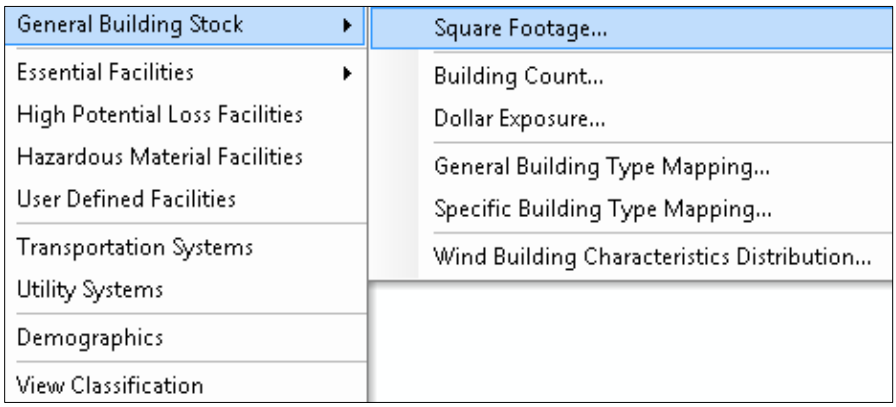
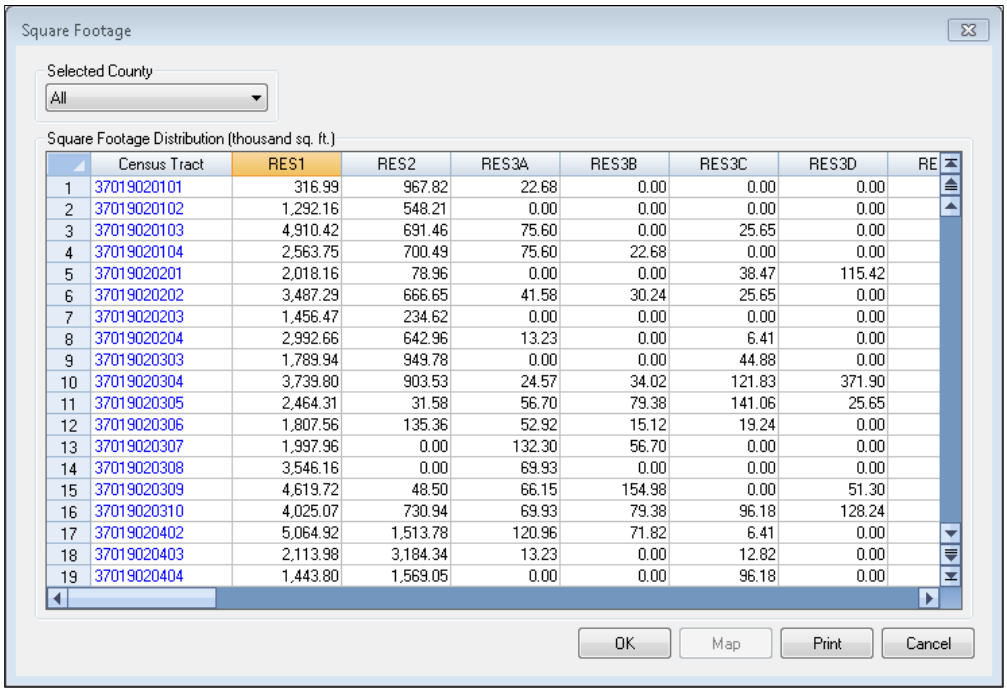


Figure 5-4: Square Footage Table



	Census Tract	RES1	RES2	RES3A	RES3B	RES3C	RES3D	RE
1	37019020101	316.99	967.82	22.68	0.00	0.00	0.00	
2	37019020102	1,292.16	548.21	0.00	0.00	0.00	0.00	
3	37019020103	4,910.42	691.46	75.60	0.00	25.65	0.00	
4	37019020104	2,563.75	700.49	75.60	22.68	0.00	0.00	
5	37019020201	2,018.16	78.96	0.00	0.00	38.47	115.42	
6	37019020202	3,487.29	666.65	41.58	30.24	25.65	0.00	
7	37019020203	1,456.47	234.62	0.00	0.00	0.00	0.00	
8	37019020204	2,992.66	642.96	13.23	0.00	6.41	0.00	
9	37019020303	1,789.94	949.78	0.00	0.00	44.88	0.00	
10	37019020304	3,739.80	903.53	24.57	34.02	121.83	371.90	
11	37019020305	2,464.31	31.58	56.70	79.38	141.06	25.65	
12	37019020306	1,807.56	135.36	52.92	15.12	19.24	0.00	
13	37019020307	1,997.96	0.00	132.30	56.70	0.00	0.00	
14	37019020308	3,546.16	0.00	69.93	0.00	0.00	0.00	
15	37019020309	4,619.72	48.50	66.15	154.98	0.00	51.30	
16	37019020310	4,025.07	730.94	69.93	79.38	96.18	128.24	
17	37019020402	5,064.92	1,513.78	120.96	71.82	6.41	0.00	
18	37019020403	2,113.98	3,184.34	13.23	0.00	12.82	0.00	
19	37019020404	1,443.80	1,569.05	0.00	0.00	96.18	0.00	

5.1.2 Building Count

Building Count (Figure 5-5) allows the user to review the building count per census tract **By Occupancy** and **By Building Type** for specific and general occupancies, as shown in Figure 5-6.

Figure 5-5: General Building Stock / Building Count Menu

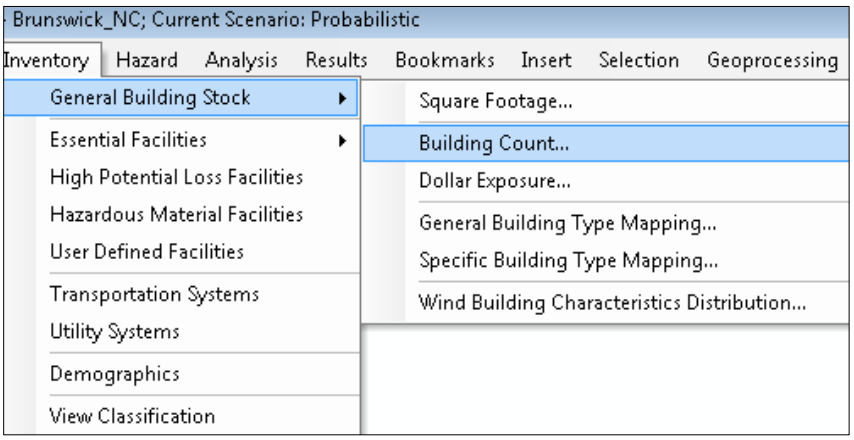
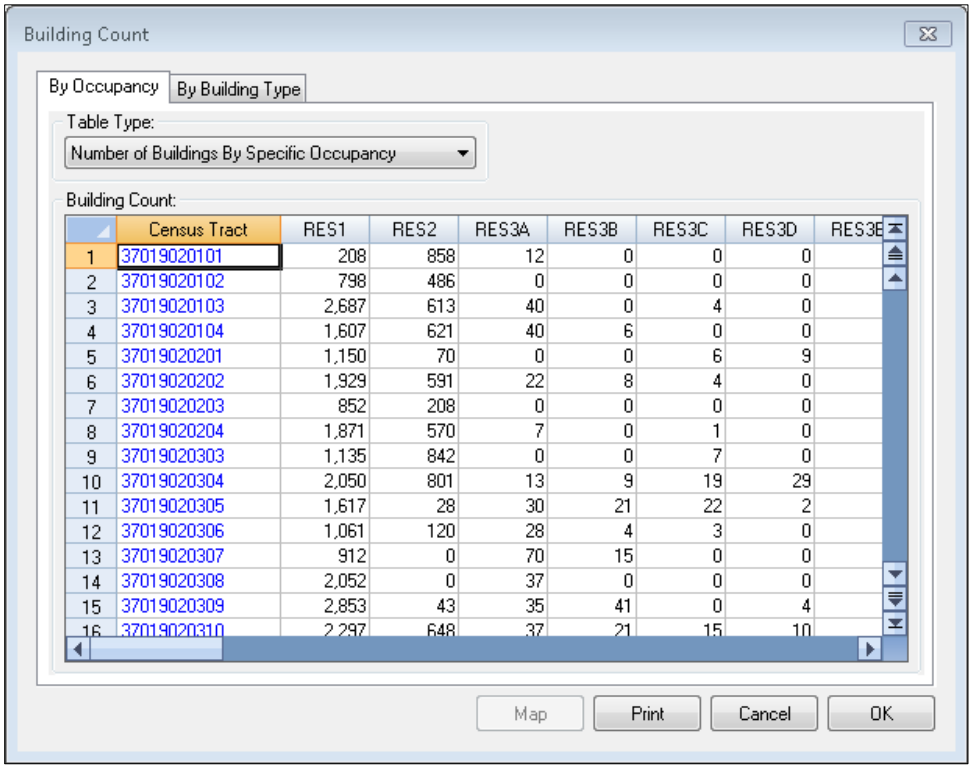


Figure 5-6: Building Count (by Occupancy) Table



5.1.3 Dollar Exposure

Dollar Exposure (Figure 5-7) allows the user to review **Building** exposure per census tract in thousands of dollars, **Contents**, and **Total**. In the **Building** menu, the user can select **Specific Occupancy,** as shown in Figure 5-8, and also **General Occupancy, Specific Building Type,** and **General Building Type for Building.**

Figure 5-7: General Building Stock / Dollar Exposure Menu

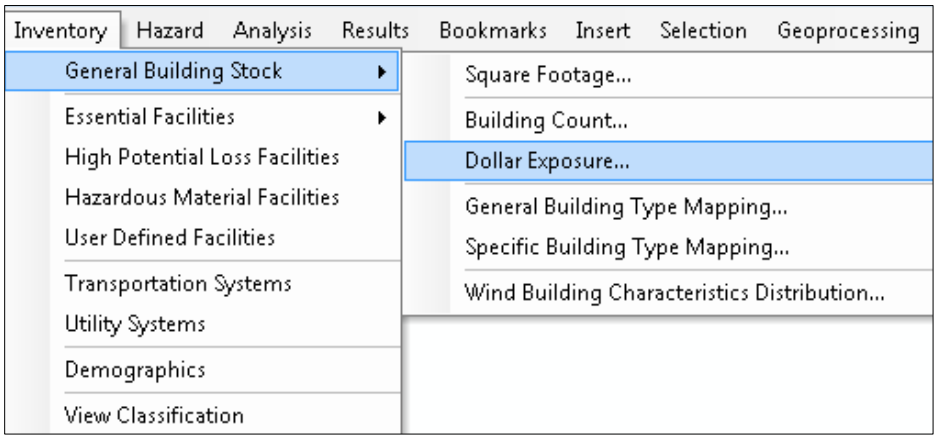
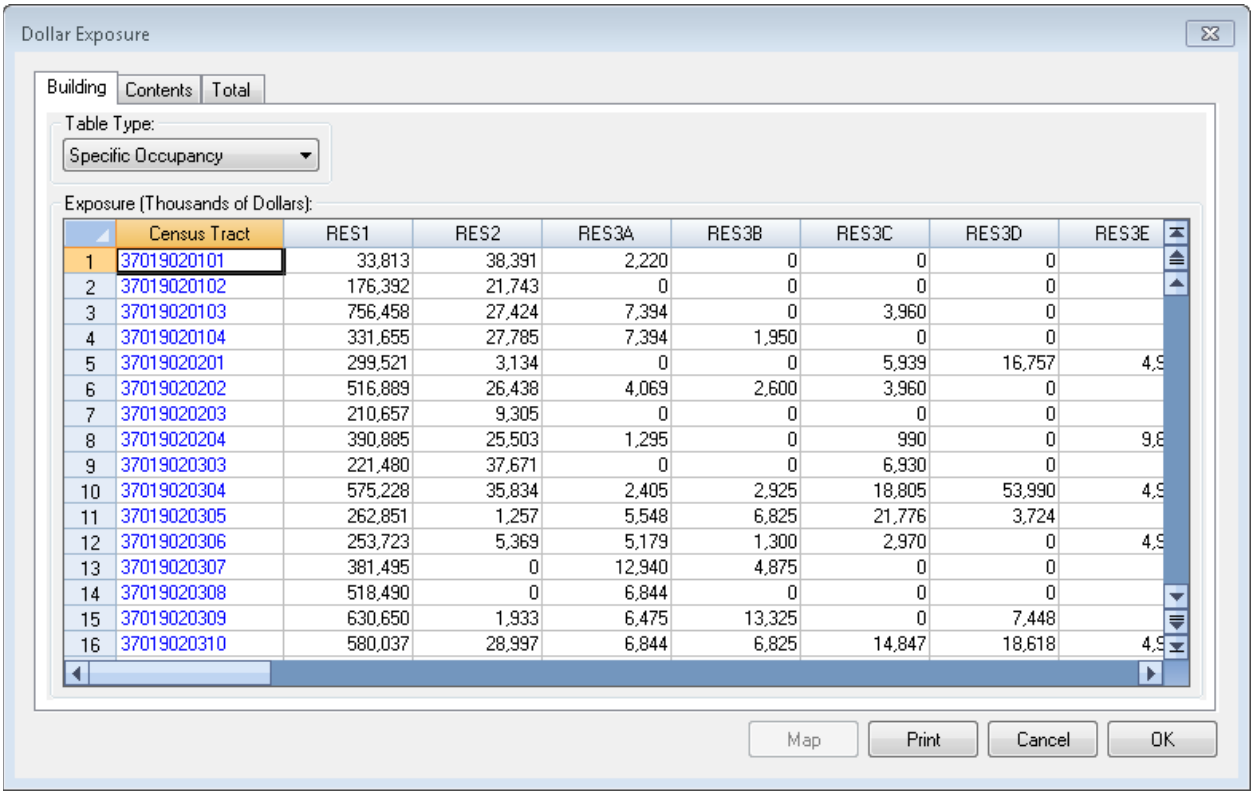


Figure 5-8: Dollar Exposure (By Building Occupancy) Table



	Census Tract	RES1	RES2	RES3A	RES3B	RES3C	RES3D	RES3E
1	37019020101	33,813	38,391	2,220	0	0	0	
2	37019020102	176,392	21,743	0	0	0	0	
3	37019020103	756,458	27,424	7,394	0	3,960	0	
4	37019020104	331,655	27,785	7,394	1,950	0	0	
5	37019020201	299,521	3,134	0	0	5,939	16,757	4,9
6	37019020202	516,889	26,438	4,069	2,600	3,960	0	
7	37019020203	210,657	9,305	0	0	0	0	
8	37019020204	390,885	25,503	1,295	0	990	0	9,8
9	37019020303	221,480	37,671	0	0	6,930	0	
10	37019020304	575,228	35,834	2,405	2,925	18,805	53,990	4,9
11	37019020305	262,851	1,257	5,548	6,825	21,776	3,724	
12	37019020306	253,723	5,369	5,179	1,300	2,970	0	4,9
13	37019020307	381,495	0	12,940	4,875	0	0	
14	37019020308	518,490	0	6,844	0	0	0	
15	37019020309	630,650	1,933	6,475	13,325	0	7,448	
16	37019020310	580,037	28,997	6,844	6,825	14,847	18,618	4,9

5.1.4 General Building Type Mapping

General Building Type Mapping (Figure 5-9) allows the user to assign, view, and edit the distribution of general building types in each occupancy type and census tract, as shown in Figure 5-10. General building type mapping schemes can be assigned at the state, county, and census tract levels.

As shown in Figure 5-10, select one or more counties and select **Census Track List** to see a list of the census tracts in the selected counties. To change the mapping scheme assigned to one or more census tracts, highlight the states, counties, and tracts of interest, select the desired mapping scheme from the dropdown list in the top right corner of the window and click **Apply**.

Figure 5-9: General Building Stock / General Building Type Mapping Menu

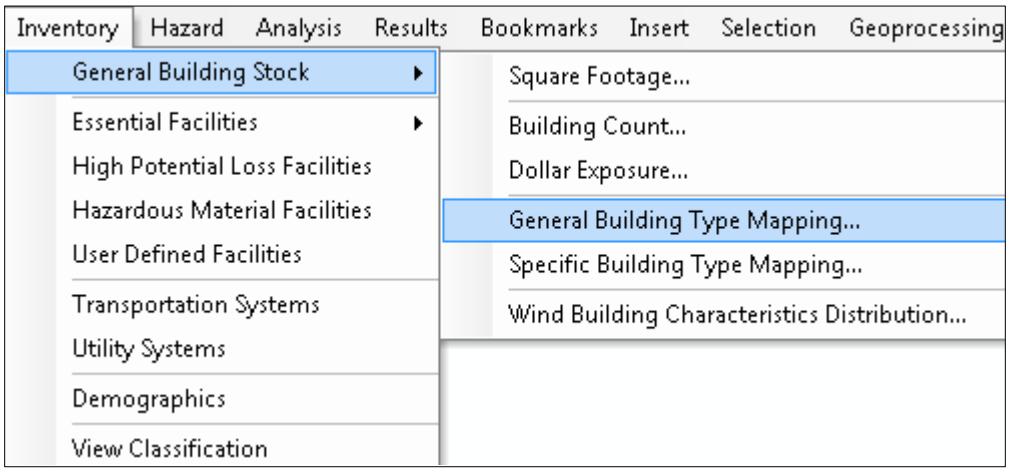
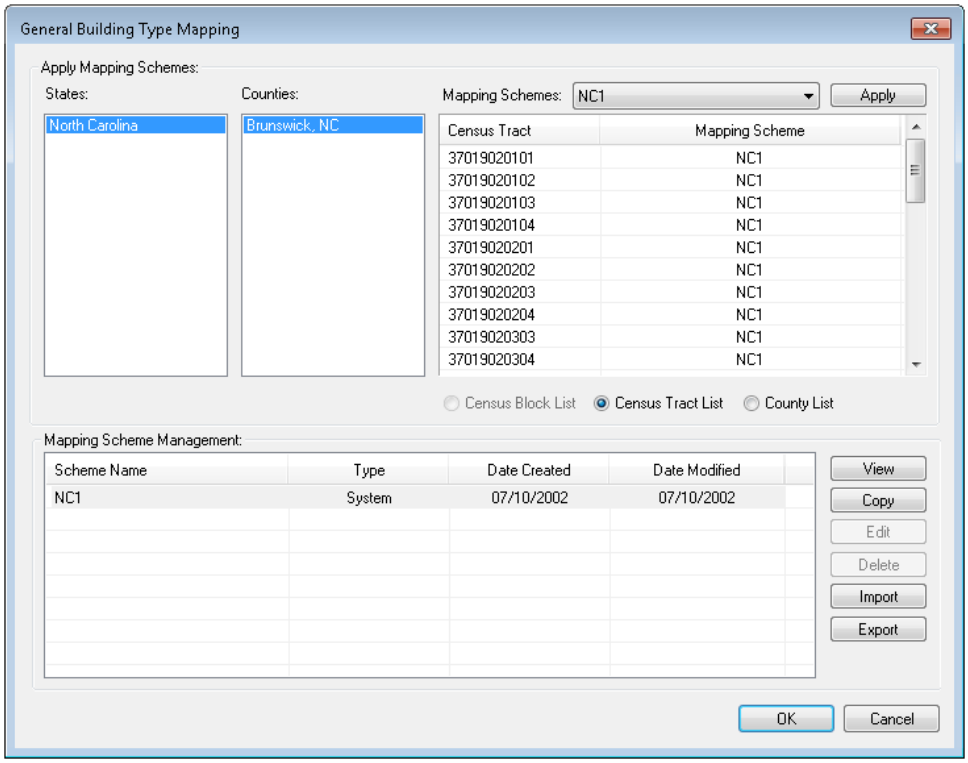


Figure 5-10: General Building Type Mapping Schemes



5.1.5 Specific Building Type Mapping

The Specific Building Type Mapping menu (Figure 5-11) allows the user to assign, view, and edit the distribution of building types in each occupancy and census tract. The data in these dialogs are specific to the Hurricane Model. Selecting **Specific Building Type Mapping** will open the window shown in Figure 5-12.

Figure 5-11: General Building Stock / Specific Building Type Mapping Menu

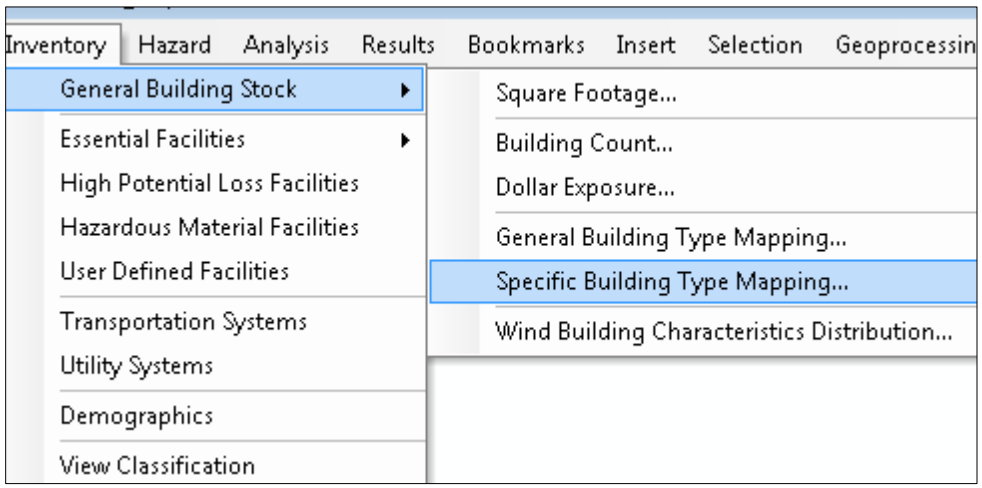
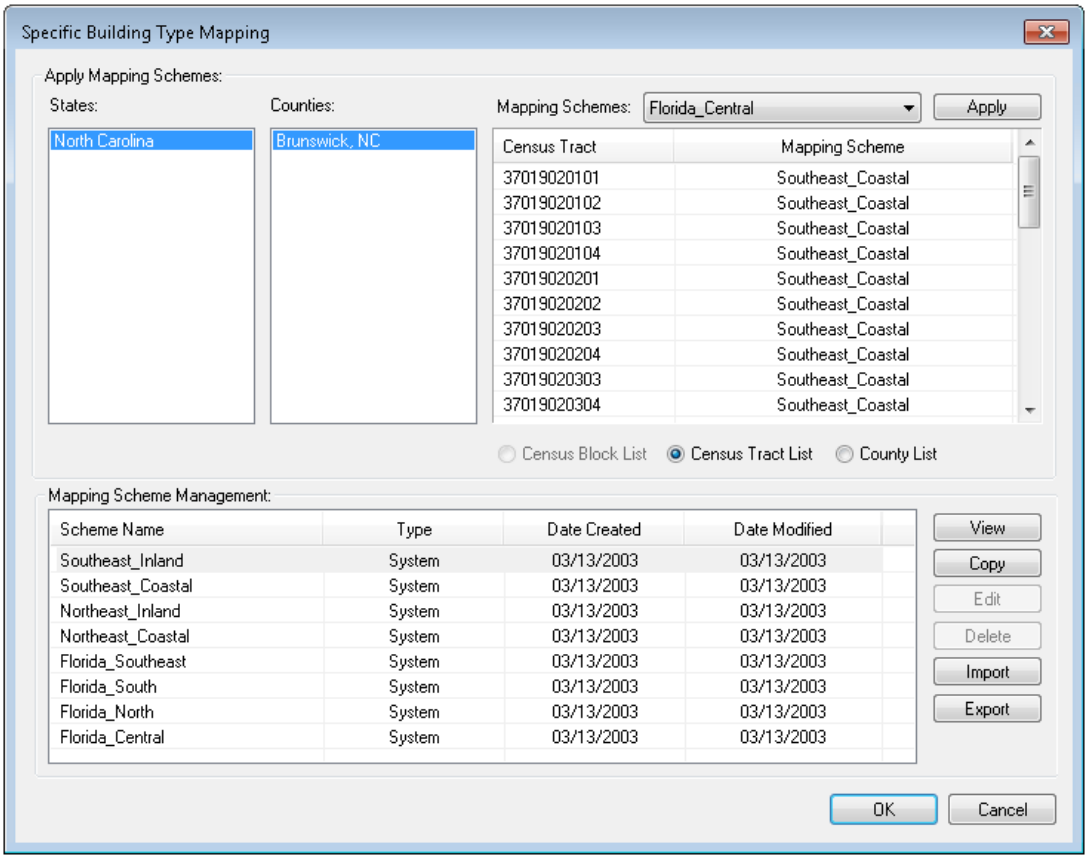


Figure 5-12: Specific Building Type Mapping Schemes



5.1.6 Wind Building Characteristics Distribution

The Wind Building Characteristics Distribution menu (Figure 5-13) allows the user to assign, view, and edit the distribution of wind building characteristics in each building type and census tract. The data in these dialogs are specific to the Hurricane Model. Selecting the Wind Building Characteristics Distribution will open the table shown in Figure 5-14.

Figure 5-13: General Building Stock / Wind Building Characteristics Distribution Menu

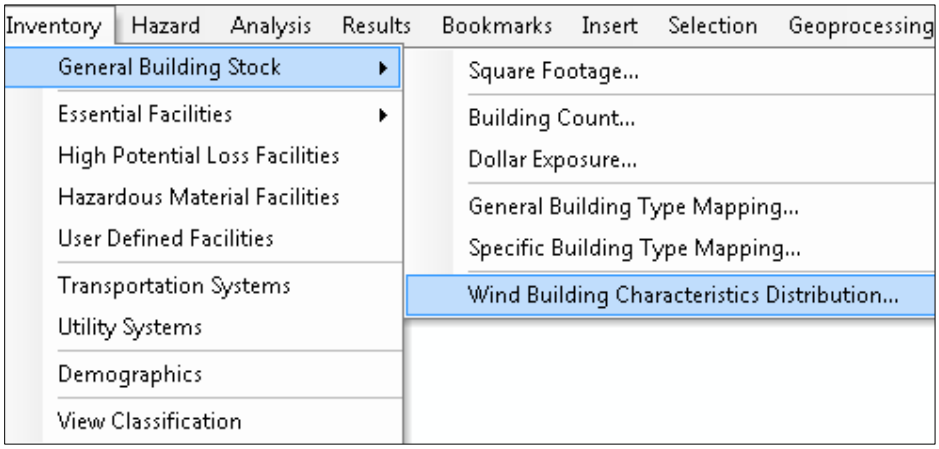
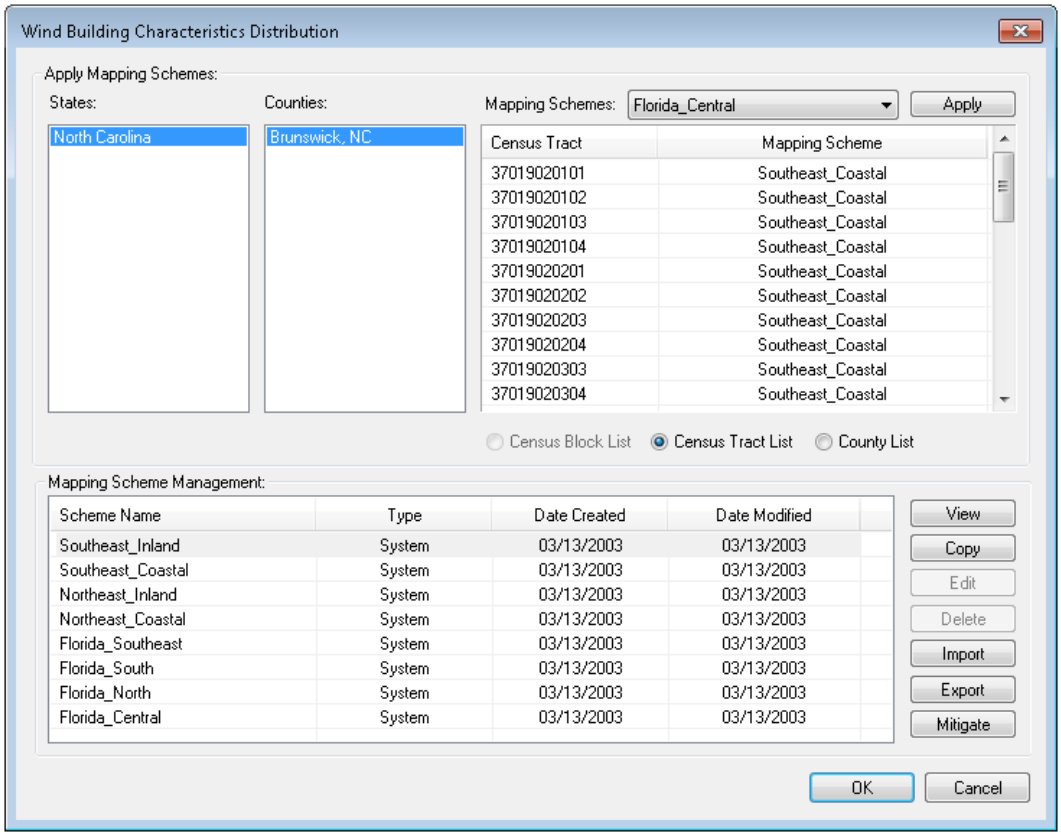


Figure 5-14: Wind Building Characteristics Distribution Schemes



5.2 Essential Facilities

Essential facilities include medical care facilities, fire stations, police stations, emergency response centers, and schools.

5.2.1 Inventory

To view the essential facilities inventory in the Study Region, select **Essential Facilities** (Figure 5-15). Selecting **Inventory** will open the window shown in Figure 5-16.

Figure 5-15: Inventory / Essential Facilities Menu

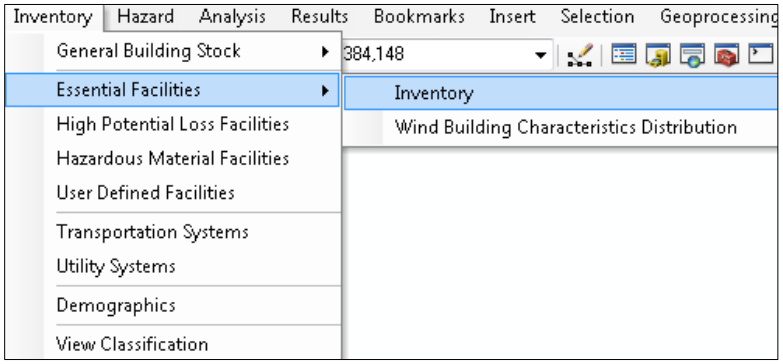
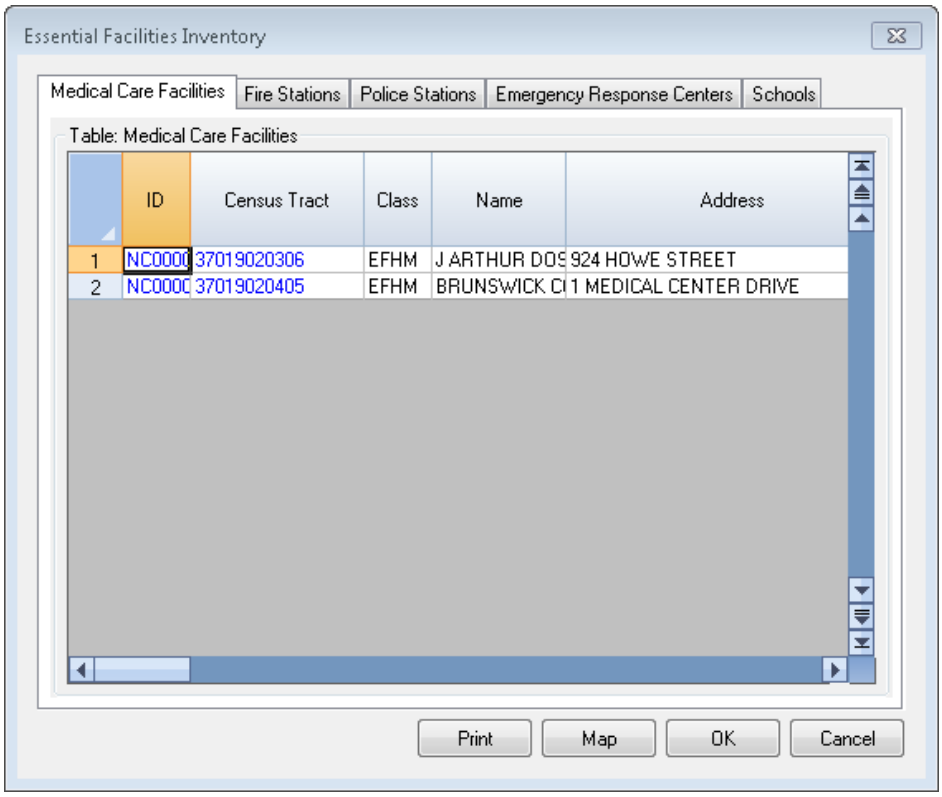


Figure 5-16: Essential Facilities (Medical Care Facilities) Table



5.2.2 Wind Building Characteristics Distribution

Wind Building Characteristics Distribution (Figure 5-17) allows the user to assign, view, and edit the distribution of wind building characteristics for essential facilities. The data in these dialogs are specific to the Hurricane Model. Selecting the **Wind Building Characteristics Distribution** will open the table shown in Figure 5-18.

Figure 5-17: Essential Facilities / Wind Building Characteristics Distribution Menu

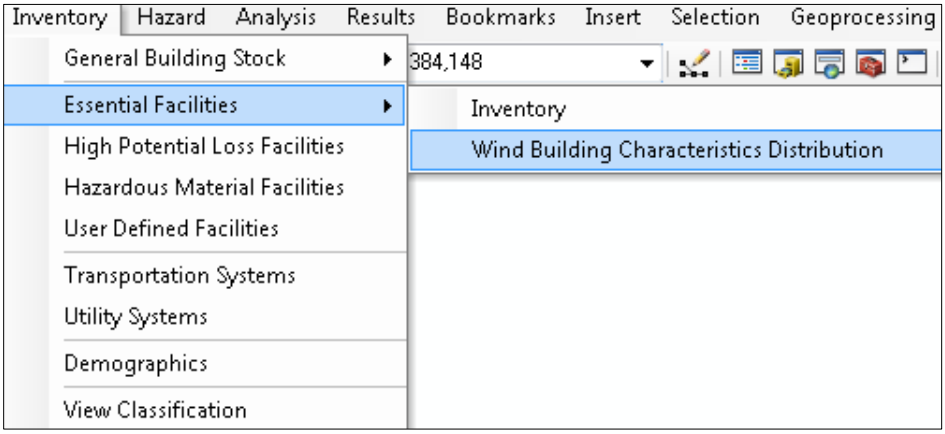
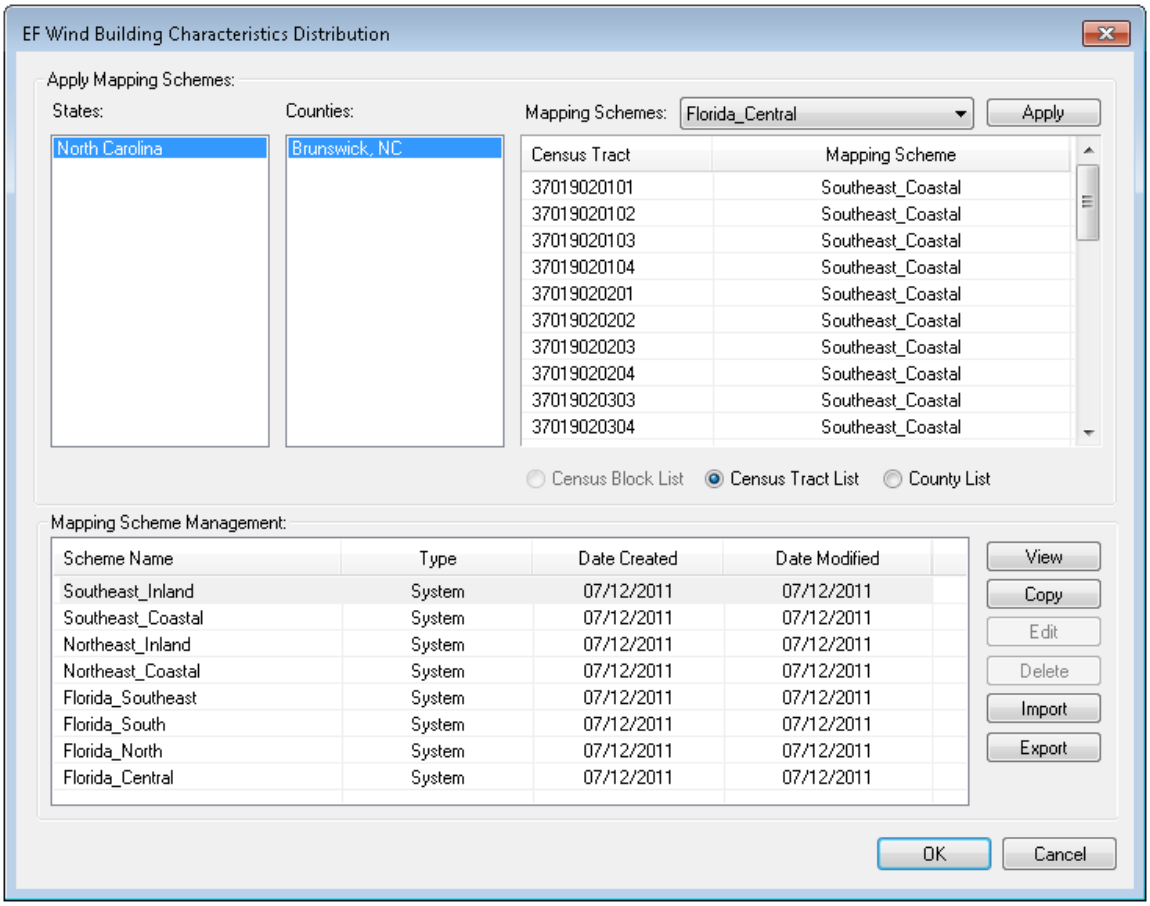


Figure 5-18: Essential Facilities / Wind Building Characteristics Distribution Schemes



5.3 High Potential Loss Facilities

High Potential Loss Facilities (HPLF) (Figure 5-19) allows the user to view and map the default database for the Study Region. Damage and loss are not computed for HPLF in the current version of the Hurricane Model. Selecting **High Potential Loss Facilities** will open the table shown in Figure 5-20. HPLF include dams and levees, nuclear power facilities, and military installations.

Figure 5-19: Inventory / High Potential Loss Facilities Menu

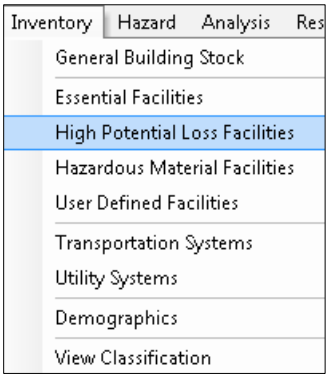
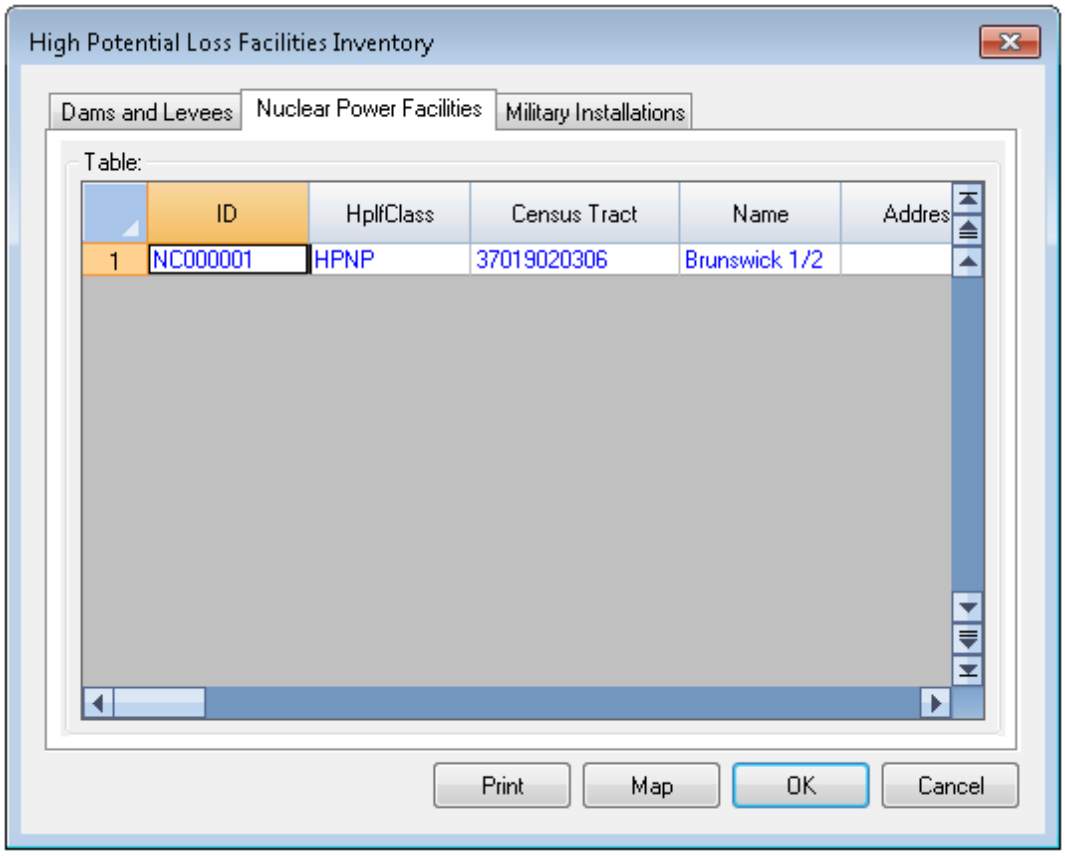


Figure 5-20: High Potential Loss Facilities (Nuclear Power Facilities) Table



5.4 Hazardous Materials Facilities

Hazardous Materials Facilities (Figure 5-21) allows the user to view and map the default database for the Study Region. Damage and loss are not computed for hazardous materials sites in the current version of the Hurricane Model. Selecting **Hazardous Materials Facilities** will open the table shown in Figure 5-22.

Figure 5-21: Inventory / Hazardous Materials Facilities Menu

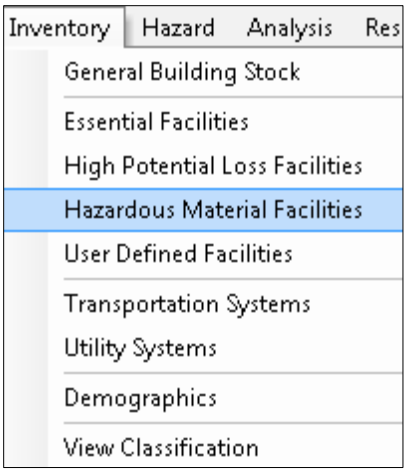
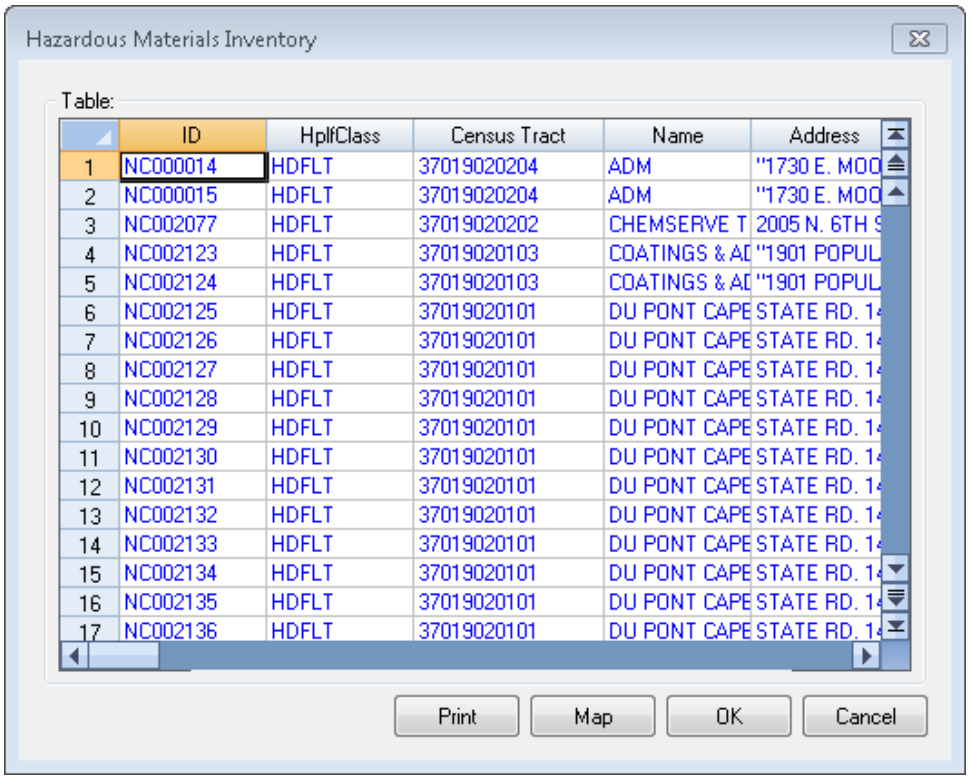


Figure 5-22: Hazardous Materials Facilities Table

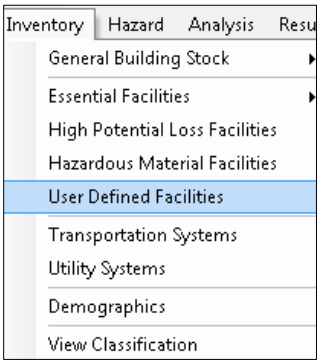


5.5 User-Defined Facilities[1]

User-defined facilities (UDF) are buildings at specific locations that the user adds to the inventory. Damage is evaluated on a building-by-building basis for user-defined facilities. Due to limited functionality of the current Hurricane Model, the hurricane UDF analysis is limited to hurricane damage state estimates and does not estimate dollar losses.

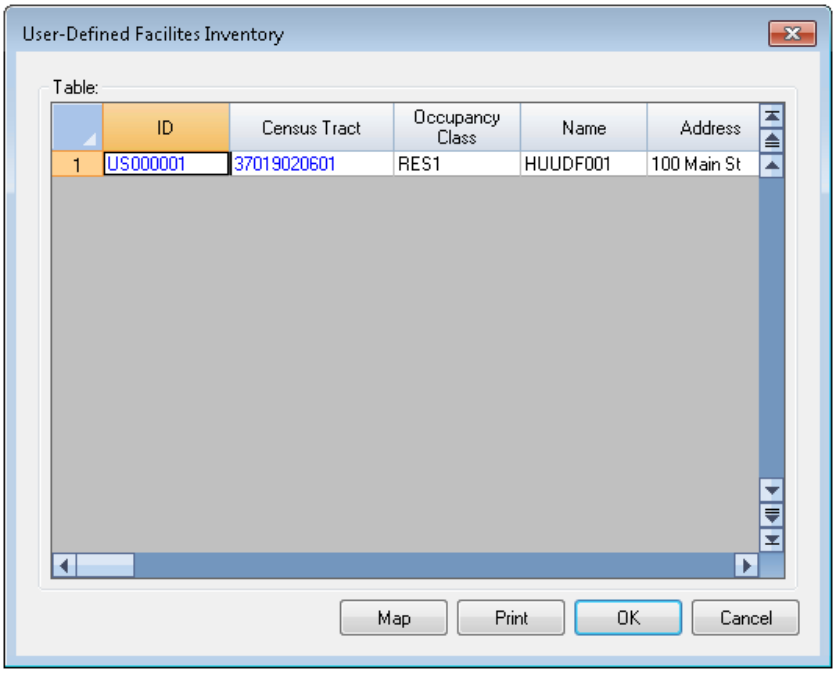
Selecting **User-Defined Facilities** (Figure 5-23) will open the table shown in Figure 5-24.

Figure 5-23: Inventory / User-Defined Facilities Menu



[1] Hazus uses “user-defined facilities” and “user-defined structures” interchangeably.

Figure 5-24: User-Defined Facilities Table



See Chapter 9 for information on the advanced Hazus analysis user-defined inventory, which allows the user to import custom data into Hazus.

5.6 Transportation Systems

Transportation lifelines, including highways, railways, light rail, bus systems, ports, ferry systems and airports, are divided into components such as bridges, stretches of roadway or track, terminals, and port warehouses. Selecting **Transportation Systems** (Figure 5-25) will open the window shown in Figure 5-26.

Figure 5-25: Inventory / Transportation Systems Menu

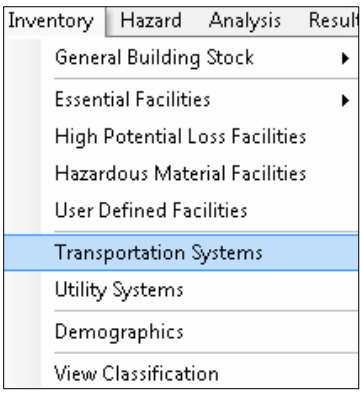
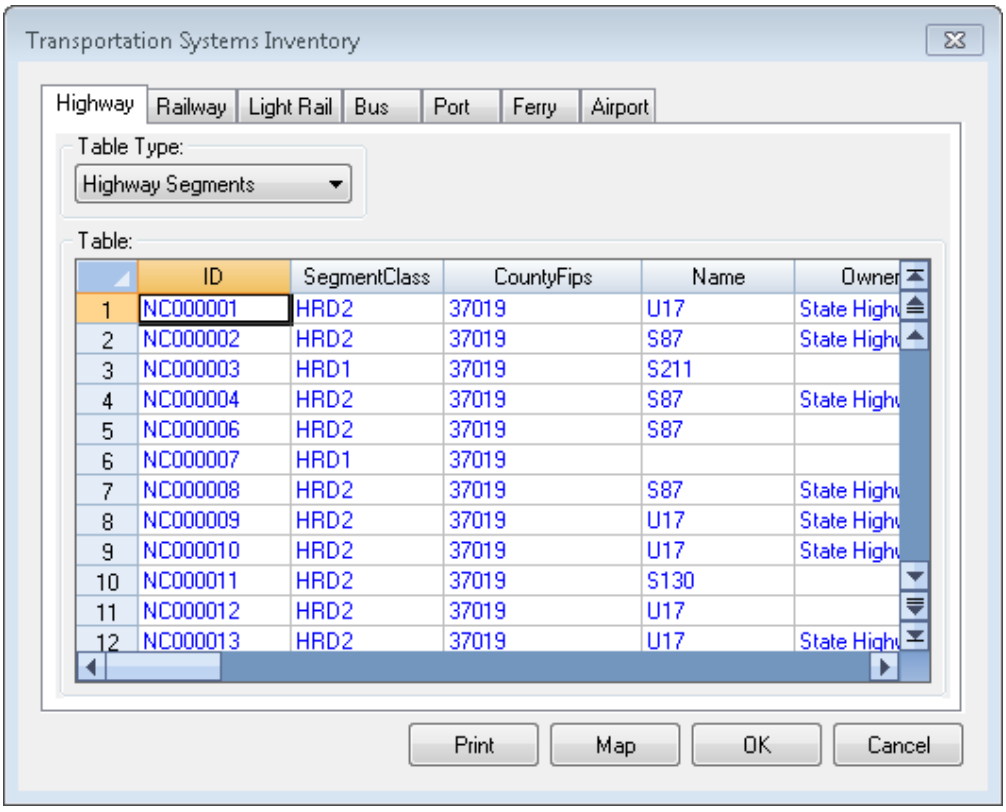


Figure 5-26: Transportation Systems (Highway) Table



5.7 Utility Systems

Utility lifelines, including potable water, electric power, wastewater, communications, and liquid fuels (oil and gas), are modeled similar to transportation lifelines. Examples of utility lifeline are electrical substations, water treatment plants, tank farms, and pumping stations. Selecting **Utility Systems** (Figure 5-27) will open the window shown in Figure 5-28.

Figure 5-27: Inventory / Utility Systems Menu

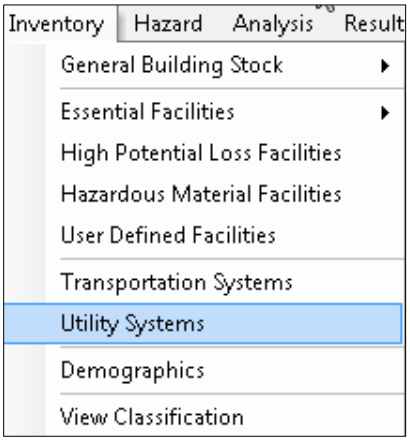
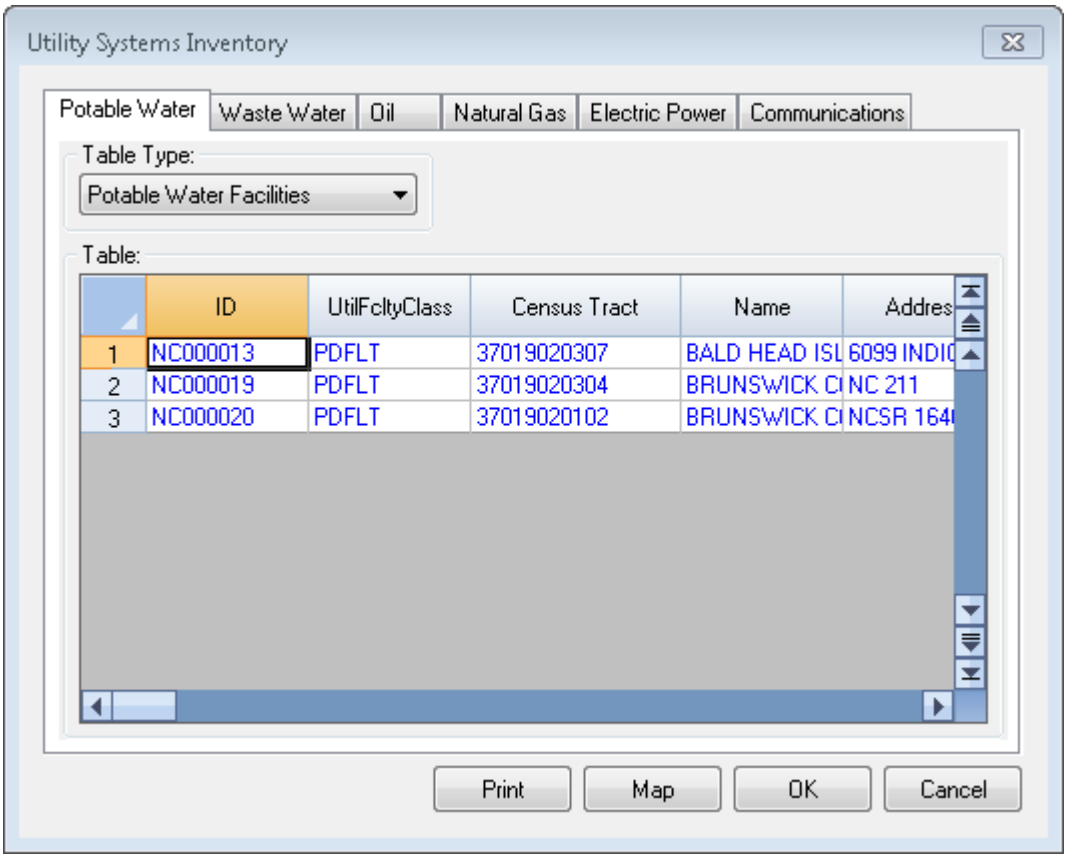


Figure 5-28: Utility Systems (Potable Water) Table



5.8 Demographics

Population statistics are used in estimating losses such as casualties, displaced households, and shelter needs. Population location, as well as ethnicity, income level, age, and home ownership, is needed to make these estimates. The 2010 Census data are included with Hazus. Users may be able to obtain updated information from the Census Bureau or from a regional planning agency. See Chapter 9 for information on user-defined demographic and inventory data. Selecting **Demographics** (Figure 5-29) will open the window shown in Figure 5-30.

Figure 5-29: Inventory / Demographics Menu

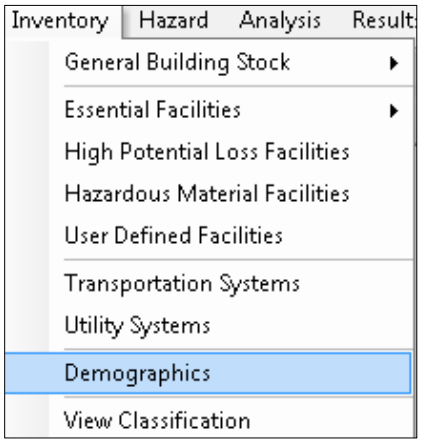
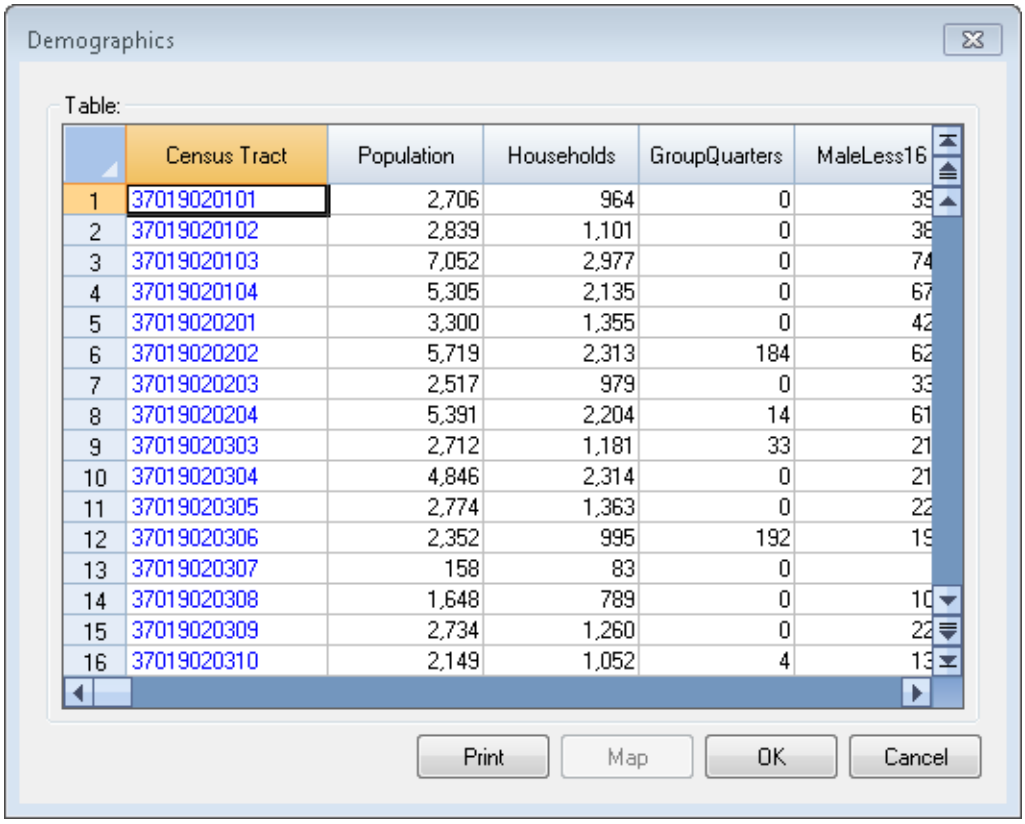


Figure 5-30: Demographics Table



5.9 View Classification

View Classification (Figure 5-31) allows users to view definitions of the classification categories. Selecting **View Classification** will open the window shown in Figure 5-32.

Figure 5-31: Inventory / View Classification Menu

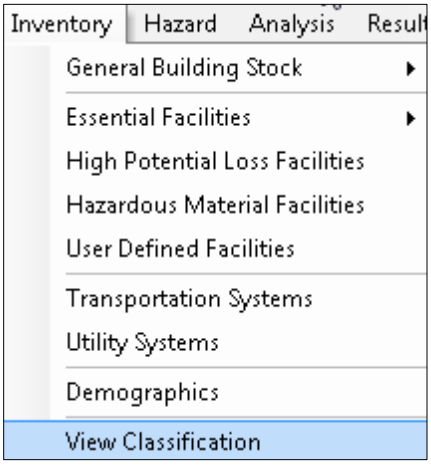
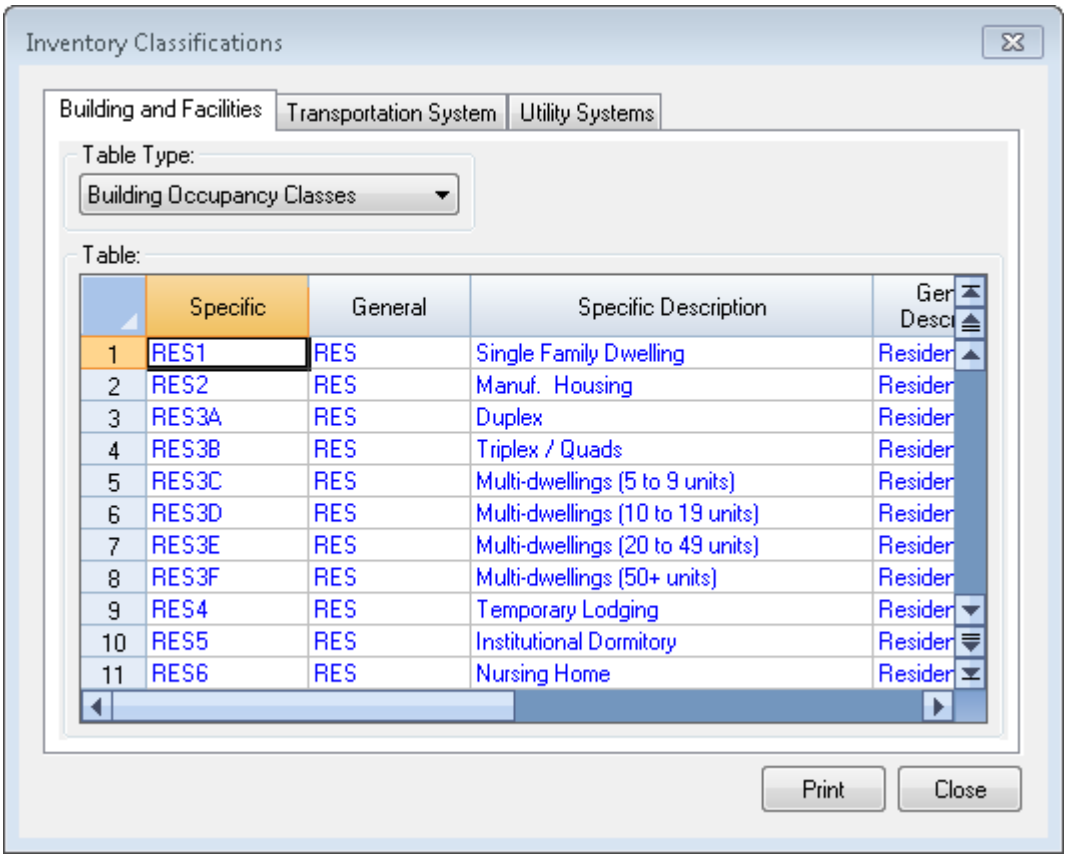


Figure 5-32: View Classification (Building and Facilities) Table



6 Model Menu: Hazard

The two basic scenario options in the Hurricane Model are (1) a probabilistic hurricane scenario and (2) a single deterministic hurricane track. Deterministic tracks can include both historic and hypothetical hurricane tracks that are user-defined or imported from an external source. The inputs required for both options are described in this chapter.

6.1 Probabilistic Scenario

The probabilistic scenario is the default hazard scenario option in the Hurricane Model. The scenario considers the associated impacts of many thousands of potential storms that have tracks and intensities reflecting the full spectrum of Atlantic and Central Pacific hurricanes. Refer to the Technical Manual for information on the data the probabilistic scenario is based on.

The probabilistic scenario option is the active scenario until a different type of scenario is made active for the Study Region.

After selecting **Scenario** in the **Hazard** menu (Figure 6-1), the **Scenario Wizard** (Figure 6-2) will open. The wizard will guide the user through defining a storm track for the probabilistic scenario. Click **Next**.

Figure 6-1: Select Scenario in Hazard Menu

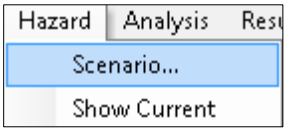
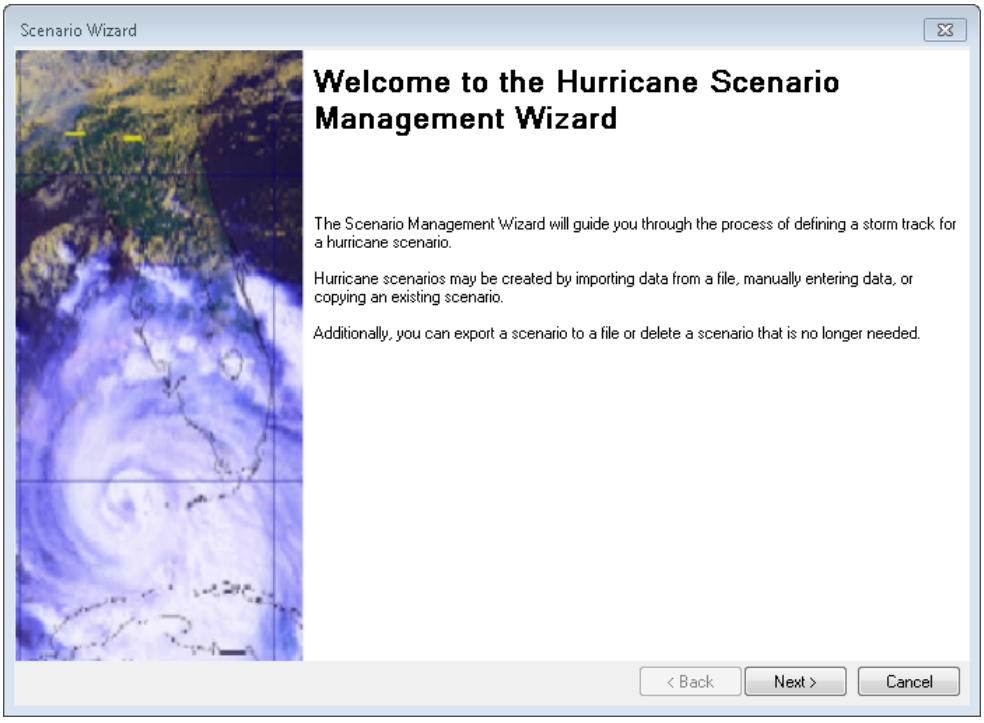
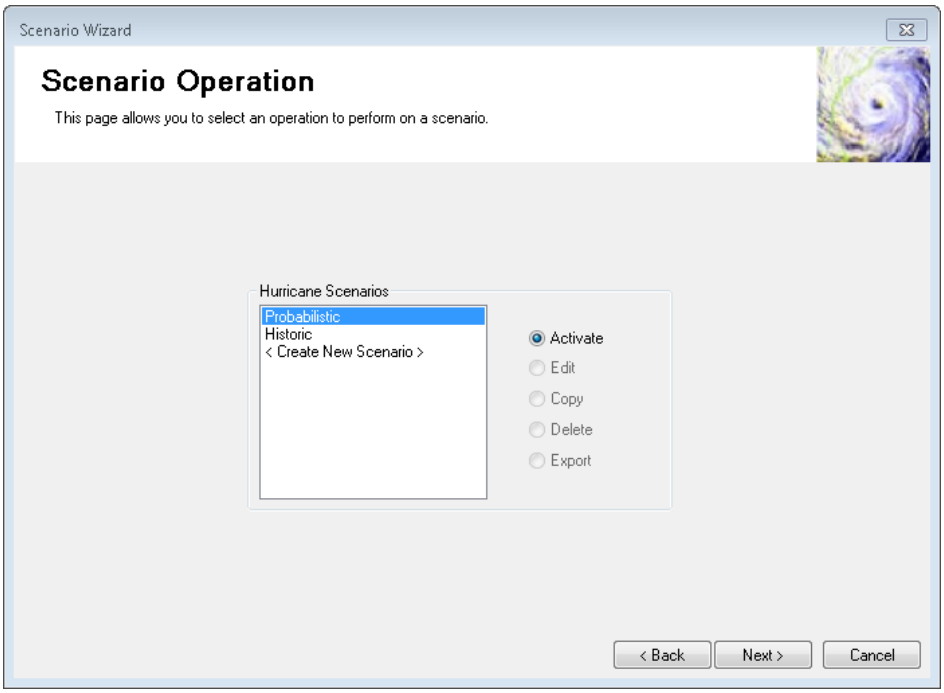


Figure 6-2: Scenario Wizard



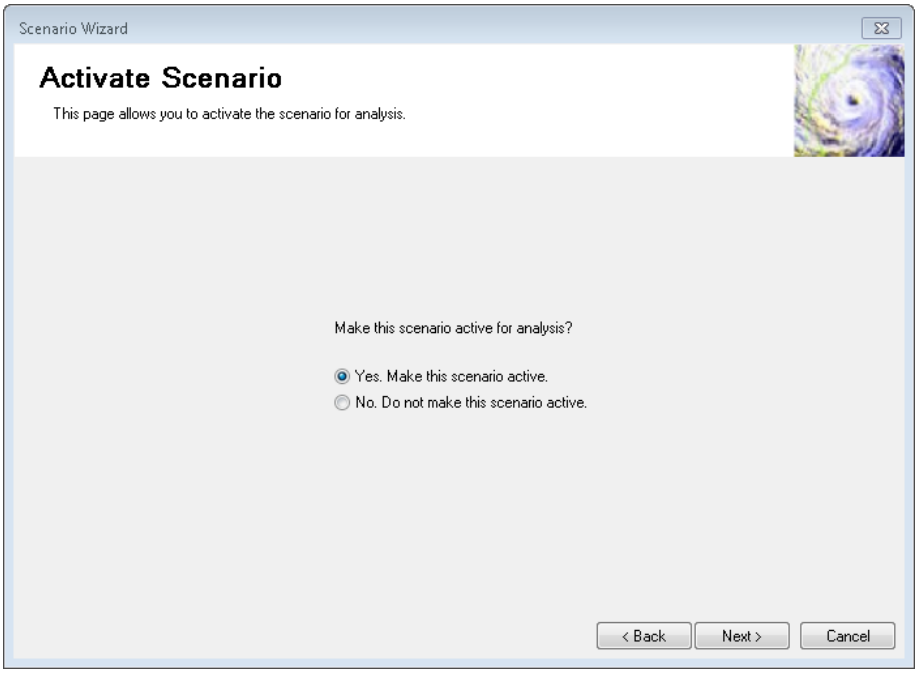
The probabilistic scenario is the first option in the **Scenario Operation** menu (Figure 6-3). Choose this option and click **Next**.

Figure 6-3: Select Probabilistic in Scenario Operation



Select the first option in the **Activate Scenario** menu (Figure 6-4) to activate the probabilistic scenario option. Click **Next**.

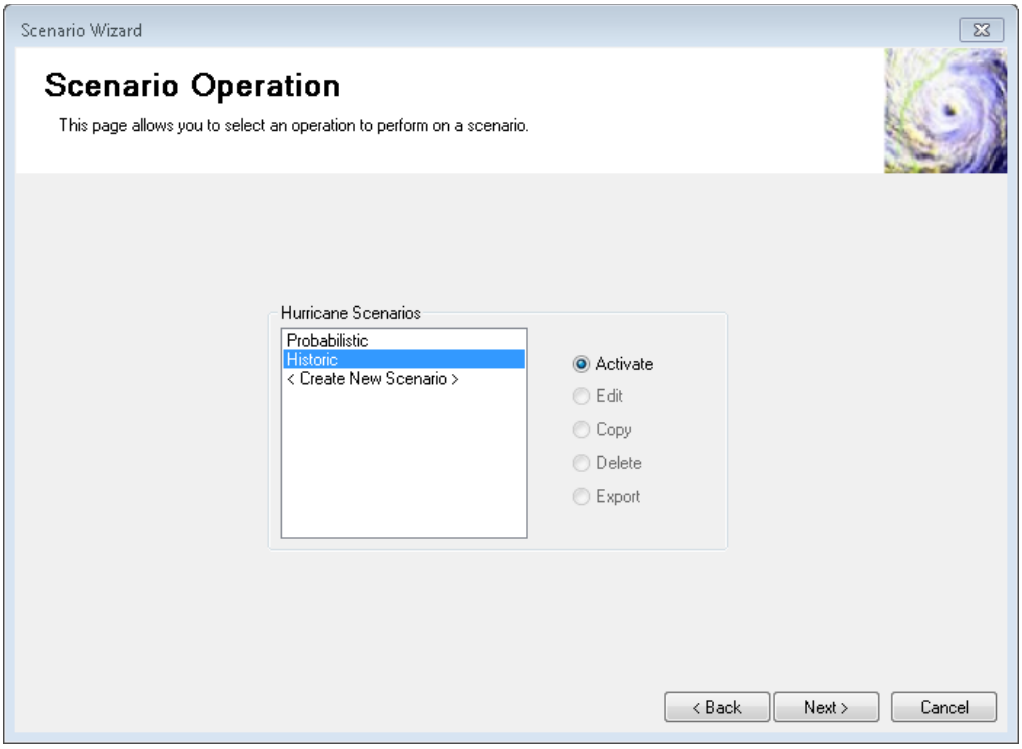
Figure 6-4: Select Yes to Activate Scenario



6.2 Historic Scenario

The historic scenario is another scenario option in the Hurricane Model. Activating the historic hurricane hazard allows users to select from the historical storms that are preloaded into the program. Only historical storms that affected the Study Region can be selected. The historic scenario walkthrough begins with the screen shown in Figure 6-5.

Figure 6-5: Select Historic in Scenario Operation

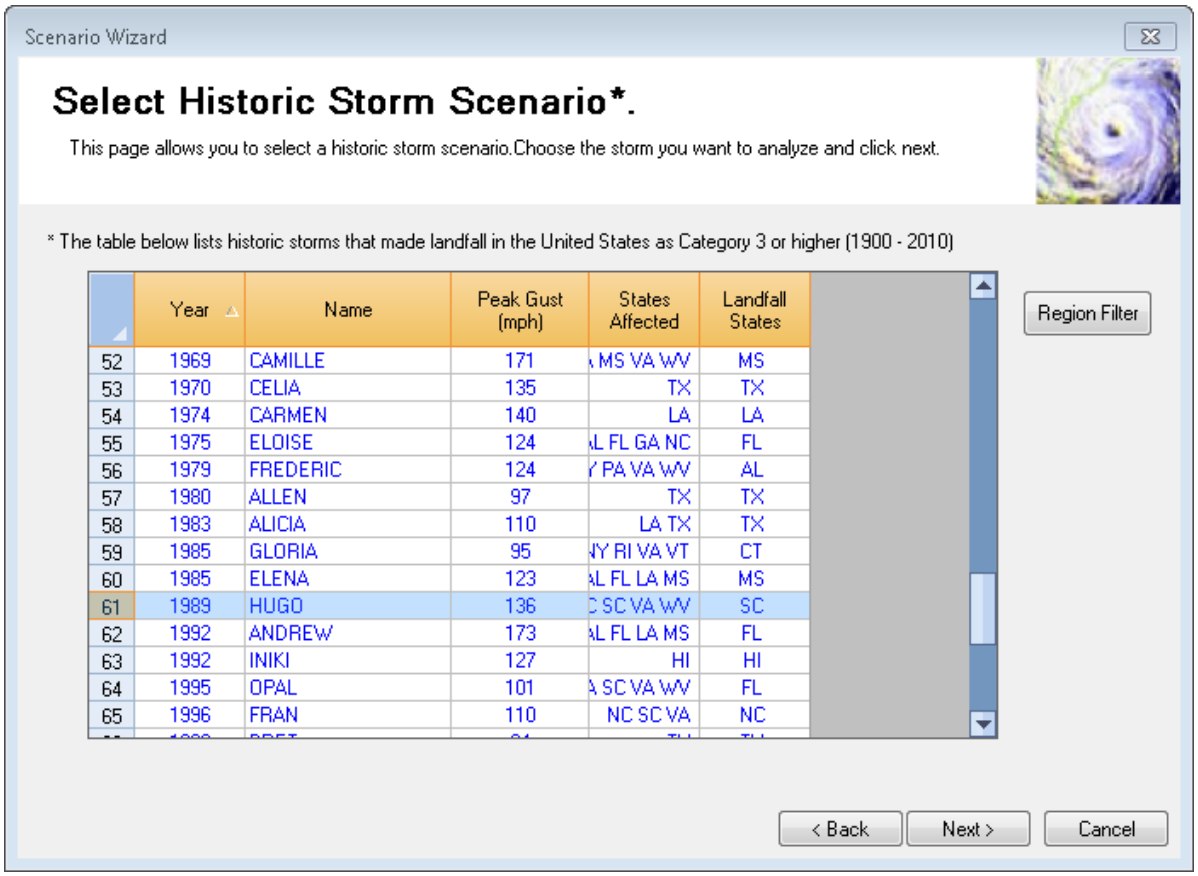


Next, the user will see the **Select Historic Storm Scenario** menu (Figure 6-6). This menu contains a predefined list of historic storms that includes the following information:

- Year
- Name
- Peak gust
- States affected
- Landfall states

Select the desired storm for the Study Region and click **Next**.

Figure 6-6: Select Desired Storm in Historic Storm Scenario



Next, the user will see the **Scenario Review** window (Figure 6-7), which has the scenario information. Click **Next**. When the **Activate Scenario** window (Figure 6-8) appears, select the first option (to make the scenario active) and click **Next**.

Figure 6-7: Select Next in Scenario Review

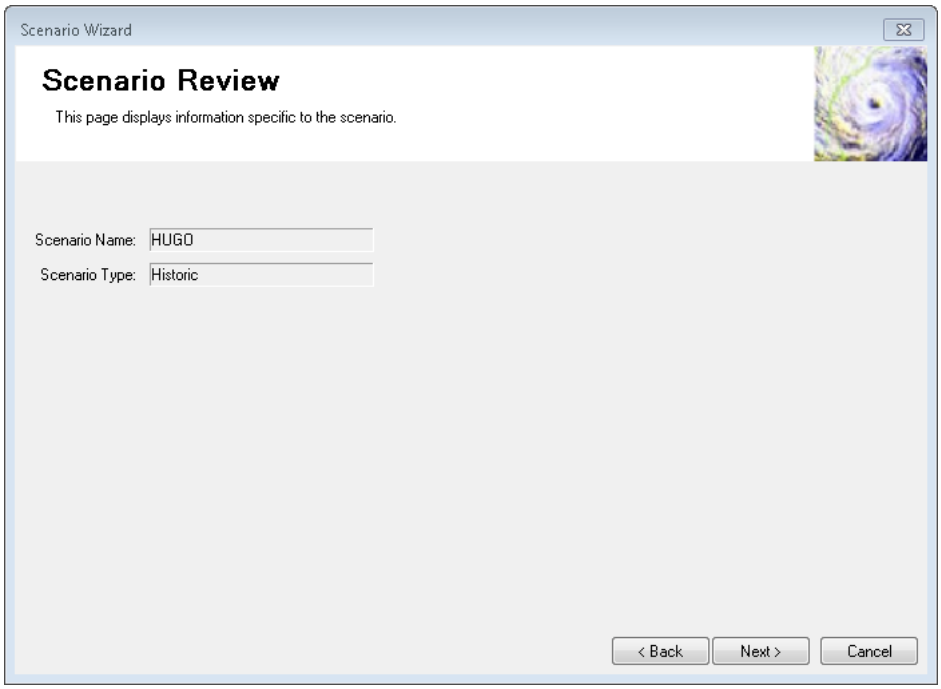
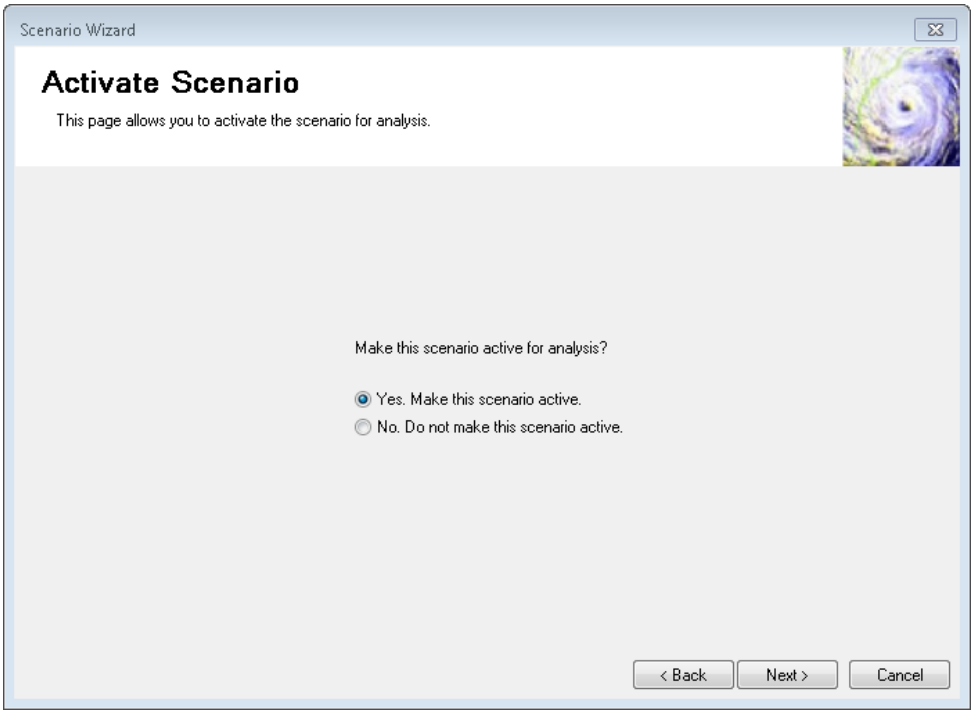


Figure 6-8: Select Yes to Activate Scenario



6.3 Create New Scenario

The **<Create New Scenario>** is another scenario option in the Hurricane Model (Figure 6-9). Creating a new hurricane scenario will allow the user to select (shown in Figure 6-10) from the following options:

- Define Storm Track Manually
- Import from Exported File (storm created in previous Hazus Study Region)
- Import Census Tract Data File
- Import a Hurrevac Storm Advisory

Figure 6-9: Create New Scenario Operation

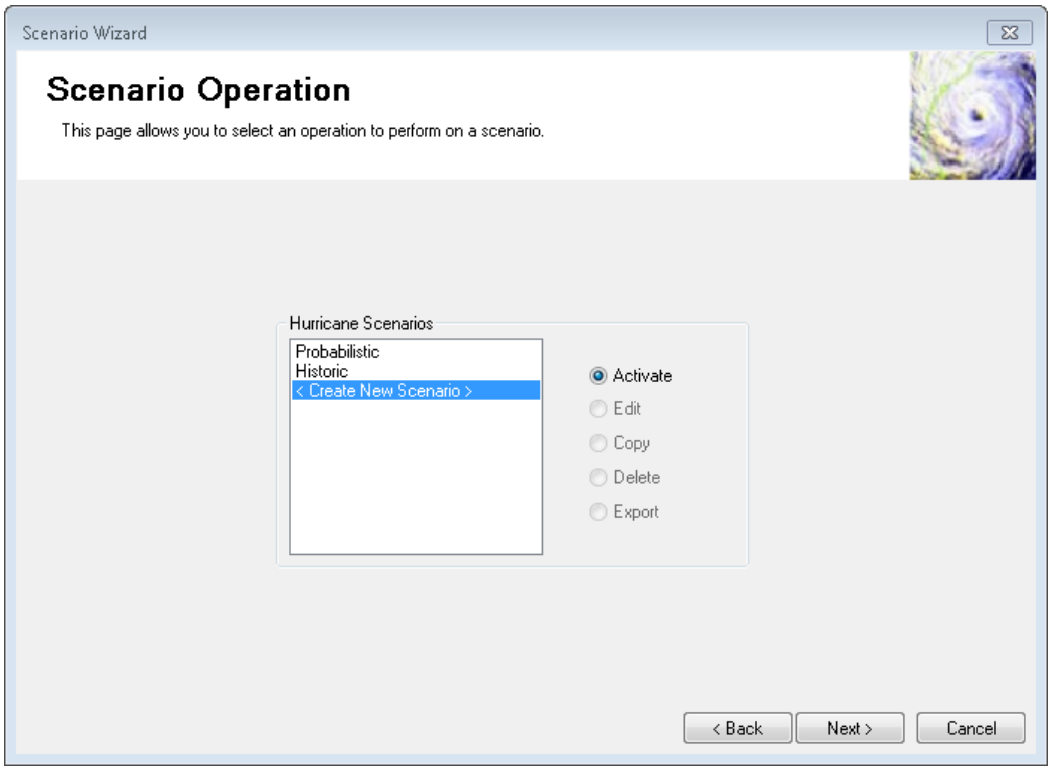
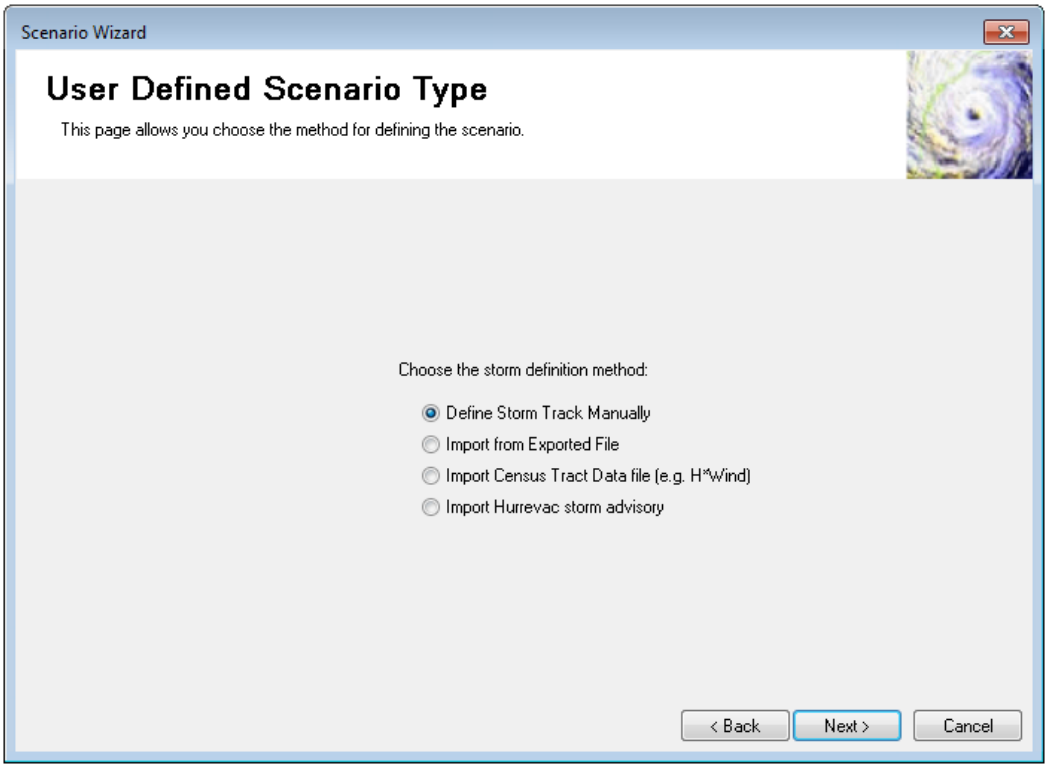


Figure 6-10: Select Preferred Storm Definition Method



6.3.1 Define Storm Track Manually

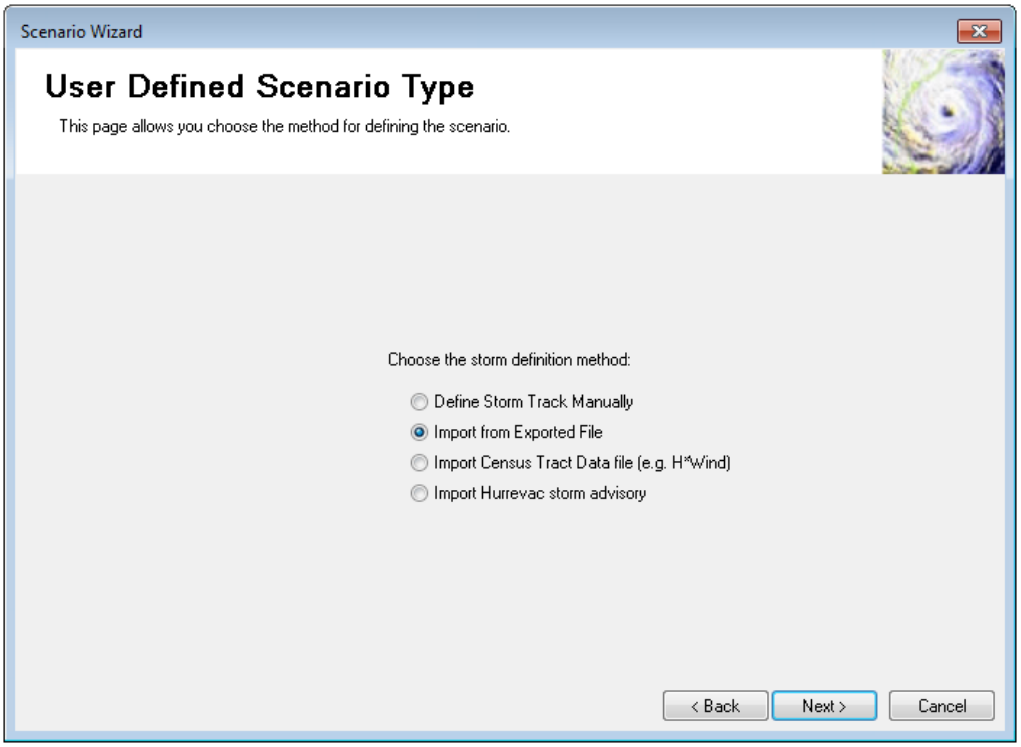
Define Storm Track Manually allows users to enter their own hurricane track data. Because this is a detailed process, step-by-step instructions on entering the data comprise a chapter of this User Manual (Chapter 10).

6.3.2 Import a Storm

Import from Exported File (Figure 6-11) allows the user to import a scenario from a saved file, which will allow the user to name and import a saved scenario.

Select **Import from Exported File** in the **User-Defined Scenario Type** window (Figure 6-11) and click **Next**.

Figure 6-11: Select Import from Exported File

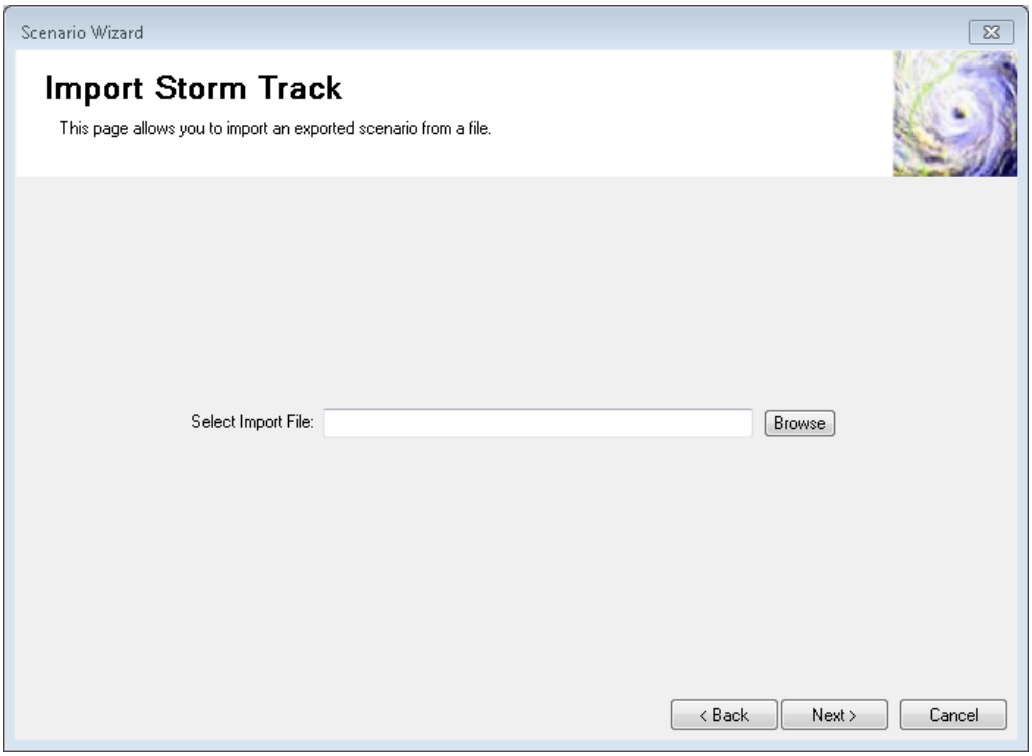


The default name of the imported scenario will be the date. The user can rename the imported scenario (Figure 6-12). Click **Next**.

Figure 6-12: Provide Scenario Name for Imported File

Next, the user will see the **Import Storm Track** window. Select **Browse** and find the desired file to import (Figure 6-13). After selecting the file, click **Next**. The **Windfield Calculation** will be run, and the user can activate the scenario.

Figure 6-13: Select Desired Import File for Storm Track



6.3.3 Import Census Tract Data File

Similar to importing a file that had been previously exported from Hazus, a user can import into Hazus a hurricane wind data file in the .dat format with information at the census tract centroid. The .dat file must already be available and must be created using the format established originally by NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML) Hurricane Research Division (HRD) for their retired H*wind Program. Contact the Hazus Help Desk (hazus-support@riskmapcds.com) for more information on the .dat format.

To import a .dat file, select the **Import Census Tract Centroid Data file** (see Figure 6-14), enter a scenario name on the following screen (Figure 6-15), and select the file on the following screen (Figure 6-16) and click **Next**.

Figure 6-14: Select Import Census Tract Data File

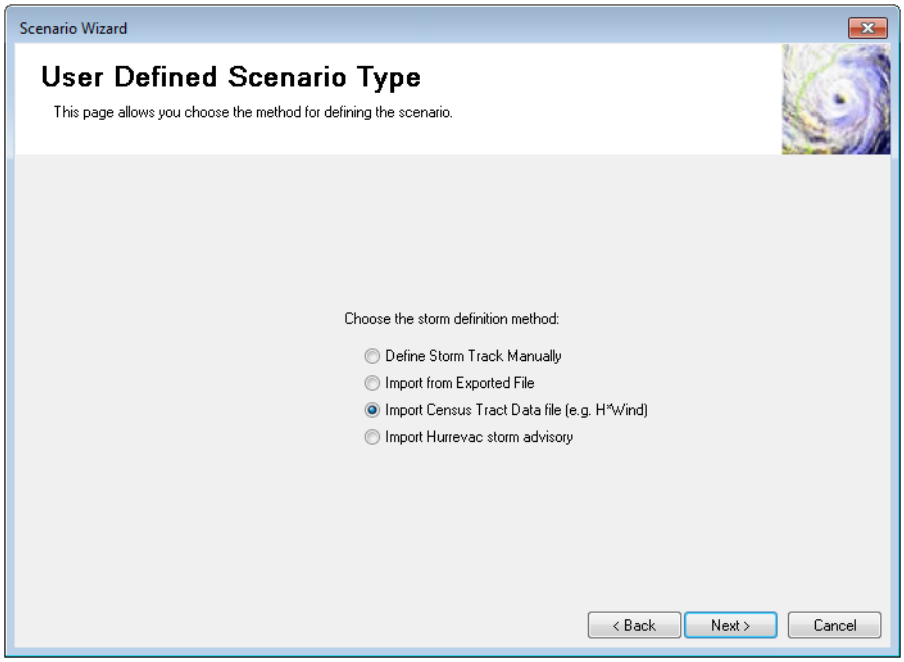
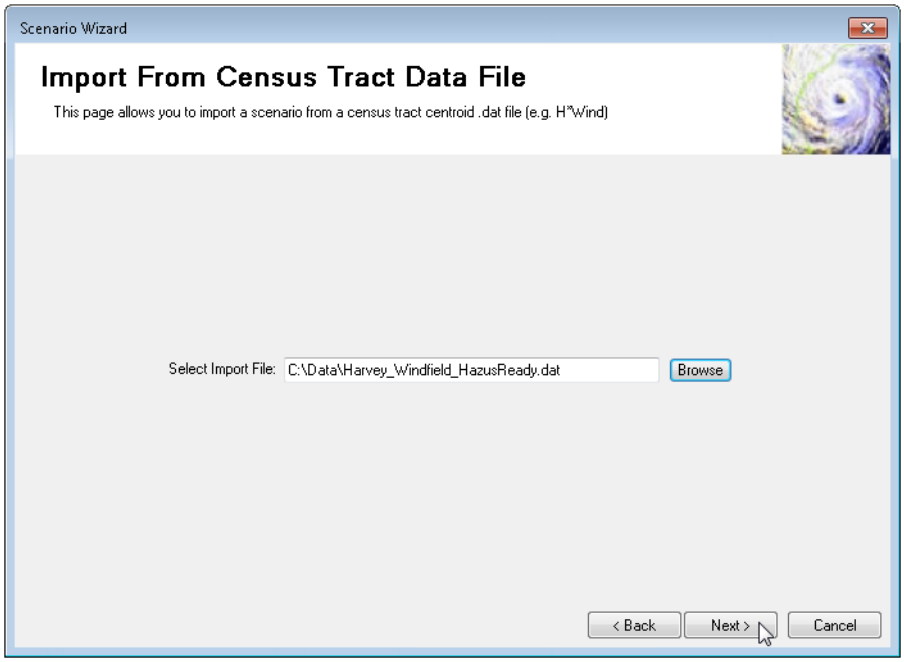


Figure 6-15: Provide Scenario Name for Imported Census Tract Data File

Figure 6-16: Select Desired Import File for Census Tract Data File



After the file imports, click **Next** on the screen shown in Figure 6-17 to complete the import process, which can be confirmed on the final status review screen shown in Figure 6-18. The storm tract data review data will not populate when importing a census tract data file. To build this table, Hazus utilizes the hurricane track information, however, in this case users are assigning observed wind speeds to census tracts directly. Therefore the hurricane track is not needed for this step.

Figure 6-17: Select Next to Load Imported Data

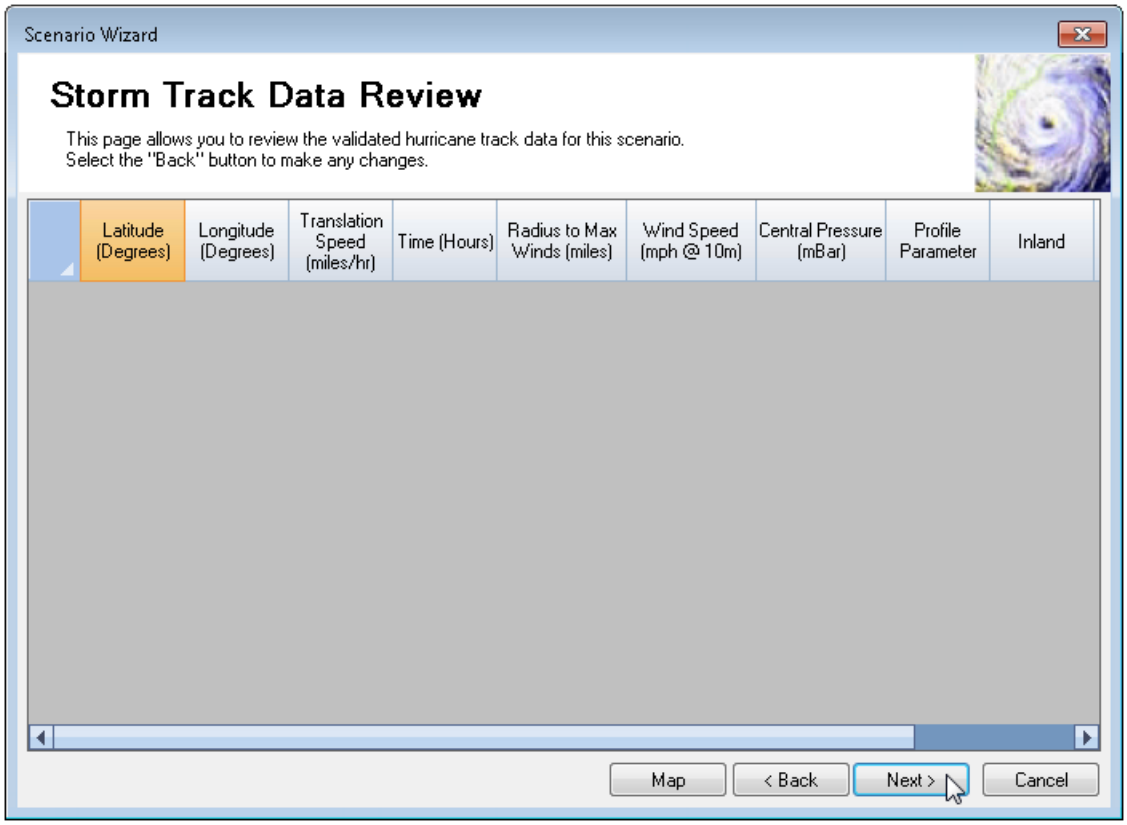
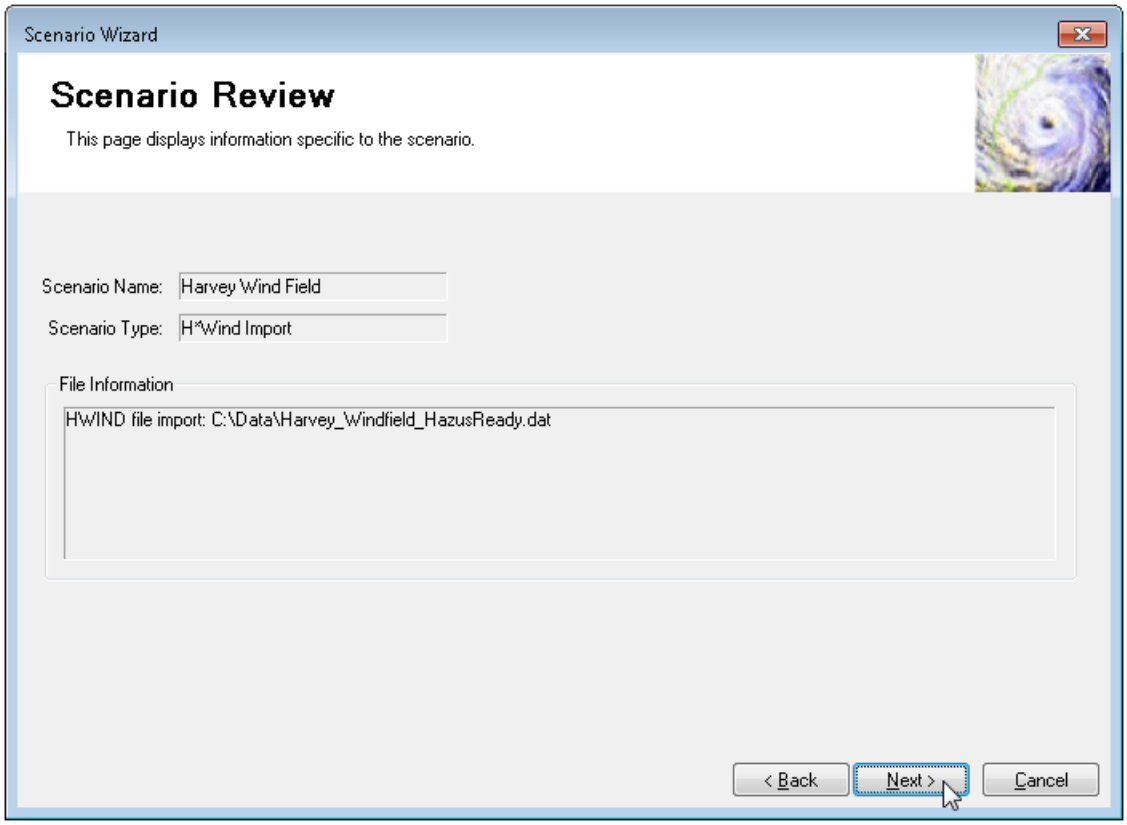


Figure 6-18: Select Next to Finish Loading Imported File



6.3.4 Import a Hurrevac Storm Advisory

The **Import Hurrevac storm advisory** option in the **User-Defined Scenario Type** window (Figure 6-19) allows the user to import Hurrevac storm advisory information from the Atlantic or Pacific. Select **Import Hurrevac storm advisory** and click **Next**.

Once Atlantic or Central Pacific has been chosen in Figure 6-20, the user can choose from all available forecast/advisories.

Figure 6-19: Select Import Hurrevac Storm Advisory

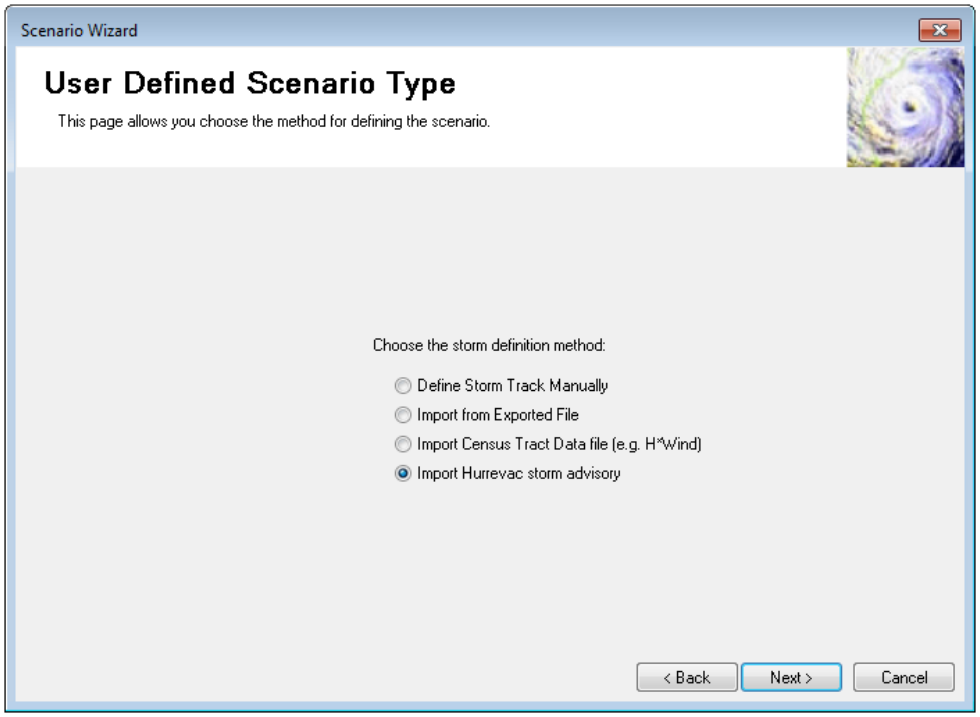
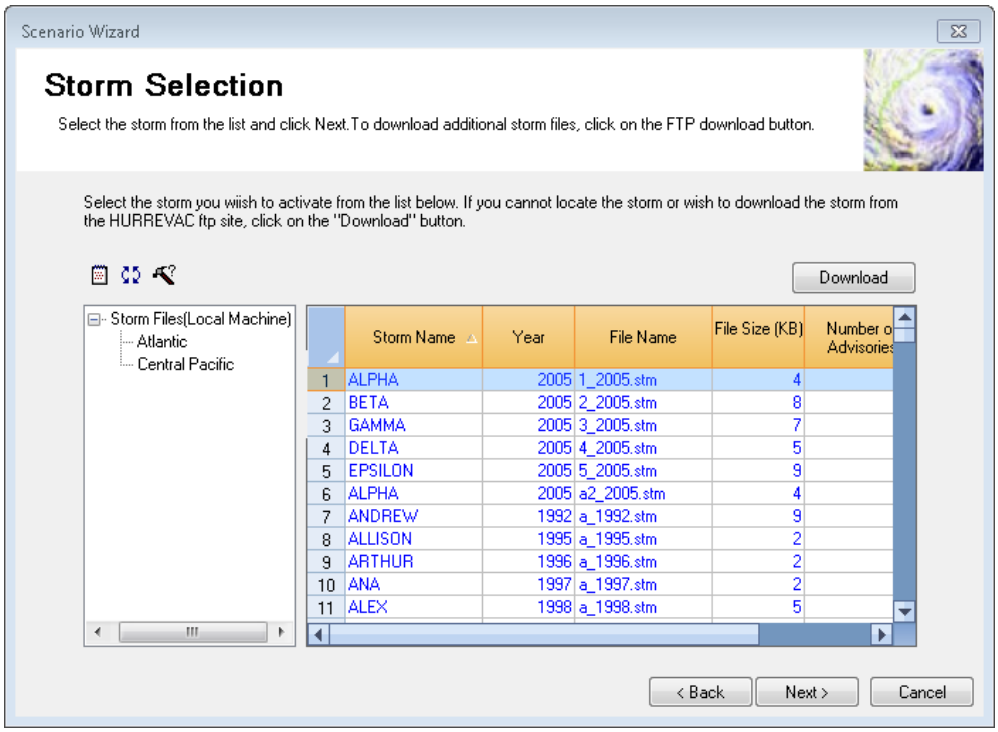


Figure 6-20: Select Desired Storm



Hazus 4.2 has been updated to include Hurrevac tracks through 2017. To obtain more recent tracks, the user can click the **Download** button in Figure 6-20 to bring up the **Hurrevac Download** screen to obtain information from the Hurrevac website, as shown in Figure 6-21. If the information is downloaded successfully, the Hurrevac Download confirmed screen will appear (Figure 6-22).

Figure 6-21: Download Current Hurrevac Tracks

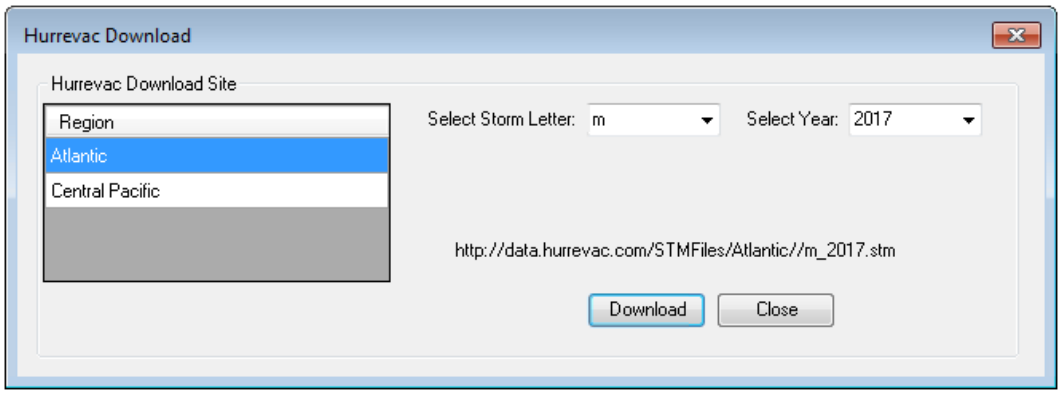
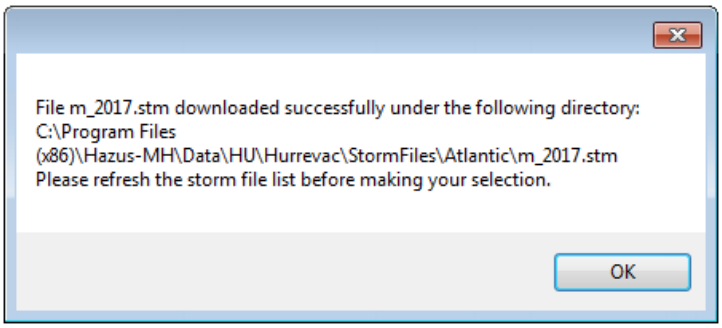
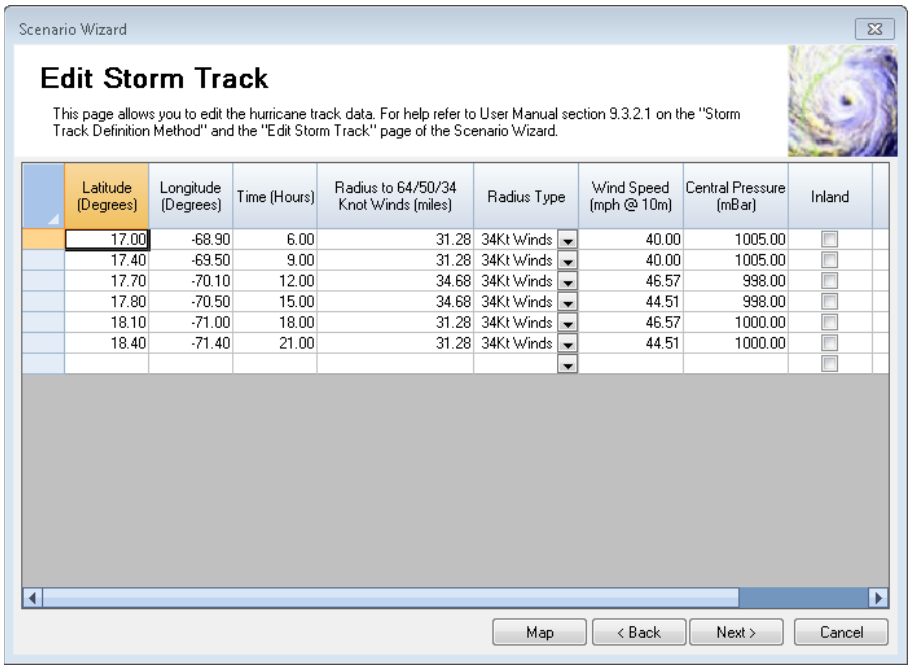


Figure 6-22: Confirm Hurrevac Download



After choosing a forecast/advisory, choose **Next** to bring up the **Edit Storm Track** table, as shown in Figure 6-23**.**

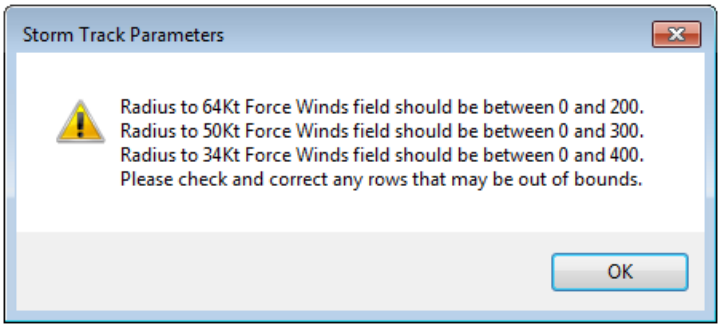
Figure 6-23: Edit Storm Track



The user can make any desired edits to the storm tracking in the **Edit Storm Track** table (Figure 6-23**)**. When an existing forecast/advisory is selected or a new forecast/advisory is downloaded, the hurricane radii and wind speeds in the forecast/advisory files are reduced by the default factors given in the Settings.xml file (typically installed to the C:\Program Files (x86)\Hazus-MH\ directory), with default values of 0.90 = HurrevacVmaxFactor, 0.77 = HurrevacRHurr64Factor, and 0.68 = HurrevacRHurrr50Factor. Consult the Technical Guidance or the contact the Hazus Help Desk for more information on these adjustments.

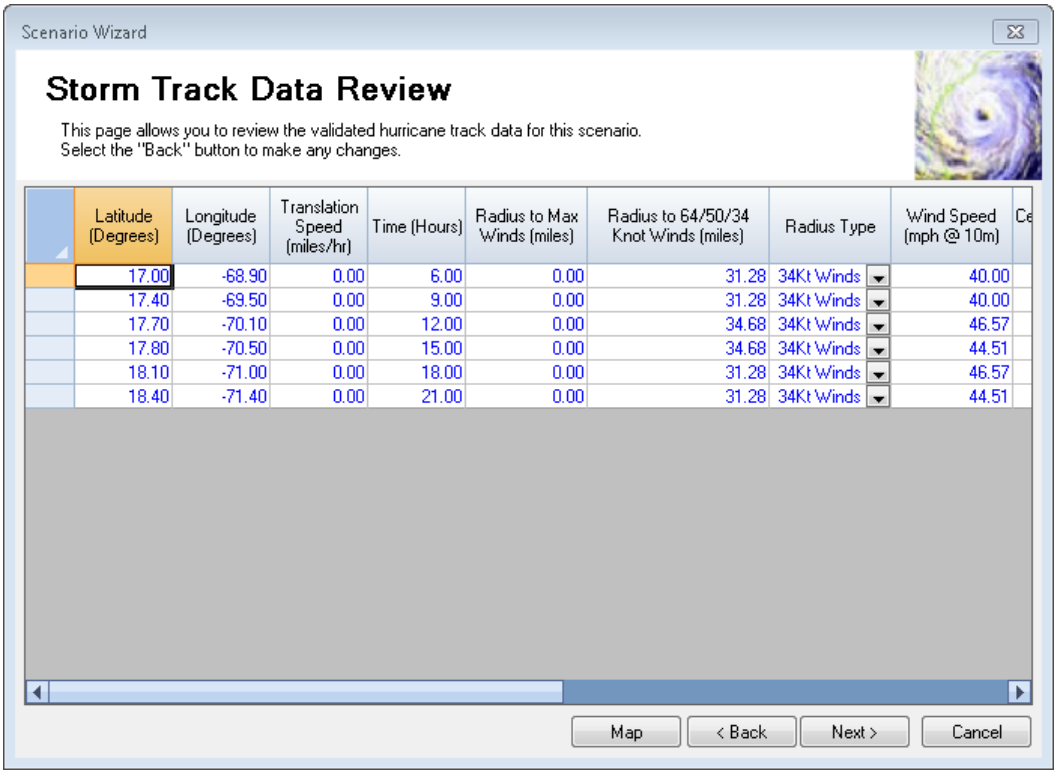
A user may also need to edit values when the storm track data are incomplete. Hazus expects radius to 64Kt force winds to be between 0 and 200 miles, radius to 50Kt force winds to be between 0 and 300 miles, and radius to 34Kt force winds to be between 0 and 400 miles. If values are outside these ranges, Hazus will show an error message (Figure 6-24) when the user clicks **Next** in the **Edit Storm Track** table (Figure 6-23).

Figure 6-24: Correct Errors for Edited Storm Track



Click **Next** to continue once all storm track edits have been completed. The program will calculate the Windfield Calculation. The results will appear, as shown in Figure 6-25**.**

Figure 6-25: Review Storm Track Data



Click **Next** after reviewing the Storm Track Windfield Calculation results to bring up the **Scenario Review** window, as shown in Figure 6-26. The **Scenario Review** shows the overview of the scenario and the file information. Clicking **Next** will allow the user to activate the newly created scenario, as shown in Figure 6-27.

Figure 6-26: Review Scenario Information

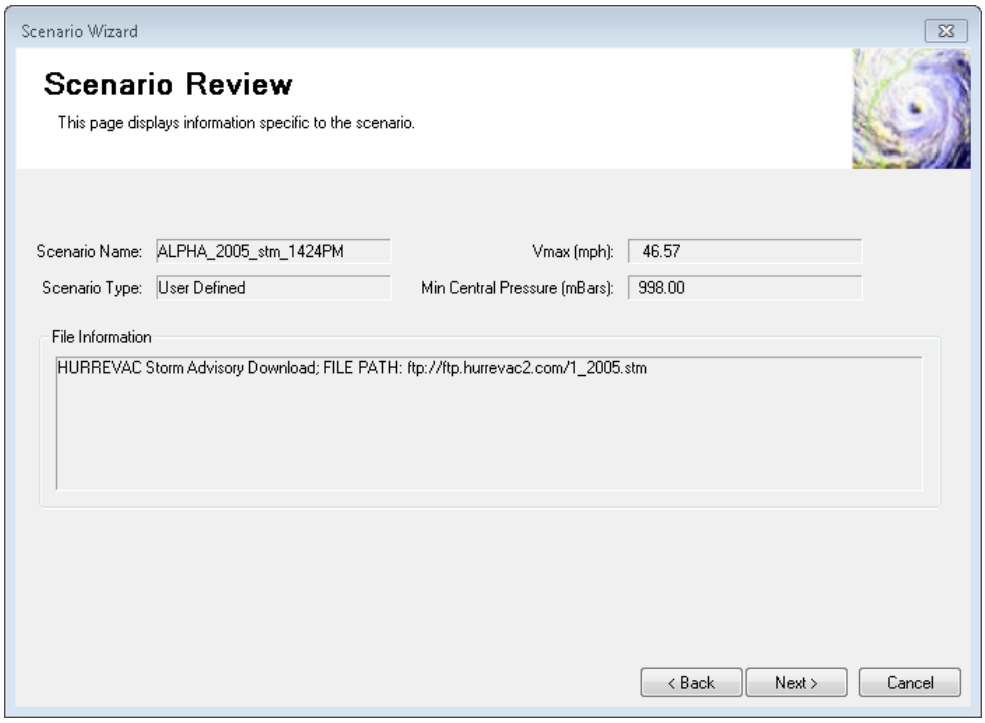
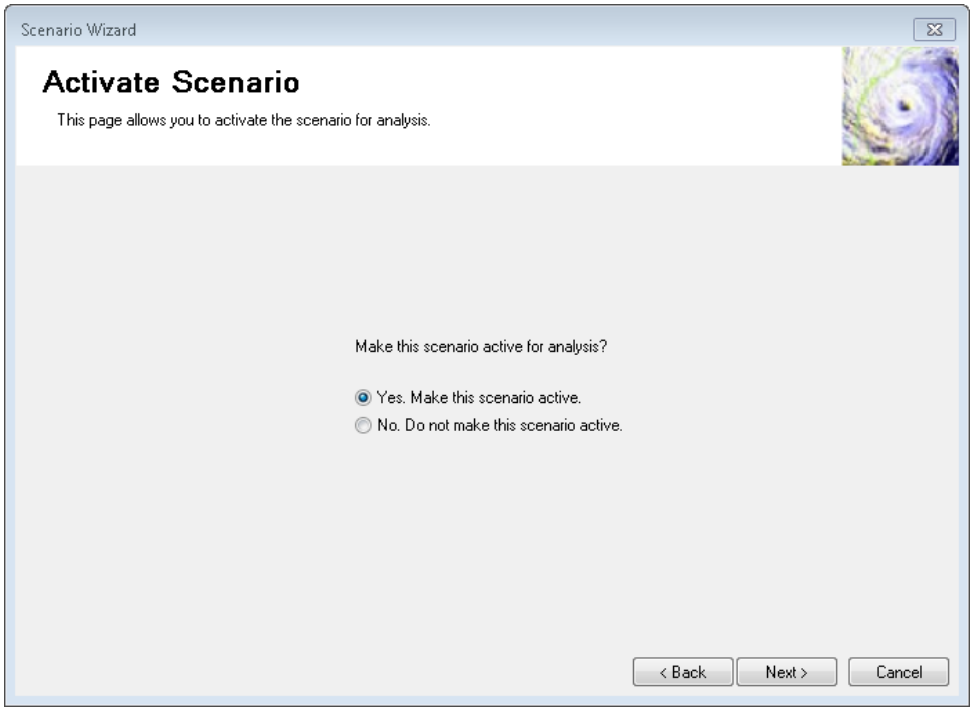


Figure 6-27: Activate Scenario



6.4 Viewing the Defined Hazard

The **Show Current** option in the **Hazard** menu (Figure 6-28) allows the user to view the active scenario in the **Current Hazard** window (Figure 6-29**)**. No changes to the scenario can be made in the **Current Hazard** window.

Figure 6-28: Storm Selection Menu

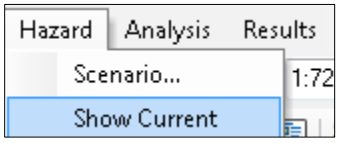
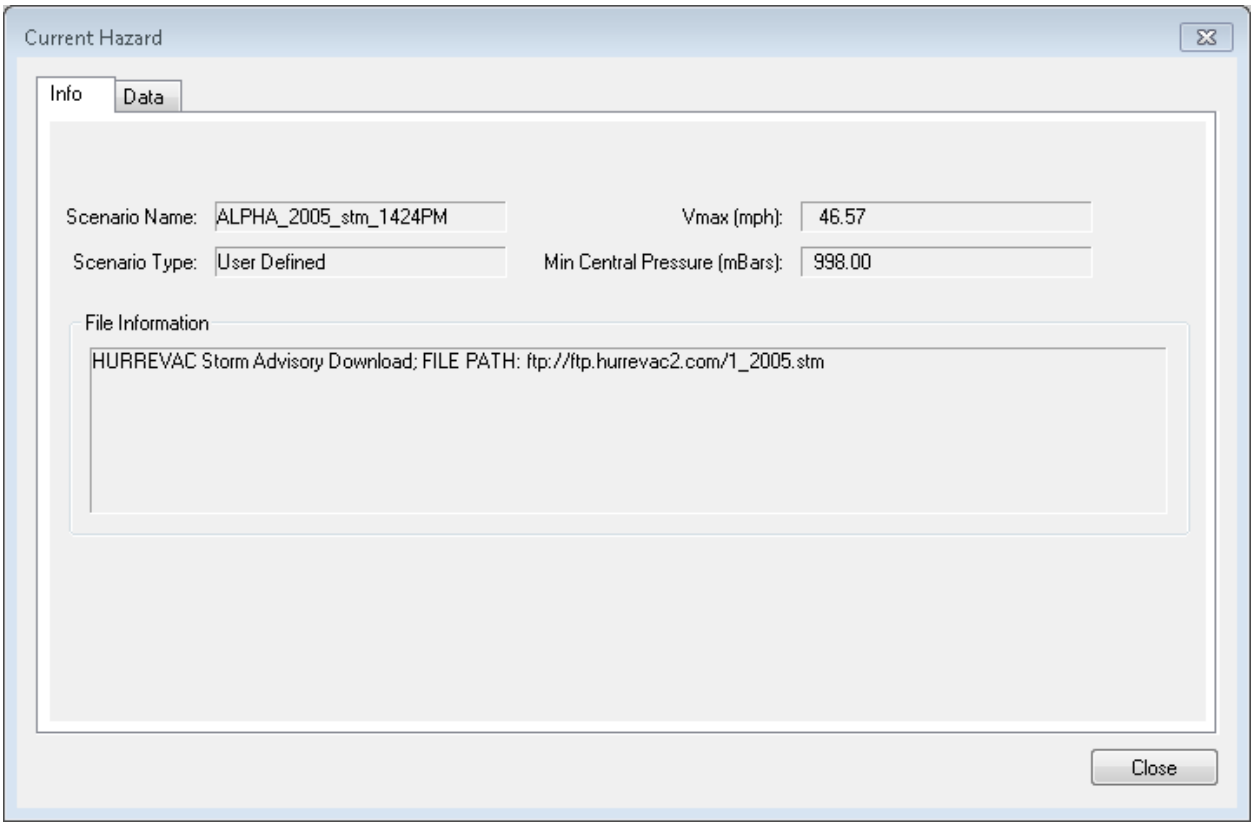


Figure 6-29: Review Current Hazard Information



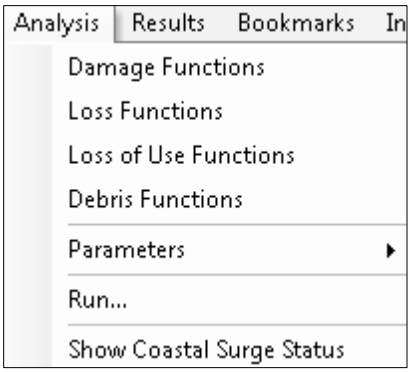
7 Model Menu: Analysis

The four basic classes of analysis functions used in the Hurricane Model are as follows:

- Damage Functions (building damage)
- Loss Functions (building and contents loss)
- Loss of Use Functions (building loss of use)
- Debris Functions (building debris)

Figure 7-1 shows the four functions. The functions cannot be modified, but users can see graphs of the functions. The functions are described in this chapter.

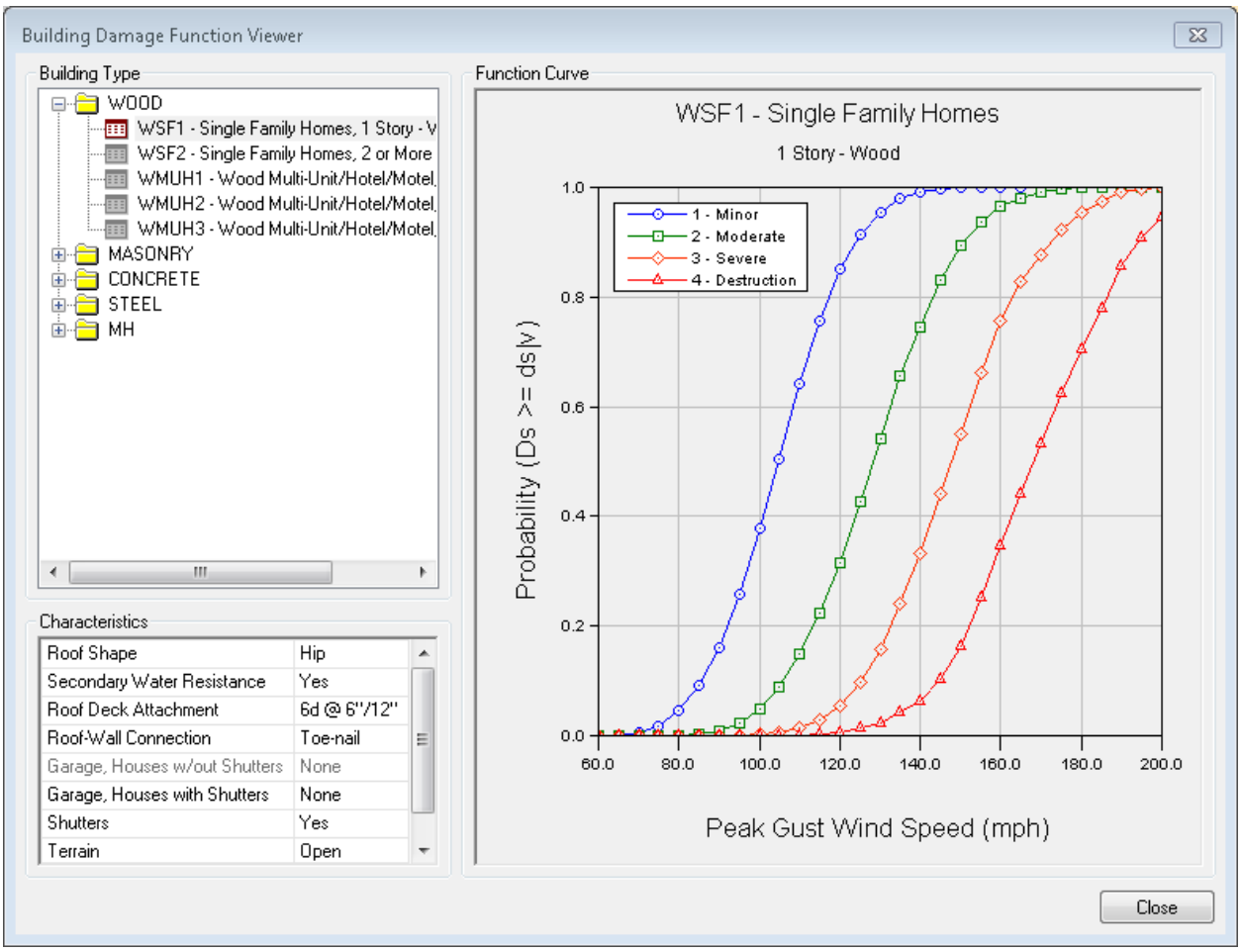
Figure 7-1: Analysis Menu



7.1 Building Damage Functions

Selecting **Analysis** and then **Damage Functions** (Figure 7-1) will display graphs of the probabilities of four damage states for each wind building type as a function of peak gust wind speed, as shown in Figure 7-2.

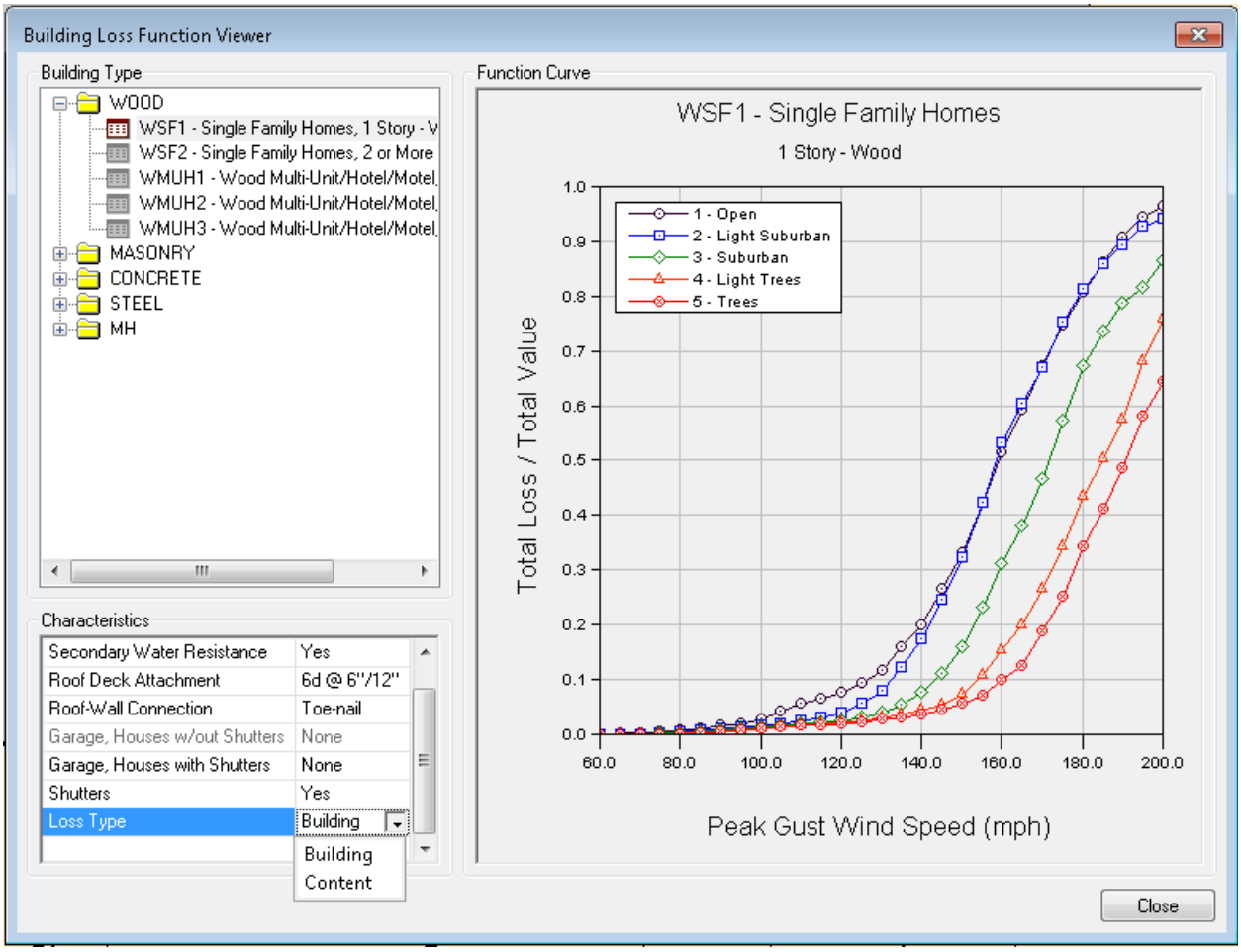
Figure 7-2: Example – Building Damage Function Viewer



7.2 Building and Contents Loss Functions

Selecting **Analysis** and then **Loss Functions** (Figure 7-1) will display graphs of the building, contents, or combined loss ratios for each wind building type as a function of peak gust wind speed (Figure 7-3).

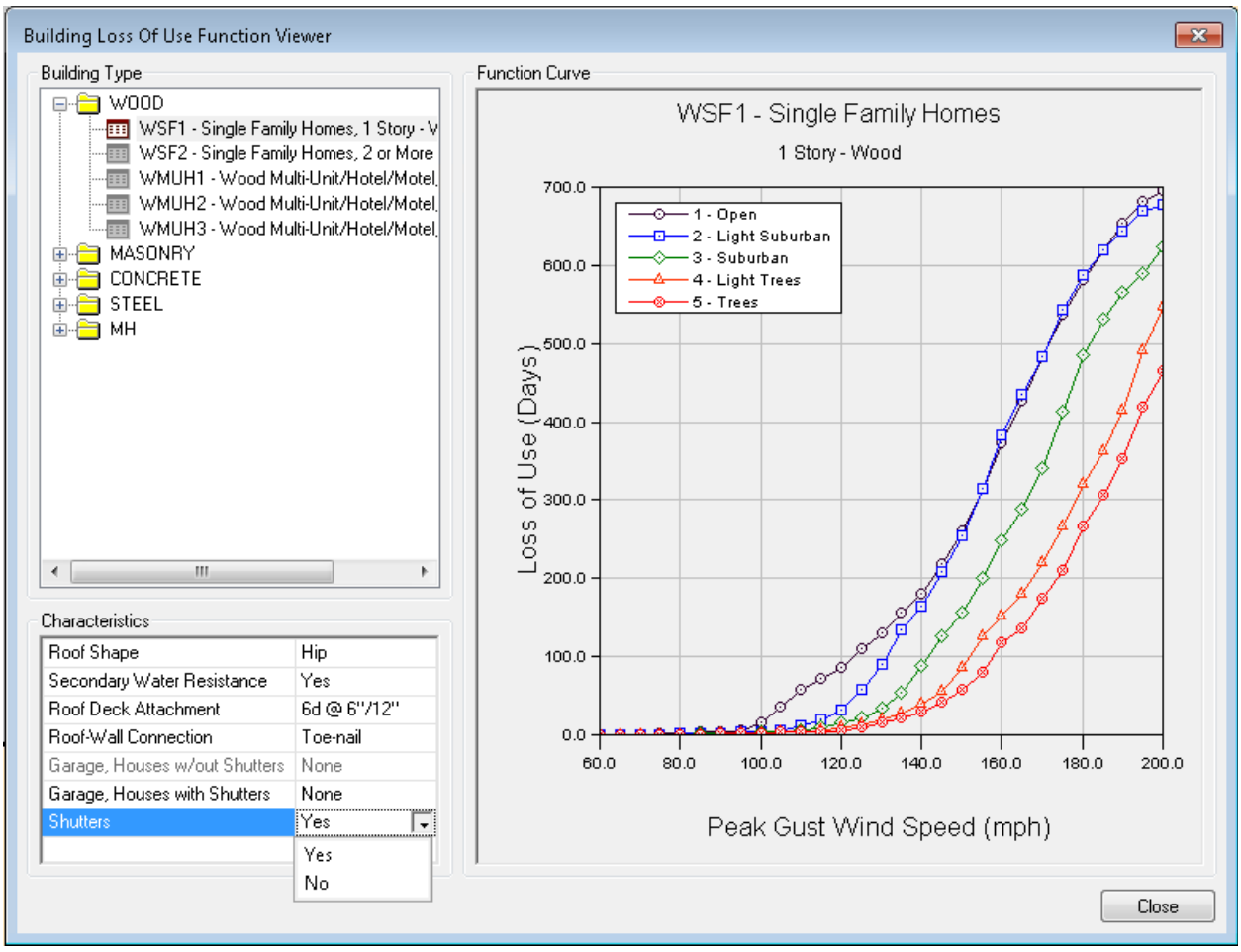
Figure 7-3: Example – Building Loss Function Viewer



7.3 Loss of Use Functions

Selecting **Analysis** and then **Loss of Use Functions** (Figure 7-1) will display graphs of the expected number of days needed to restore the function of each wind building type as a function of peak gust wind speed (Figure 7-4).

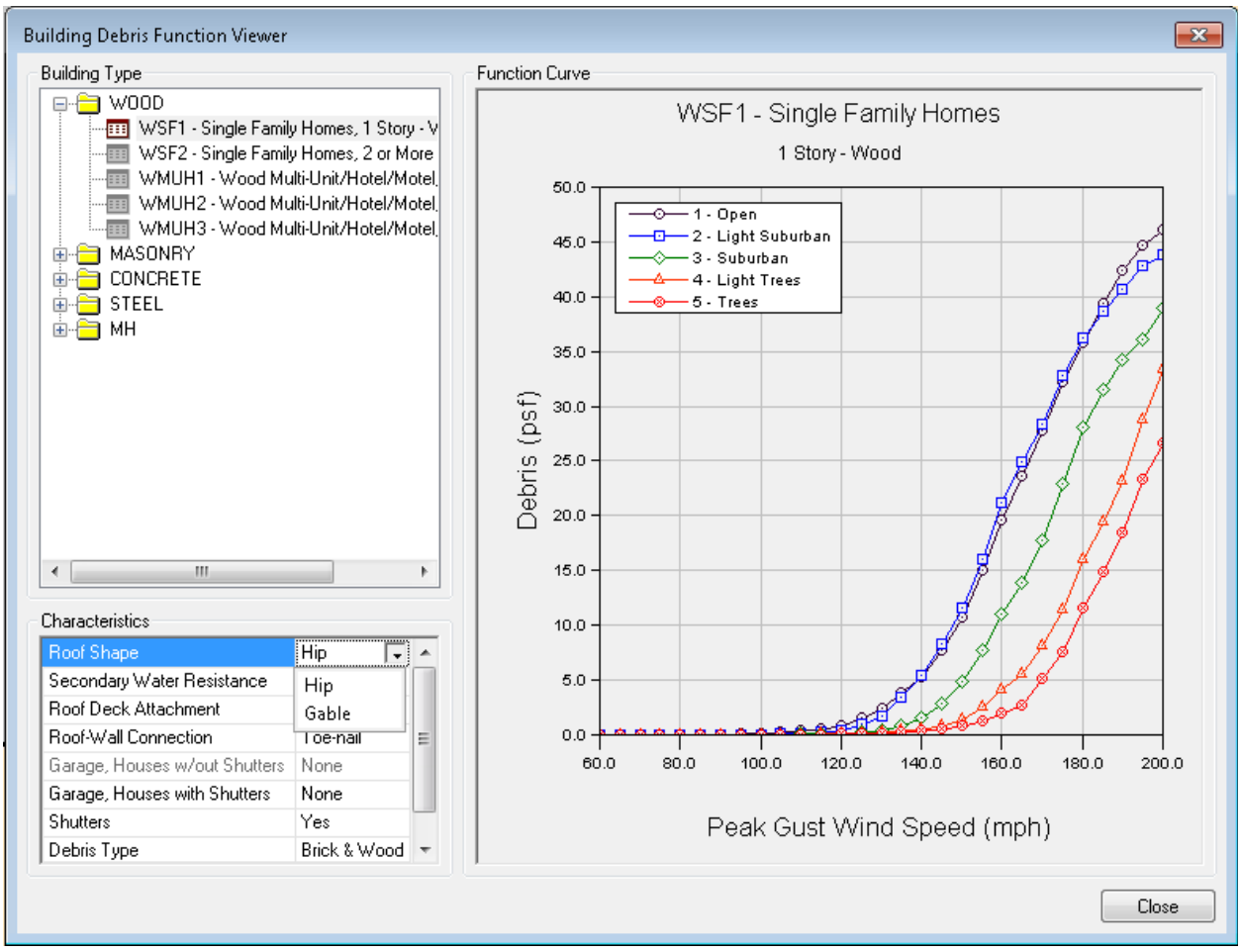
Figure 7-4: Example – Building Loss of Use Function Viewer



7.4 Building Debris Functions

Selecting **Analysis** and then **Debris Functions** (Figure 7-1) will display graphs of the expected debris weights (per unit floor area) generated by each wind building type as a function of peak gust wind speed (Figure 7-5).

Figure 7-5: Example – Building Debris Function Viewer



Building debris is divided into two types:

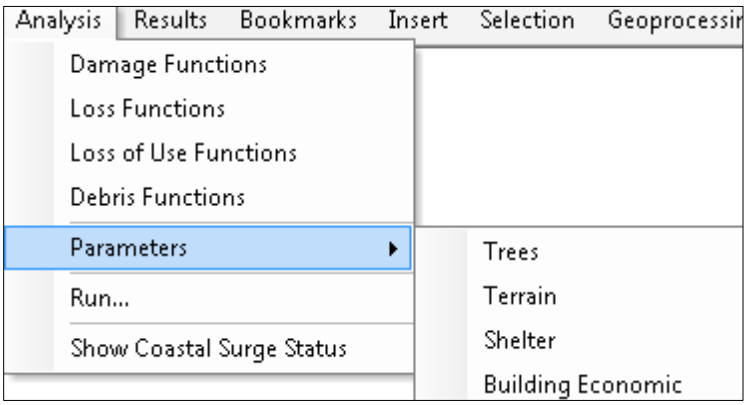
- Debris Type 1 – Brick, wood, and other debris
- Debris Type 2 – Reinforced concrete and steel members

Debris Type 1 includes all debris except wrecked, reinforced concrete and steel members. It includes glass, furniture, equipment, plaster walls, brick, and wood. Type 1 can be moved and broken up by a bulldozer or handheld tools, but Type 2 cannot. Type 2 debris (long steel members and large pieces of concrete) must be broken up using cranes and other heavy equipment before it can be transported.

7.5 Parameters

Selecting **Analysis** and then **Parameters** (Figure 7-6) allows the user to define tree coverage, terrain data, shelter, and building economic parameters. See Chapter 12 for information on each parameter.

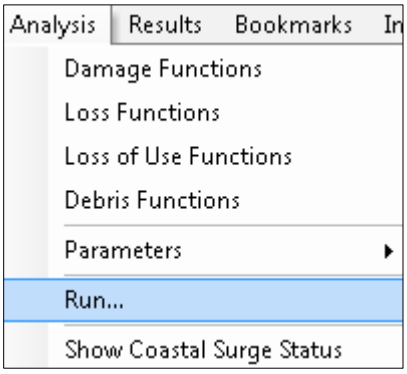
Figure 7-6: Analysis / Parameters Menu



7.6 Run

When the Study Region inventory, hazard, and analysis parameters have been specified, the analysis can be run. Select **Analysis** and then **Run** (Figure 7-7) to display the **Analysis Options** dialog shown in Figure 7-8.

Figure 7-7: Analysis / Run Menu

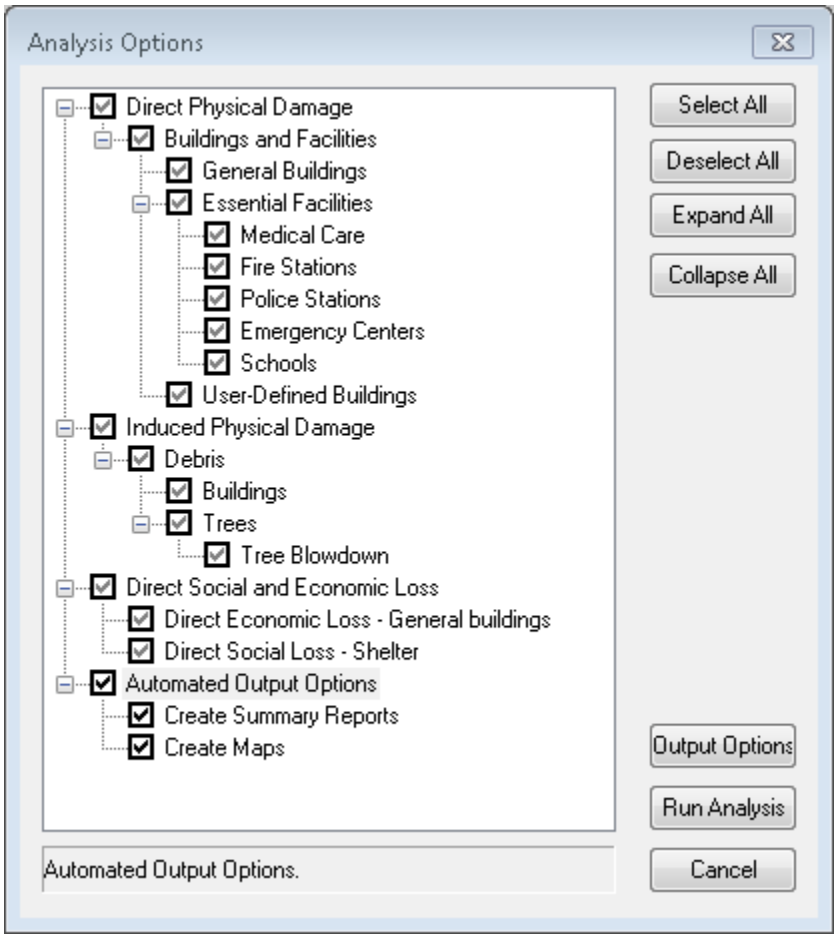


The **Analysis Options** window shown in Figure 7-8 allows the user to exclude inventory items or outputs and to review intermediate results.

7.6.1 Run Analysis

When satisfied with the inventories, select **Run Analysis**. The user will now be able to access all of the information listed in the **Results Menu** (see Chapter 8).

Figure 7-8: Select Inventory and Run Analysis

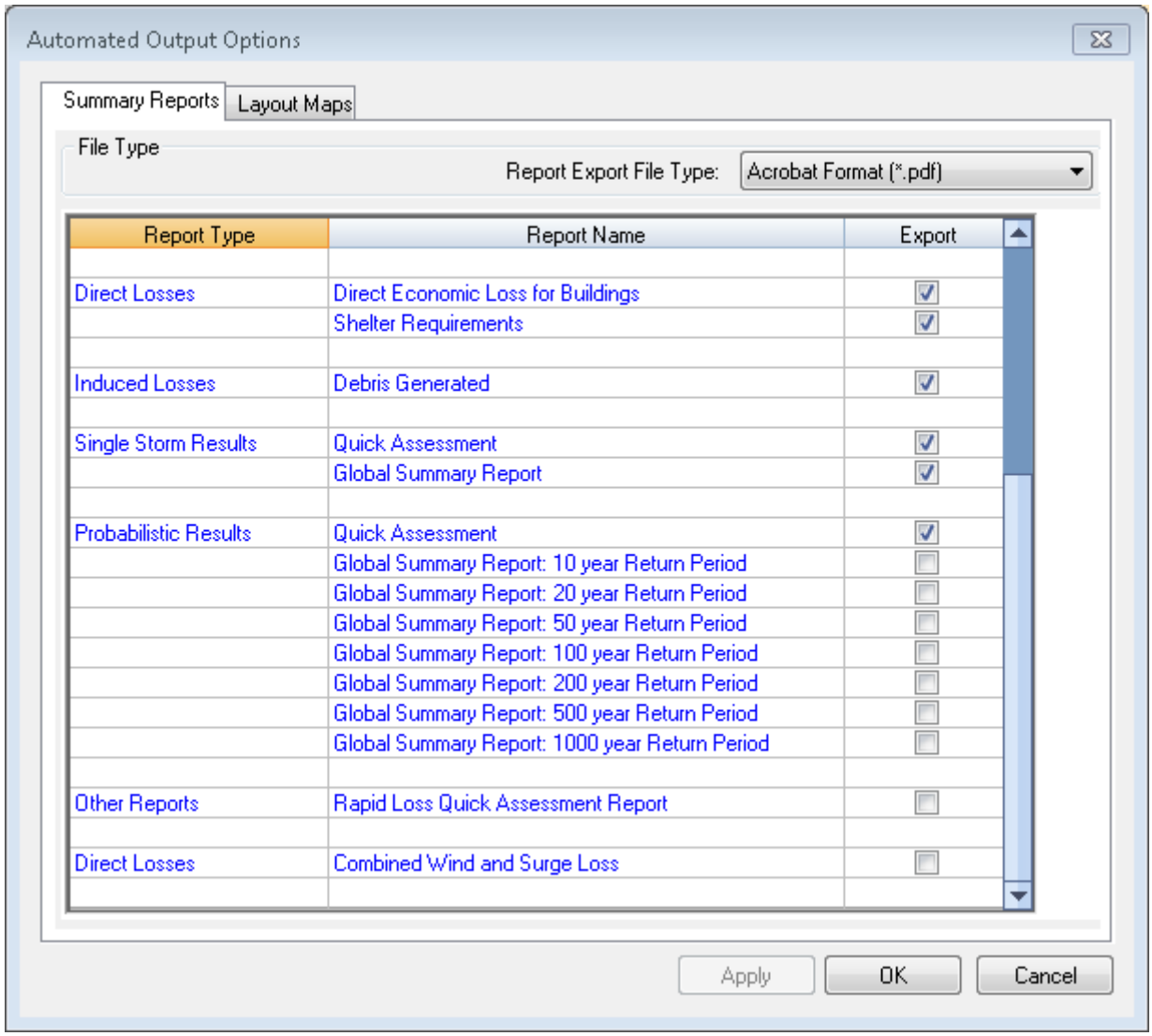


7.6.2 Automated Output Options

If Automated Outputs Options at the bottom of the **Analysis Options** window is checked, as shown in Figure 7-8, the Hurricane Model will automatically produce a set of specified summary reports and map layers at the conclusion of the analysis and save them to a subfolder in the Study Region folder with the name of the hurricane scenario. Selected layers will be added to the map.

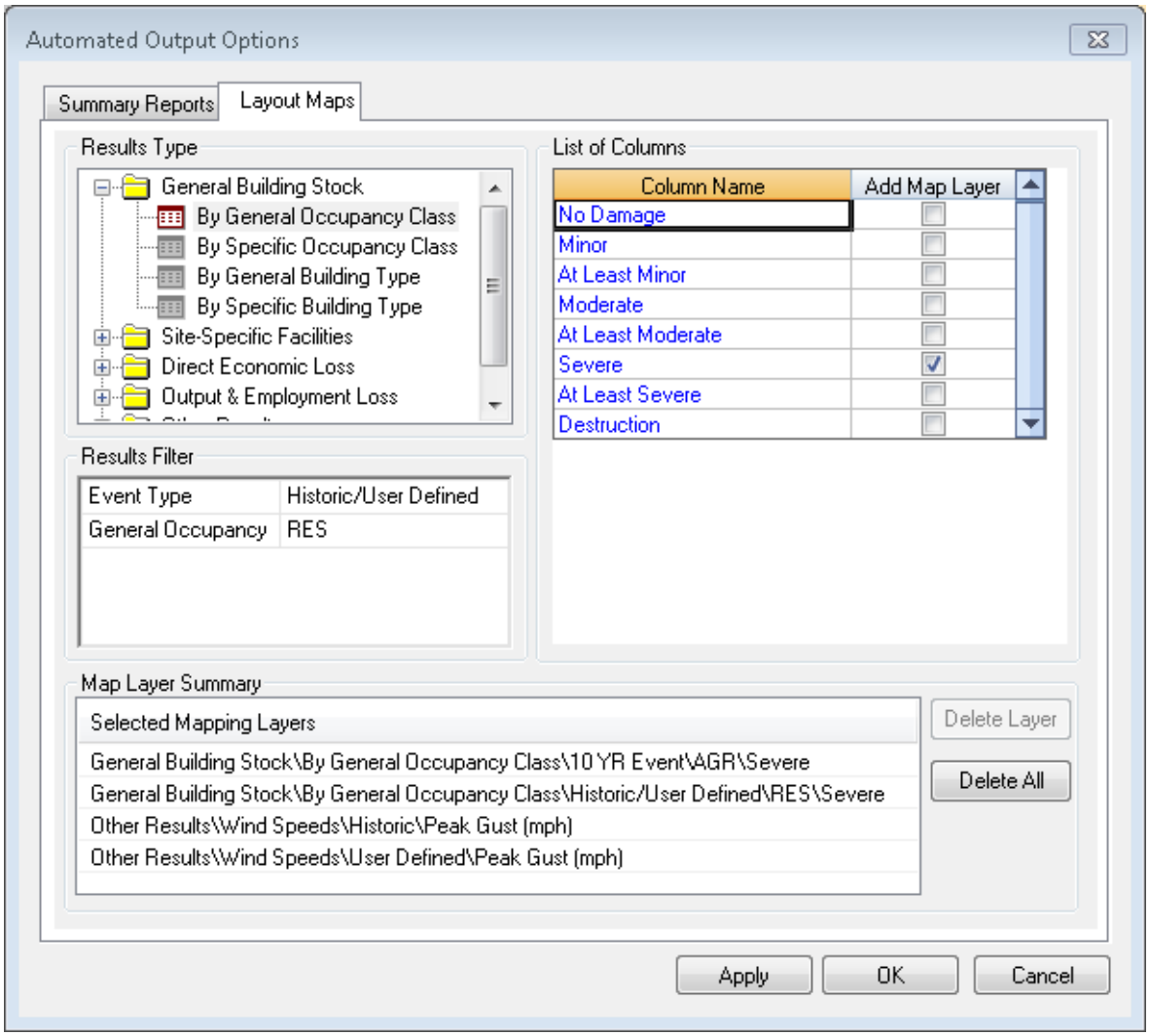
Select the preferred summary reports on the first page of the Automated Output Options dialog (Figure 7-9).

Figure 7-9: Select Preferred Report on Automated Output Options, Page 1



The users can select the preferred map layers on the second page of the **Automated Output Options** dialog (Figure 7-10). Select the **Results Type** and **Results Filter** to see the **List of Columns** that can be mapped and then check the preferred data columns. Click on the right-hand side of the **Results Filter** table to change the filter setting. The **Map Layer Summary** at the bottom of the window lists the currently selected map layers. When the **Automatic Outputs Option** is selected (Figure 7-8), the selected map layers will be created automatically and added to the GIS map table of contents.

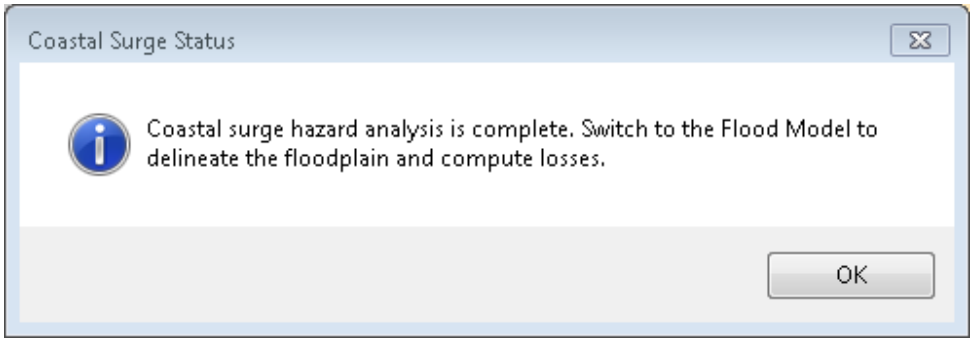
Figure 7-10: Select Preferred Map Layers on Automated Output Options, Page 2



7.7 Show Coastal Surge Status

See Chapter 11 for the instructions to run the Coastal Surge Model. When the coastal surge analysis is complete, click on **Analysis** and then **Show Coastal Surge Status** to confirm that the analysis was successful. The window shown in Figure 7-11 will appear.

Figure 7-11: Coastal Surge Status Window



8 Model Menu: Results

The types of outputs from a Hurricane Model analysis are shown in Figure 8-1 and are as follows:

- Storm Track
- Wind Speeds
- General Building Stock
- Combined Wind and Surge Loss
- Essential Facilities
- User-Defined Facilities
- Debris
- Shelter
- Summary Reports

Outputs are in result tables, maps, and reports and are numerical or graphical.

After running a single-track or probabilistic analysis, the user can access the output in the **Results Menu** (Figure 8-1). Table 8-1 summarizes the outputs from a Hurricane Model analysis.

Figure 8-1: Results Menu

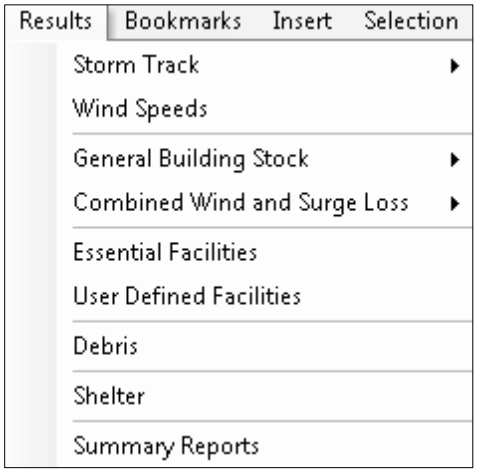


Table 8-1: List of Hurricane Model Outputs

Output	Description
Maps of wind hazards	• Peak gust (3-second) wind speed for each census tract • Maximum sustained (1-minute) wind speed for each census tract •
General Building Stock (GBS)	• Damage probabilities by occupancy • Damage probabilities by building type • Cost of building repair or replacement • Loss of contents • Business inventory loss • Loss of rental income • Relocation costs • Business income loss • Employee wage loss
Essential facilities	• Damage probabilities • Probability of functionality • Loss of beds in hospitals
Debris	• Building debris generated by weight and type of material • Tree debris generated by weight or volume
Social losses	• Number of displaced households • Number of people requiring temporary shelter
High potential loss facilities (HPLF)	• Locations of dams • Locations of nuclear plants • Locations of military facilities • Locations of other identified HPLF
Transportation and utility lifelines	• Locations of transportation facilities • Locations of lifelines
Hazardous material sites	• Location of facilities that contain hazardous materials

Hurricane Model outputs have several pre- and post-hurricane applications. Examples of possible pre-event applications are as follows:

- The development of hurricane hazard mitigation strategies that outline policies and programs for reducing the hurricane losses and disruptions that are indicated in the loss estimation study. The strategies may involve upgrading existing buildings (e.g., addition of shutters) or the adoption of new building codes.
- Anticipation of the nature and scope of response and recovery efforts including identifying short-term shelter and debris management requirements

Examples of post-event applications are as follows:

- Projection of immediate economic impact assessments for state and federal resource allocation and support including supporting the declaration of a state and/or federal

disaster by calculating direct economic impact on public and private resources, local governments, and the functionality of the area.

- Activation of immediate emergency recovery efforts including provision of emergency housing shelters and initiating debris clean-up efforts.
- Application of long-term reconstruction plans including the identification of long-term reconstruction goals, the institution of appropriate wide-range economic development plans for the entire area, allocation of permanent housing needs, and the application of land use planning principles and practices.

Once the inventory has been developed and imported, making modifications and running new analyses are simple tasks. The ease with which reports and maps can be generated makes the software useful for a variety of applications.

8.1 Storm Track

Storm Track results show a historical storm scenario (Figure 8-2 and Figure 8-3). For a probabilistic scenario, there is an option for each return period event, as shown in Figure 8-4. The line layer can be exported as a shapefile or geodatabase feature class.

Figure 8-2: Results / Storm Track Menu

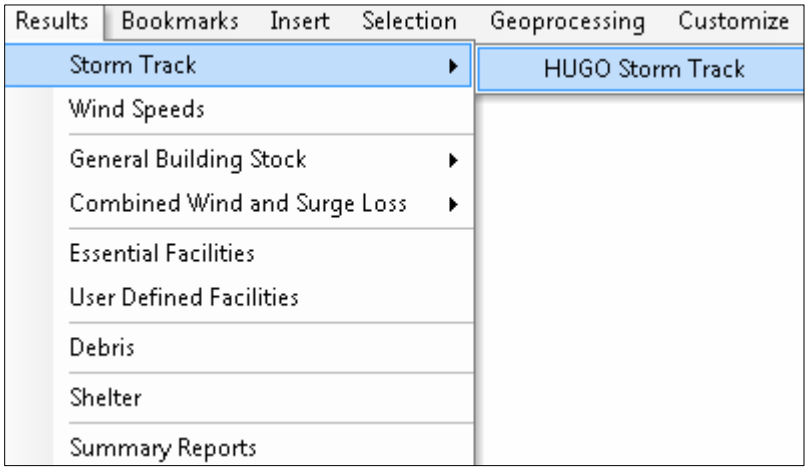


Figure 8-3: Example – Historical Storm Track

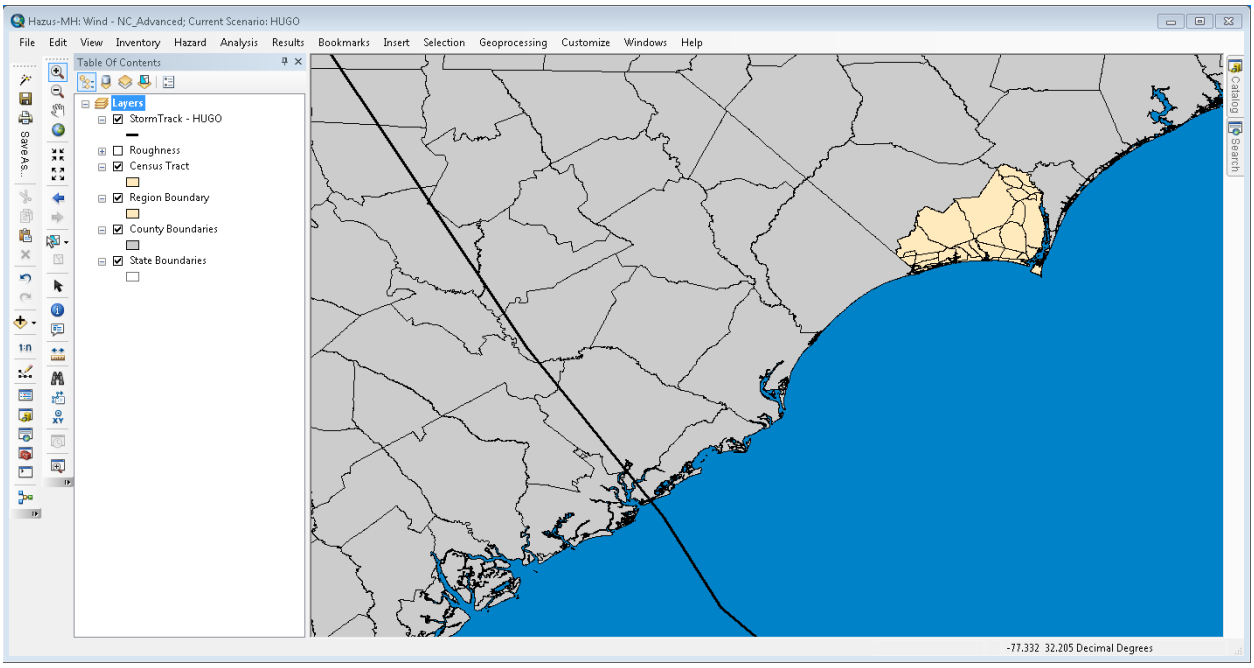
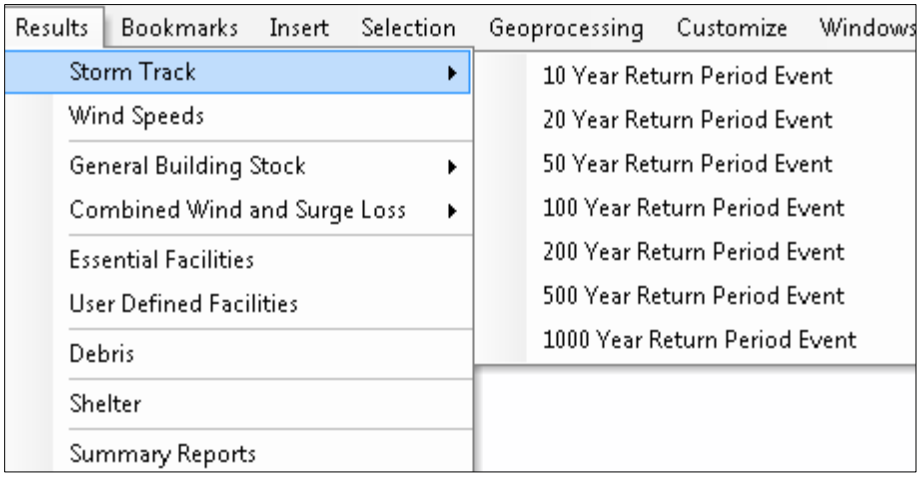


Figure 8-4: Example – Probabilistic Storm Track



8.2 Wind Speeds

Selecting Results and then Wind Speeds (Figure 8-5) brings up a table that allows the user to see and map the peak wind speeds for the current hazard by census tract (Figure 8-6). The wind speeds that are shown are the estimated maximum 3-second gusts in open terrain at 10 meters above ground at the centroid of each census tract for specific hurricane events. Hazus searches through the 100,000 year simulated database for all storms events that intersect the study region. The total losses for each storm event are ranked and then used to determine the specific hurricane for each annual chance event. The wind speeds for that specific hurricane are then used as the basis to determine the wind speed values and losses at the individual census tract level. This may result in some individual census tracts having lower wind speeds for less frequent events, such as the example shown in Figure 8-6 where a set of census tracts have lower wind speeds for the 1000-yr event as compared to the 500-yr event.

Figure 8-5: Results / Wind Speeds Menu

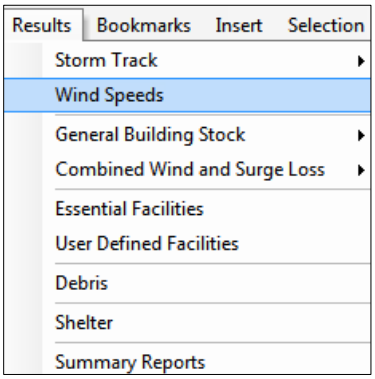
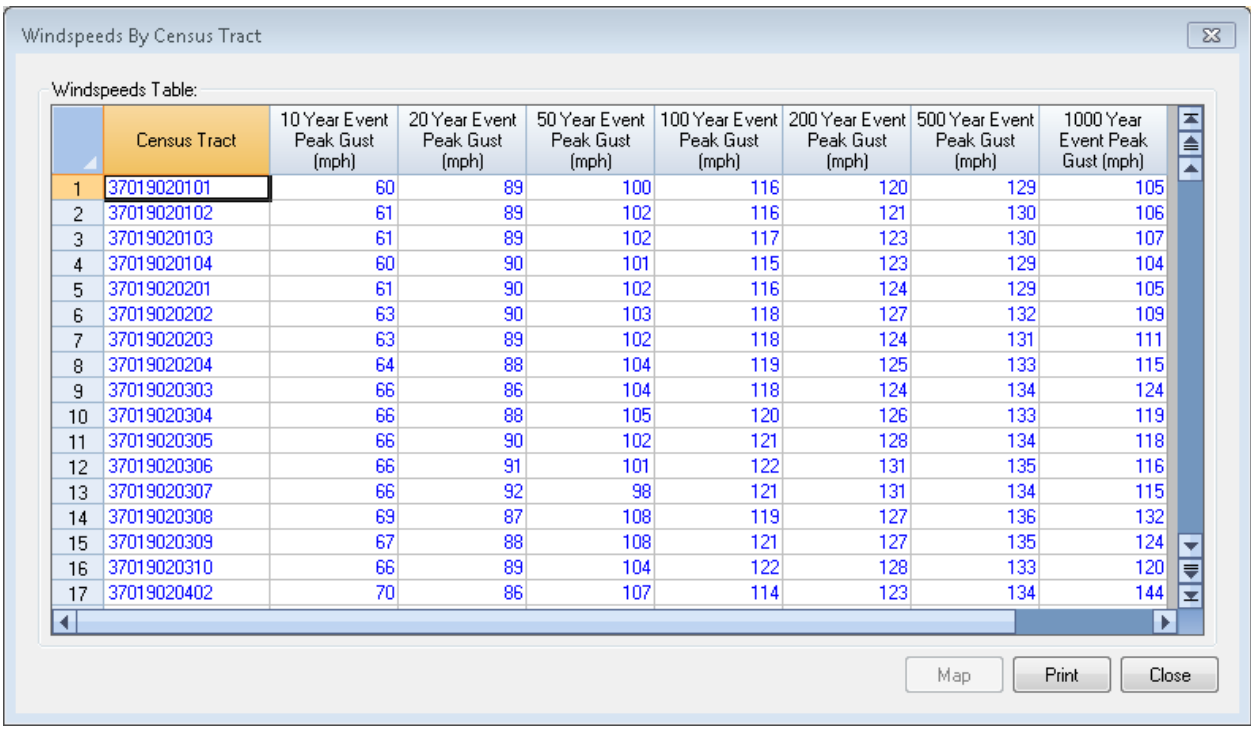


Figure 8-6: Wind Speeds by Census Tract Table

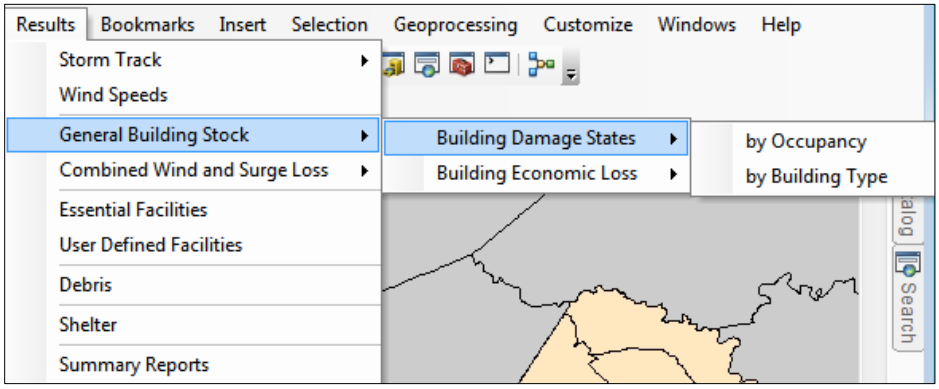


	Census Tract	10 Year Event Peak Gust (mph)	20 Year Event Peak Gust (mph)	50 Year Event Peak Gust (mph)	100 Year Event Peak Gust (mph)	200 Year Event Peak Gust (mph)	500 Year Event Peak Gust (mph)	1000 Year Event Peak Gust (mph)
1	37019020101	60	89	100	116	120	129	105
2	37019020102	61	89	102	116	121	130	106
3	37019020103	61	89	102	117	123	130	107
4	37019020104	60	90	101	115	123	129	104
5	37019020201	61	90	102	116	124	129	105
6	37019020202	63	90	103	118	127	132	109
7	37019020203	63	89	102	118	124	131	111
8	37019020204	64	88	104	119	125	133	115
9	37019020303	66	86	104	118	124	134	124
10	37019020304	66	88	105	120	126	133	119
11	37019020305	66	90	102	121	128	134	118
12	37019020306	66	91	101	122	131	135	116
13	37019020307	66	92	98	121	131	134	115
14	37019020308	69	87	108	119	127	136	132
15	37019020309	67	88	108	121	127	135	124
16	37019020310	66	89	104	122	128	133	120
17	37019020402	70	86	107	114	123	134	144

8.3 General Building Stock Results

Selecting Results and then General Building Stock (Figure 8-7) allows the user to see and map the general inventory damage results by occupancy and building type.

Figure 8-7: Results / General Building Stock by Building Damage States Menu

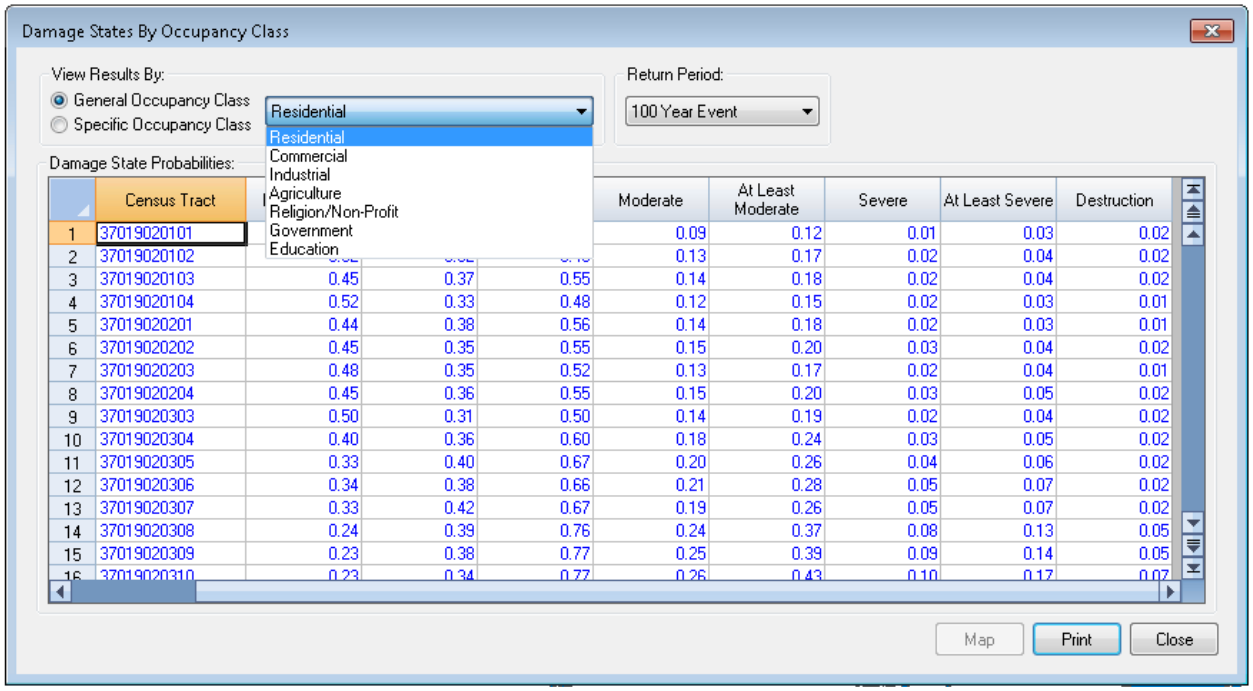


8.3.1 Building Damage States by Occupancy Class

Figure 8-8 shows the GBS occupancy class results table where the user can see and map the general inventory damage results by general or specific occupancy class. The values in the table represent the expected fraction of building square footage in each damage state.

For probabilistic scenarios, the dropdown box allows the user to select one of seven sample return period events from different occupancies and return periods to see damage state probabilities by census tract.

Figure 8-8: Damage States by Occupancy Class Table

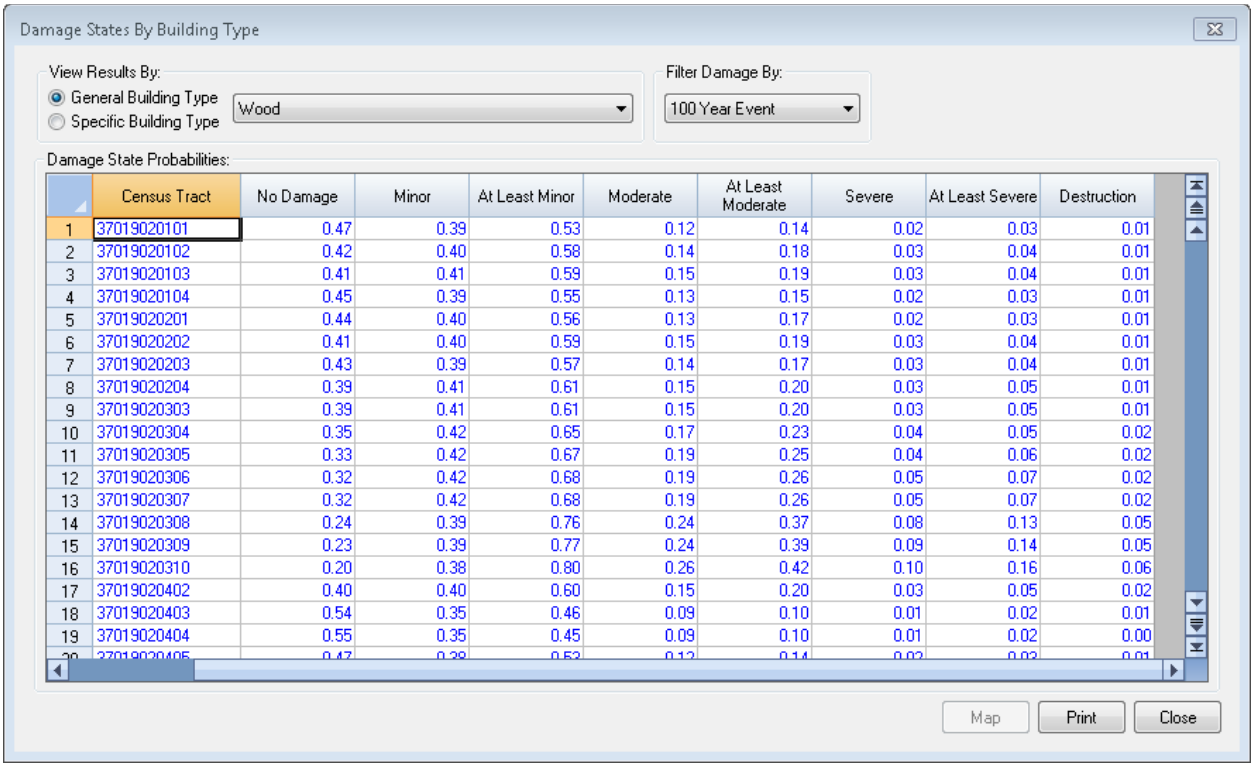


8.3.2 Building Damage States by Building Type

Figure 8-9 shows damage states by building type, allowing the user to see the general building type and the building type by census tract.

For probabilistic scenarios, the dropdown box allows the user to select one of seven sample return period events from different occupancies and return periods to see damage state probabilities by census tract.

Figure 8-9: Damage States by Building Type Table



	Census Tract	No Damage	Minor	At Least Minor	Moderate	At Least Moderate	Severe	At Least Severe	Destruction
1	37019020101	0.47	0.39	0.53	0.12	0.14	0.02	0.03	0.01
2	37019020102	0.42	0.40	0.58	0.14	0.18	0.03	0.04	0.01
3	37019020103	0.41	0.41	0.59	0.15	0.19	0.03	0.04	0.01
4	37019020104	0.45	0.39	0.55	0.13	0.15	0.02	0.03	0.01
5	37019020201	0.44	0.40	0.56	0.13	0.17	0.02	0.03	0.01
6	37019020202	0.41	0.40	0.59	0.15	0.19	0.03	0.04	0.01
7	37019020203	0.43	0.39	0.57	0.14	0.17	0.03	0.04	0.01
8	37019020204	0.39	0.41	0.61	0.15	0.20	0.03	0.05	0.01
9	37019020303	0.39	0.41	0.61	0.15	0.20	0.03	0.05	0.01
10	37019020304	0.35	0.42	0.65	0.17	0.23	0.04	0.05	0.02
11	37019020305	0.33	0.42	0.67	0.19	0.25	0.04	0.06	0.02
12	37019020306	0.32	0.42	0.68	0.19	0.26	0.05	0.07	0.02
13	37019020307	0.32	0.42	0.68	0.19	0.26	0.05	0.07	0.02
14	37019020308	0.24	0.39	0.76	0.24	0.37	0.08	0.13	0.05
15	37019020309	0.23	0.39	0.77	0.24	0.39	0.09	0.14	0.05
16	37019020310	0.20	0.38	0.80	0.26	0.42	0.10	0.16	0.06
17	37019020402	0.40	0.40	0.60	0.15	0.20	0.03	0.05	0.02
18	37019020403	0.54	0.35	0.46	0.09	0.10	0.01	0.02	0.01
19	37019020404	0.55	0.35	0.45	0.09	0.10	0.01	0.02	0.00

8.3.3 Building Damage Economic Loss by Occupancy

GBS outputs can also be shown for economic loss (Figure 8-10). For example, Figure 8-11 shows **General Building Stock Building Economic Loss by Occupancy**. In the first tab (**Direct Economic Loss**), the user can see economic loss values by general and specific occupancy class for each census tract. The second tab (**Output & Employment**) shows losses in thousands of dollars for general and specific occupancy classes for each census tract. Values can be filtered by each return period.

Figure 8-10: Results / General Building Stock by Building Economic Loss Menu

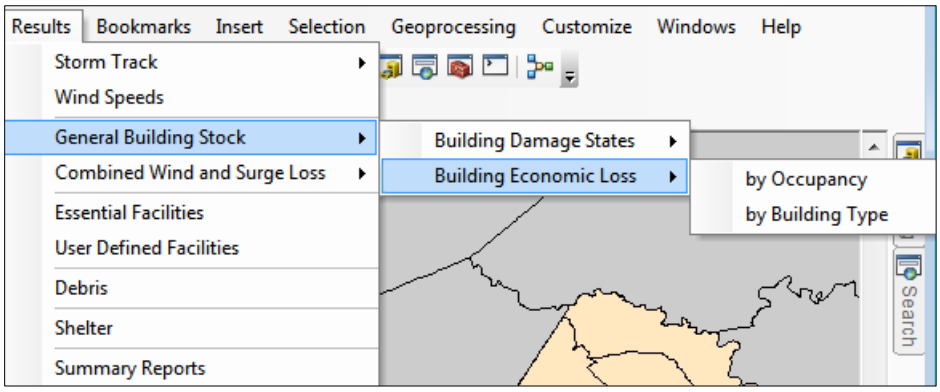
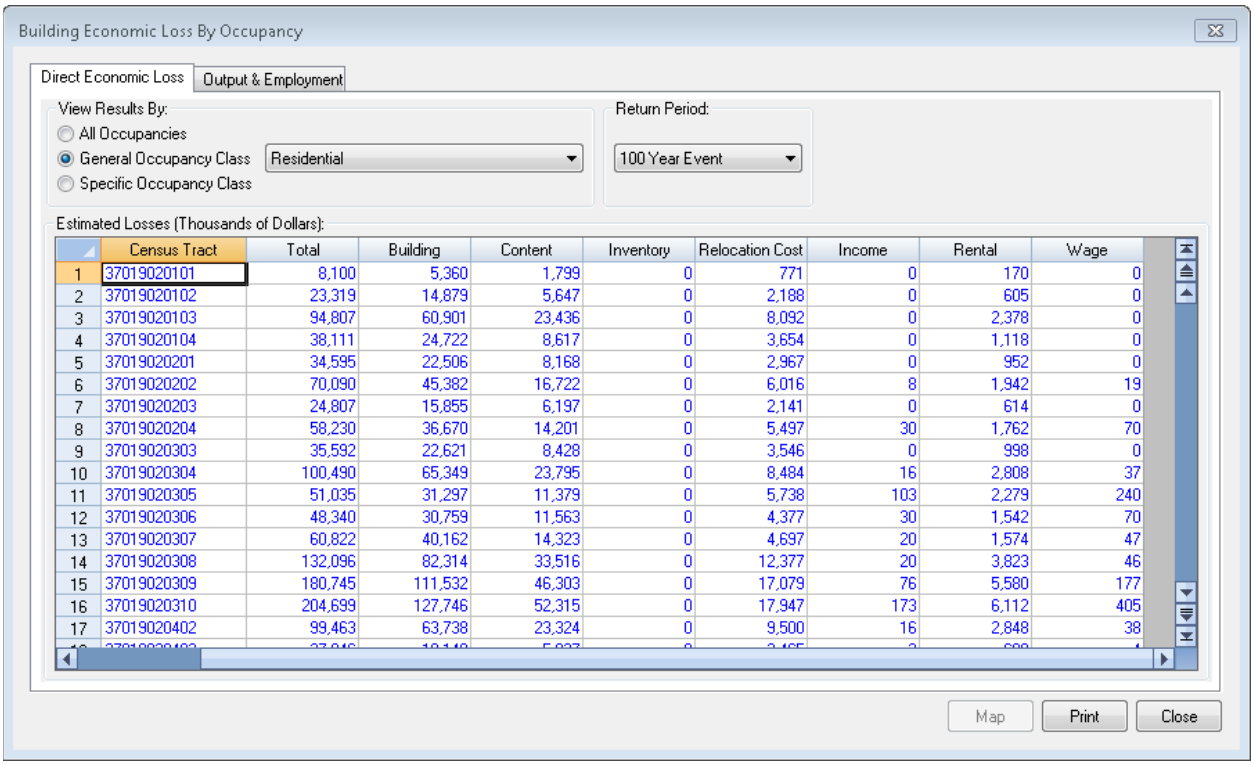


Figure 8-11: Building Economic Loss by Occupancy Table



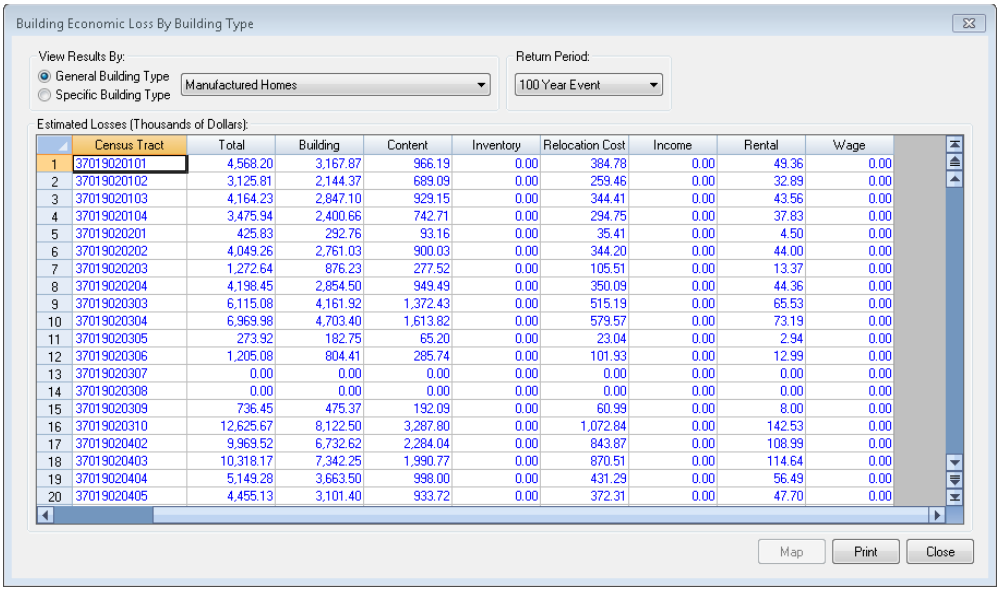
	Census Tract	Total	Building	Content	Inventory	Relocation Cost	Income	Rental	Wage
1	37019020101	8,100	5,360	1,799	0	771	0	170	0
2	37019020102	23,319	14,879	5,647	0	2,188	0	605	0
3	37019020103	94,807	60,901	23,436	0	8,092	0	2,378	0
4	37019020104	38,111	24,722	8,617	0	3,654	0	1,118	0
5	37019020201	34,595	22,506	8,168	0	2,967	0	952	0
6	37019020202	70,090	45,382	16,722	0	6,016	8	1,942	19
7	37019020203	24,807	15,855	6,197	0	2,141	0	614	0
8	37019020204	58,230	36,670	14,201	0	5,497	30	1,762	70
9	37019020303	35,592	22,621	8,428	0	3,546	0	998	0
10	37019020304	100,490	65,349	23,795	0	8,484	16	2,808	37
11	37019020305	51,035	31,297	11,379	0	5,738	103	2,279	240
12	37019020306	48,340	30,759	11,563	0	4,377	30	1,542	70
13	37019020307	60,822	40,162	14,323	0	4,697	20	1,574	47
14	37019020308	132,096	82,314	33,516	0	12,377	20	3,823	46
15	37019020309	180,745	111,532	46,303	0	17,079	76	5,580	177
16	37019020310	204,699	127,746	52,315	0	17,947	173	6,112	405
17	37019020402	99,463	63,738	23,324	0	9,500	16	2,848	38

8.3.4 Building Damage Economic Loss by Building Type

Figure 8-12 shows General Building Stock Building Economic Loss by Building Type. The user can see economic loss values by general and specific building type in thousands of dollars for each census tract.

For probabilistic scenarios, the dropdown menu allows the user to select annualized losses or one of seven sample return period events.

Figure 8-12: Building Economic Loss by Building Type Table



	Census Tract	Total	Building	Content	Inventory	Relocation Cost	Income	Rental	Wage
1	37019020101	4,568.20	3,167.87	966.19	0.00	384.78	0.00	49.36	0.00
2	37019020102	3,125.81	2,144.37	689.09	0.00	259.46	0.00	32.89	0.00
3	37019020103	4,164.23	2,847.10	929.15	0.00	344.41	0.00	43.56	0.00
4	37019020104	3,475.94	2,400.66	742.71	0.00	294.75	0.00	37.83	0.00
5	37019020201	425.83	292.76	93.16	0.00	35.41	0.00	4.50	0.00
6	37019020202	4,049.26	2,761.03	900.03	0.00	344.20	0.00	44.00	0.00
7	37019020203	1,272.64	876.23	277.52	0.00	105.51	0.00	13.37	0.00
8	37019020204	4,198.45	2,854.50	949.49	0.00	350.09	0.00	44.36	0.00
9	37019020303	6,115.08	4,161.92	1,372.43	0.00	515.19	0.00	65.53	0.00
10	37019020304	6,969.98	4,703.40	1,613.82	0.00	579.57	0.00	73.19	0.00
11	37019020305	273.92	182.75	65.20	0.00	23.04	0.00	2.94	0.00
12	37019020306	1,205.08	804.41	285.74	0.00	101.93	0.00	12.99	0.00
13	37019020307	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	37019020308	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	37019020309	736.45	475.37	192.09	0.00	60.99	0.00	8.00	0.00
16	37019020310	12,625.67	8,122.50	3,287.80	0.00	1,072.84	0.00	142.53	0.00
17	37019020402	9,969.52	6,732.62	2,284.04	0.00	843.87	0.00	108.99	0.00
18	37019020403	10,318.17	7,342.25	1,990.77	0.00	870.51	0.00	114.64	0.00
19	37019020404	5,149.28	3,663.50	998.00	0.00	431.29	0.00	56.49	0.00
20	37019020405	4,455.13	3,101.40	933.72	0.00	372.31	0.00	47.70	0.00

8.4 Combined Wind and Surge Loss Results

Combined Wind and Surge Loss Results, selected in Figure 8-13 and shown on Figure 8-14 allows the user to see and map combined wind and surge losses computed in the Hazus Flood Model using surge and wave grids from the Hurricane Storm Surge analysis option. See Chapter 11 for information on running a storm surge analysis.

Coastal surge results cannot be generated for probabilistic or from .dat files.

Note that combined wind and surge results are available for building, content, and inventory losses but not for relocation, income, rental, or wage losses. The radio buttons and dropdown menus allow the user to filter the losses by occupancy or building type.

Figure 8-13: Combined Flood and Hurricane Surge Loss Menu

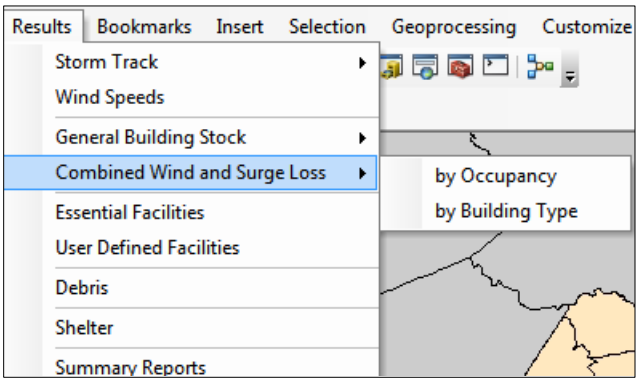
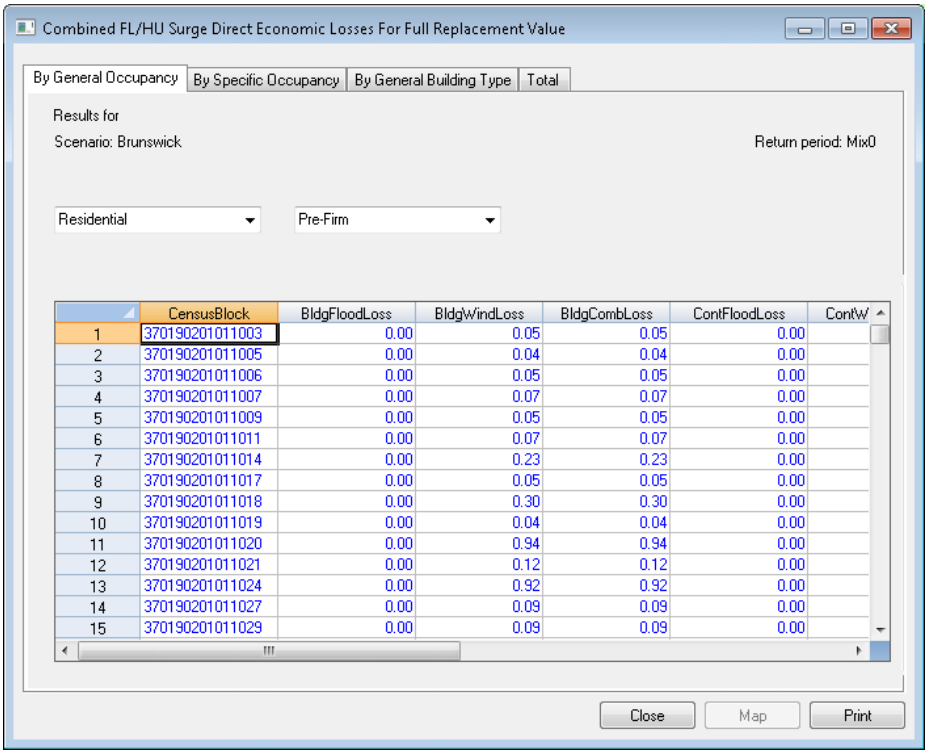


Figure 8-14: Combined Flood and Hurricane Surge Loss Results Table



	CensusBlock	BldgFloodLoss	BldgWindLoss	BldgCombLoss	ContFloodLoss	ContW
1	370190201011003	0.00	0.05	0.05	0.00	
2	370190201011005	0.00	0.04	0.04	0.00	
3	370190201011006	0.00	0.05	0.05	0.00	
4	370190201011007	0.00	0.07	0.07	0.00	
5	370190201011009	0.00	0.05	0.05	0.00	
6	370190201011011	0.00	0.07	0.07	0.00	
7	370190201011014	0.00	0.23	0.23	0.00	
8	370190201011017	0.00	0.05	0.05	0.00	
9	370190201011018	0.00	0.30	0.30	0.00	
10	370190201011019	0.00	0.04	0.04	0.00	
11	370190201011020	0.00	0.94	0.94	0.00	
12	370190201011021	0.00	0.12	0.12	0.00	
13	370190201011024	0.00	0.92	0.92	0.00	
14	370190201011027	0.00	0.09	0.09	0.00	
15	370190201011029	0.00	0.09	0.09	0.00	

8.5 Essential Facilities Results

Essential Facilities Results, selected in Figure 8-15 and shown in Figure 8-16 allows the user to see and map the damage and loss-of-use results for hospitals, police stations, fire stations, emergency operations centers, and schools.

For probabilistic scenarios, the dropdown menu allows the user to select one of seven sample return period events.

Figure 8-15: Essential Facilities Results Table

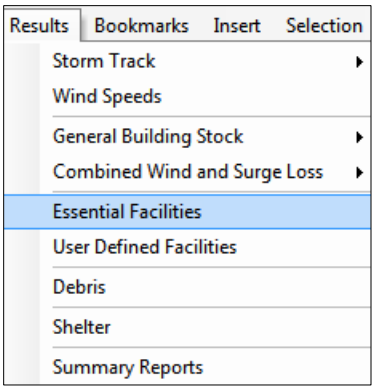
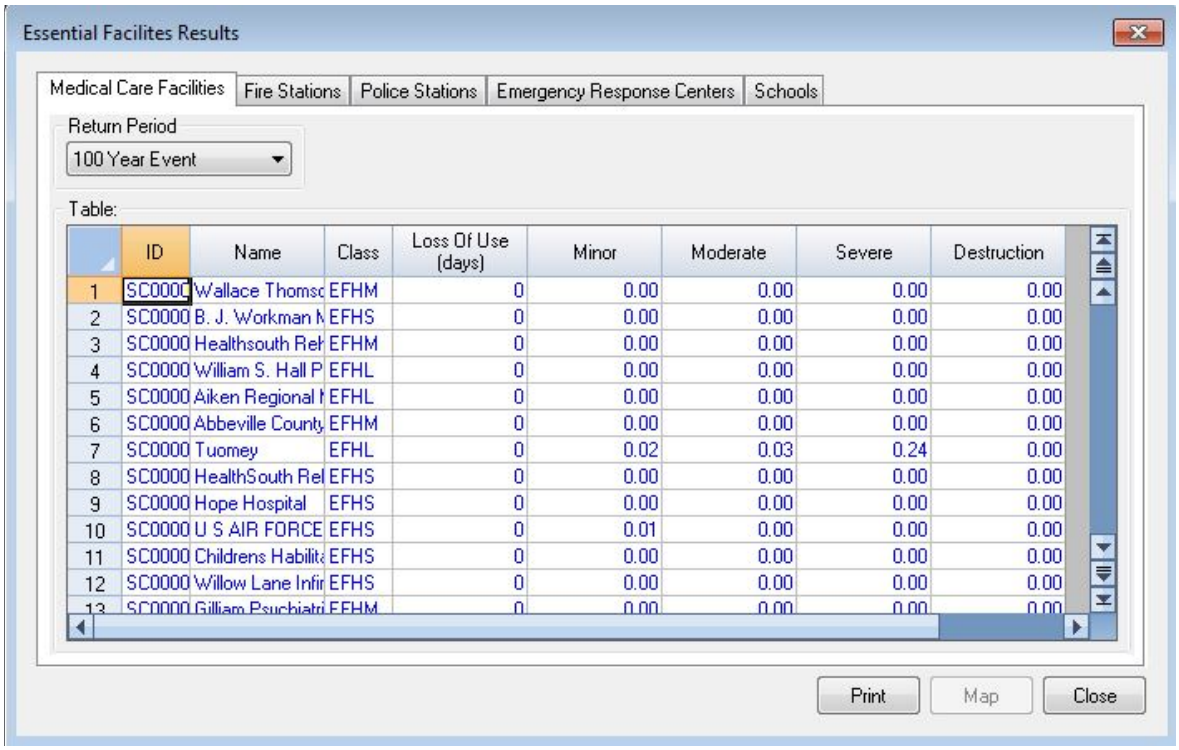


Figure 8-16: Essential Facilities Results Table



8.6 User-Defined Facilities Results

User-Defined Facilities Results, selected in Figure 8-17 and shown in Figure 8-18, allow the user to see and map only the damage stage results for individual, user-specified facilities.

For probabilistic scenarios, the dropdown menu allows the user to select one of seven sample return period events as shown in Figure 8-18.

Figure 8-17: User-Defined Facilities Results Table

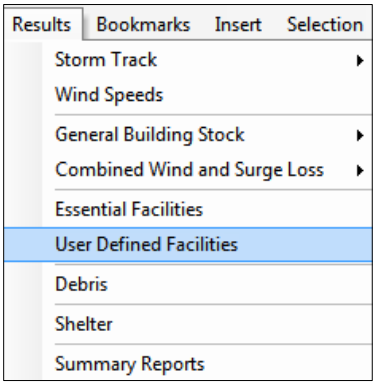
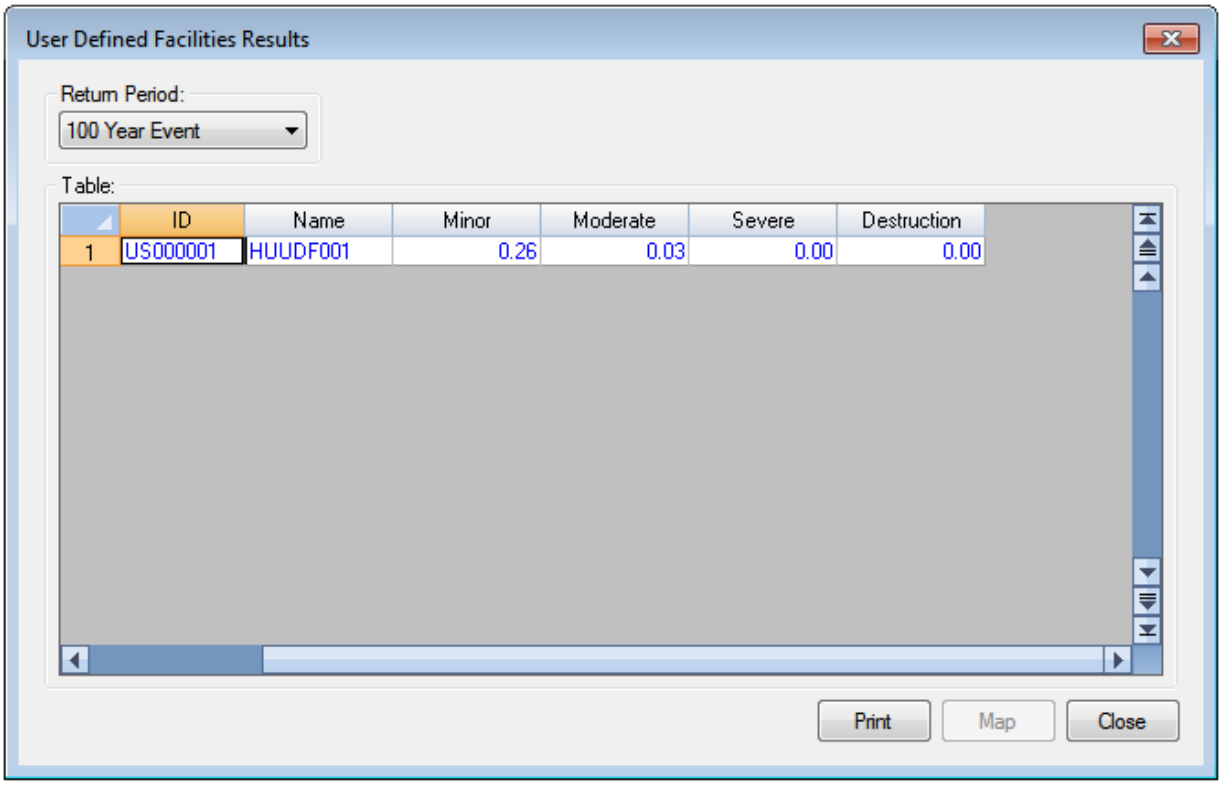


Figure 8-18: User-Defined Facilities Results Table



8.7 Debris Analysis Results

Debris Analysis Results, selected in Figure 8-19 and shown in Figure 8-20, allows the user to see and map building and tree debris results by census tract.

For probabilistic scenarios, the dropdown menu allows the user to select one of seven sample return period events.

The eligible tree debris columns (**Eligible Tree Weight** and **Eligible Tree Volume**) provide estimates of the weight and volume of downed trees that would likely be collected and disposed of at public expense. The eligible tree debris estimates produced by the Hurricane Model tend to underestimate reported volumes of debris brought to landfills for some of the events that occurred in the past several years. The underestimate suggests that that there are sources of vegetative and non-vegetative debris that are not modeled in Hazus.

For landfill estimation purposes, it is recommended that the Hazus debris volume estimate be treated as an approximate lower bound. Based on actual reported debris volumes, it is recommended that the Hazus results be multiplied by three to obtain an approximate upper bound estimate. It is also important to note that the Hurricane Model assumes a bulking factor of 10 cubic yards per ton of tree debris. If the debris is chipped prior to transport or disposal, a bulking factor of 4 is recommended.

Figure 8-19: Debris Analysis Results Table

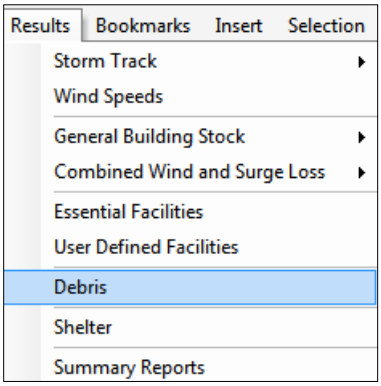
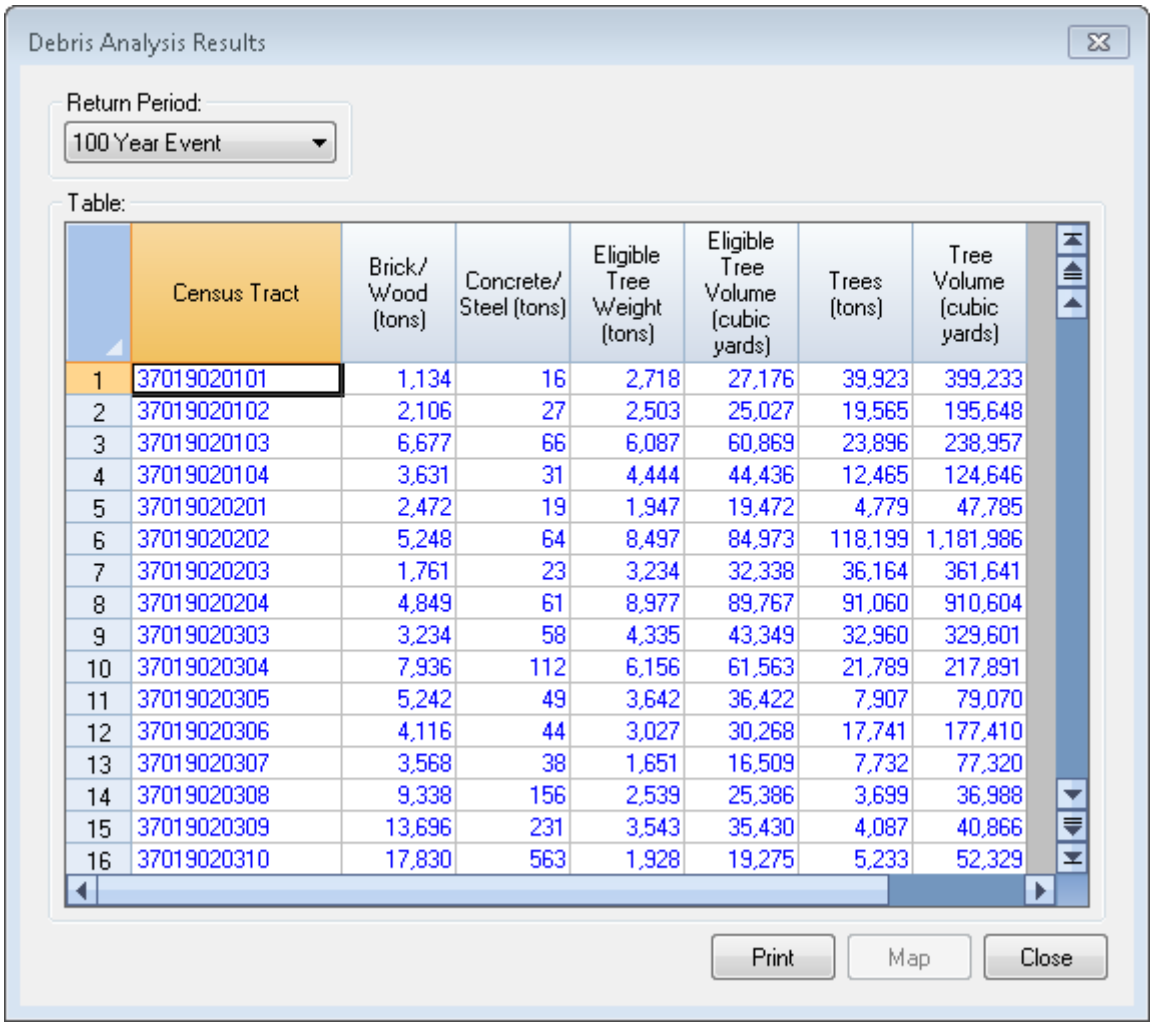


Figure 8-20: Debris Analysis Results Table



	Census Tract	Brick/ Wood (tons)	Concrete/ Steel (tons)	Eligible Tree Weight (tons)	Eligible Tree Volume (cubic yards)	Trees (tons)	Tree Volume (cubic yards)
1	37019020101	1,134	16	2,718	27,176	39,923	399,233
2	37019020102	2,106	27	2,503	25,027	19,565	195,648
3	37019020103	6,677	66	6,087	60,869	23,896	238,957
4	37019020104	3,631	31	4,444	44,436	12,465	124,646
5	37019020201	2,472	19	1,947	19,472	4,779	47,785
6	37019020202	5,248	64	8,497	84,973	118,199	1,181,986
7	37019020203	1,761	23	3,234	32,338	36,164	361,641
8	37019020204	4,849	61	8,977	89,767	91,060	910,604
9	37019020303	3,234	58	4,335	43,349	32,960	329,601
10	37019020304	7,936	112	6,156	61,563	21,789	217,891
11	37019020305	5,242	49	3,642	36,422	7,907	79,070
12	37019020306	4,116	44	3,027	30,268	17,741	177,410
13	37019020307	3,568	38	1,651	16,509	7,732	77,320
14	37019020308	9,338	156	2,539	25,386	3,699	36,988
15	37019020309	13,696	231	3,543	35,430	4,087	40,866
16	37019020310	17,830	563	1,928	19,275	5,233	52,329

8.8 Shelter

The **Shelter Analysis Results**, selected in Figure 8-21 and shown in Figure 8-22), allow the user to see and map the estimated number of displaced households and the estimated short-term shelter needs by census tract.

For probabilistic scenarios, the dropdown menu allows the user to select one of seven sample return period events.

Figure 8-21: Shelter Analysis Results Table

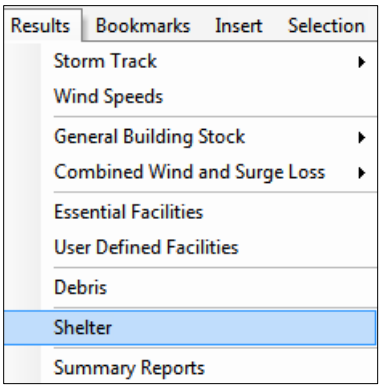
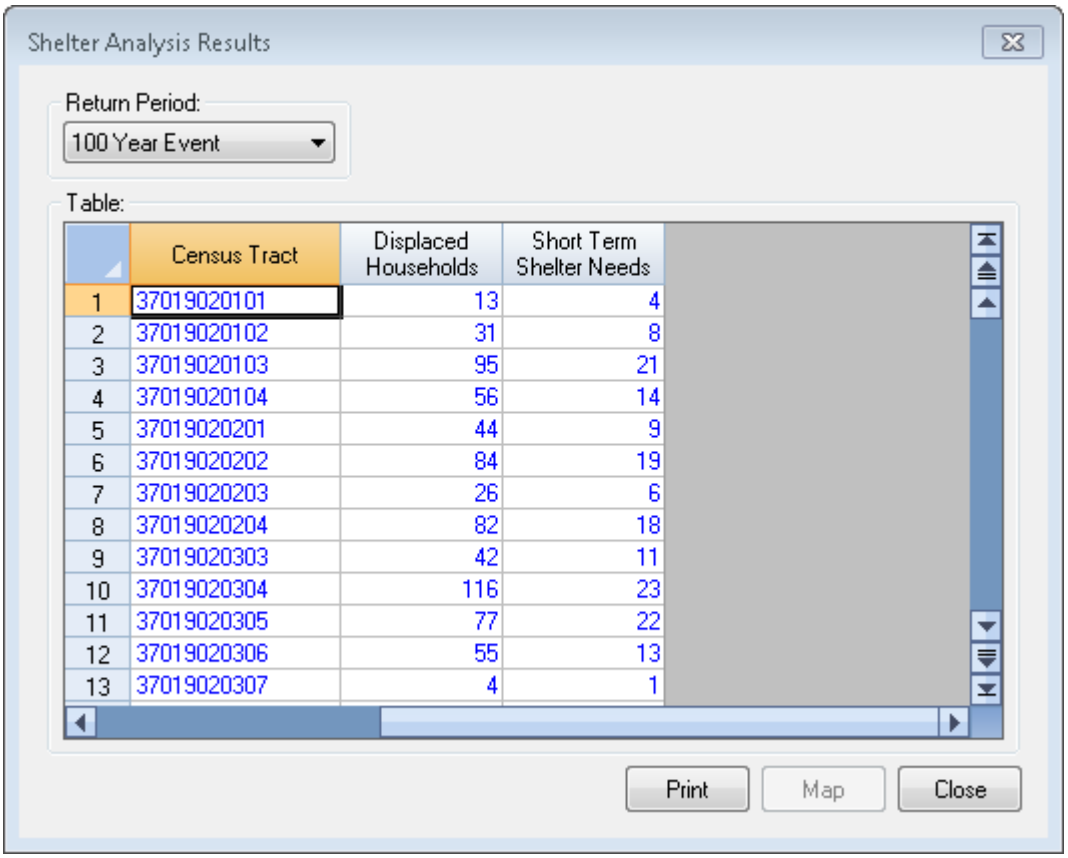


Figure 8-22: Shelter Analysis Results Table



8.9 Mapping a Results Table

To thematically map a given table, select its column by clicking on the header and then clicking the Map button at the bottom of a table (as shown in Figure 8-23) and closing the dialog. The resulting layer is shown in the wind speed example in Figure 8-24. Colors, legends, and titles can be altered easily. Any mapped layer can be exported as a shapefile or geodatabase feature class.

Figure 8-23: Example – Select Wind Speeds to Map

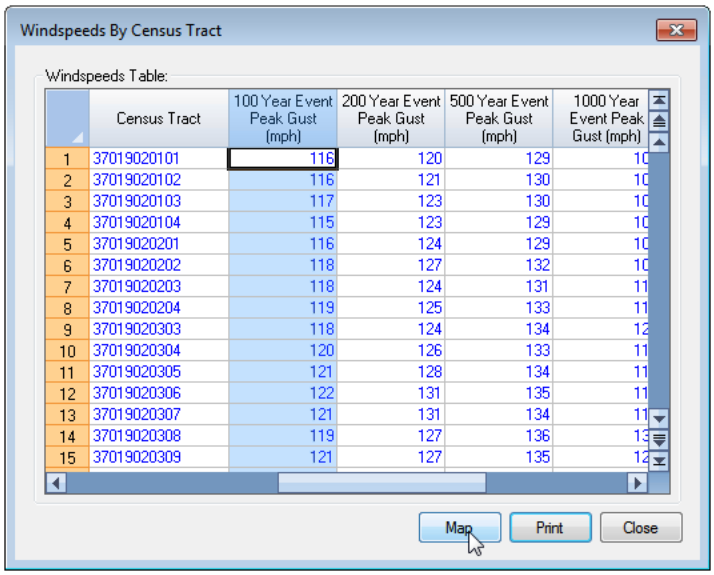
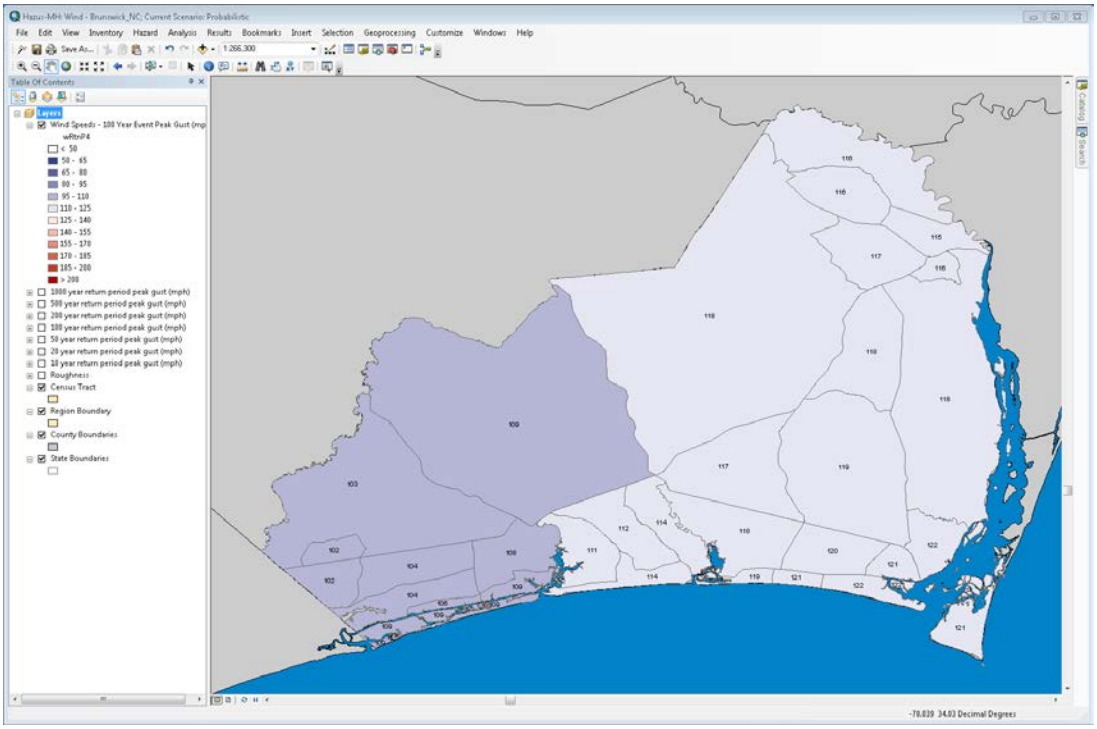


Figure 8-24: Example – Mapping Results for Selected Wind Speeds



8.10 Summary Reports

A variety of summary reports are available for viewing and printing through the **Summary Reports** menu (Figure 8-25 and Figure 8-26). After selecting a report, click **View** and a sample report will appear (Figure 8-27**)**. It may take several minutes for reports to generate after making the selection.

Figure 8-25: Results / Summary Reports Menu

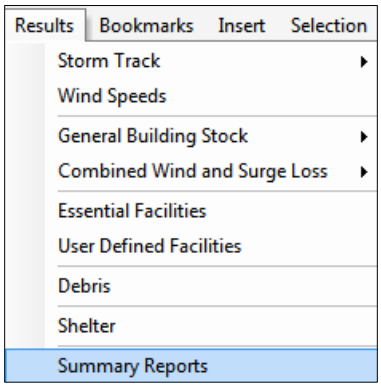


Figure 8-26: Select Desired Summary Report

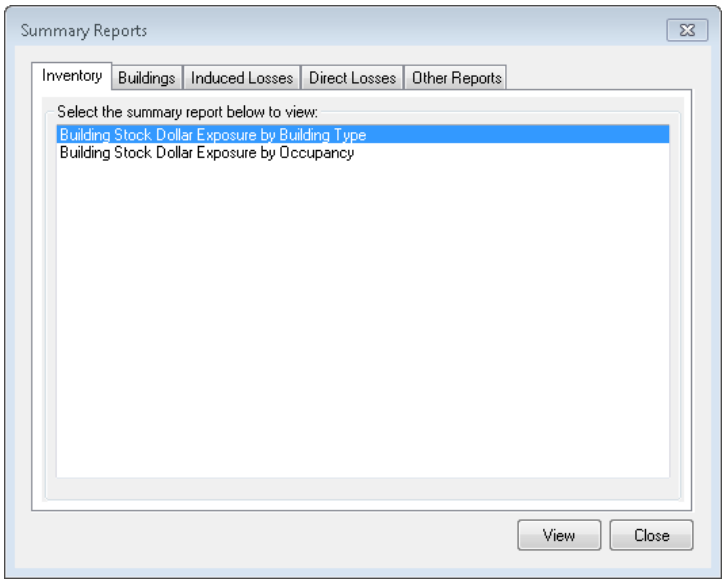
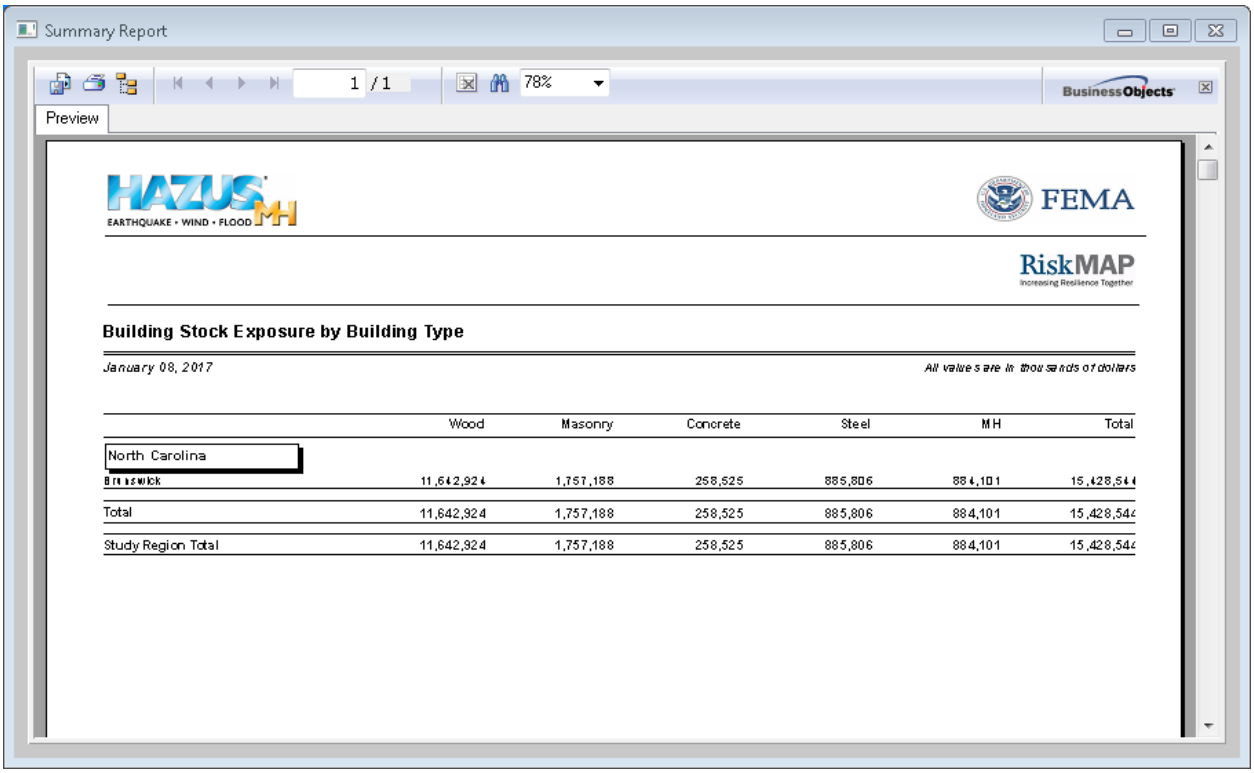


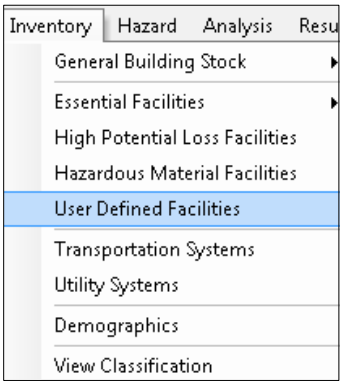
Figure 8-27: Example – Summary Report for Building Stock Exposure by Building Type



9 Advanced Hazus Analysis: User-Defined Inventory Data

The Hazus default data inventory provides a number of data sets that provide immediate analysis, but in certain Study Regions, more relevant custom data sets may be needed. User-Defined Facilities (UDF), accessible via the option **Inventory / User-Defined Facilities** (Figure 9-1), enables user-specific data sets to be analyzed through the Hazus methodologies allowing for more accurate results.

Figure 9-1: Inventory / User-Defined Facilities Menu



This chapter will primarily focus on editing UDF data within the Hazus interface. GBS and site-specific data, like UDF data, can also be edited within the Hazus Comprehensive Data Management System (CDMS) Tool, which installs with the Hazus software. CDMS allows the transfer of data into and out of the master Hazus statewide datasets, provides validation of new data into the system, and allows users to query and print information within the system. Transfer of data into the CDMS data repository supports both site-specific inventory and aggregated data. More details on CDMS can be found in the CDMS Manual.

9.1 Importing User-Defined Facilities Data

In Hazus, the default UDF table is typically empty, and the user must populate it with data specific to the area that is being analyzed. It is assumed that the user will obtain custom data from another source, convert it to a personal geodatabase (the only format the UDF import option supports), and ensure the data have populated the minimum required fields.

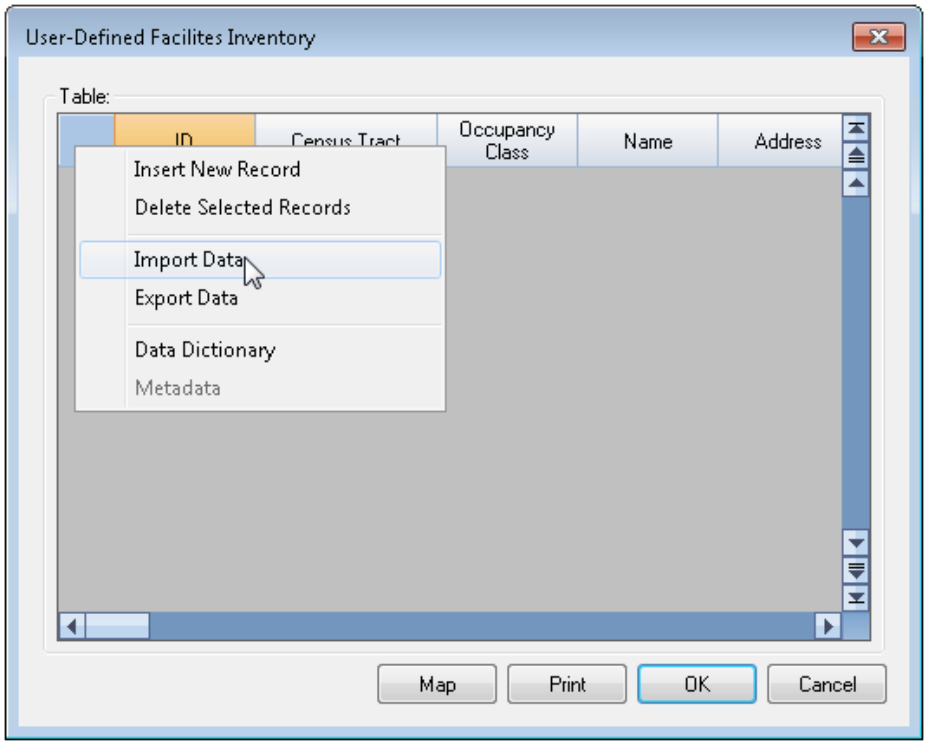
To import the data:

- Select **Inventory / User-Defined Facilities**
- Right-click the (empty) table to get the context menu
- Select **Start Editing** / **Import** (Figure 9-2)
- Select the geodatabase (.mdb) with the data. Hazus will number the tables that are in the geodatabase and prompt the user to select the table to use.

Since the input data could be in any schema, Hazus will automatically bring up a dialog box to allow the user to map the data from the input format to the target format. The list of fields in the input table will be shown on the left and will vary depending on the data inputs selected. The list of the target fields will be shown on the right. Selecting the correct target fields is the most

critical step in the import process since it affects the data used, and therefore the results obtained.

Figure 9-2: Import Hazus UDF Data



9.2 Required Attributes for User-Defined Facilities

The Hurricane Model does not currently perform economic loss analysis for UDF points. Instead, the model uses the UDF location to query the damage state information for the census tract where the UDF point is located, as shown in Figure 9-3. Therefore, the minimum attributes required for hurricane analysis of UDF, shown in Table 9-1, are limited to the UDF point location and the Wind Building Type and several fields derived from these values (Census Tract, Occupancy Type and the Wind Building Scheme Name).

Figure 9-3: User-Defined Facilities Results Table

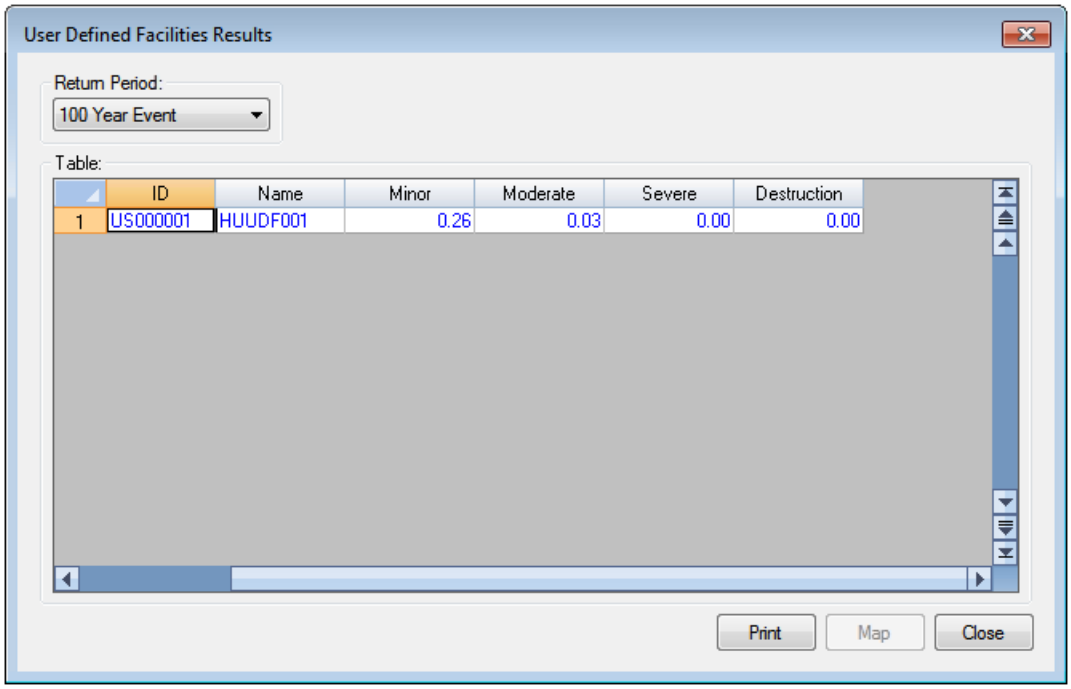


Table 9-1: List of Hurricane UDF Required Attributes

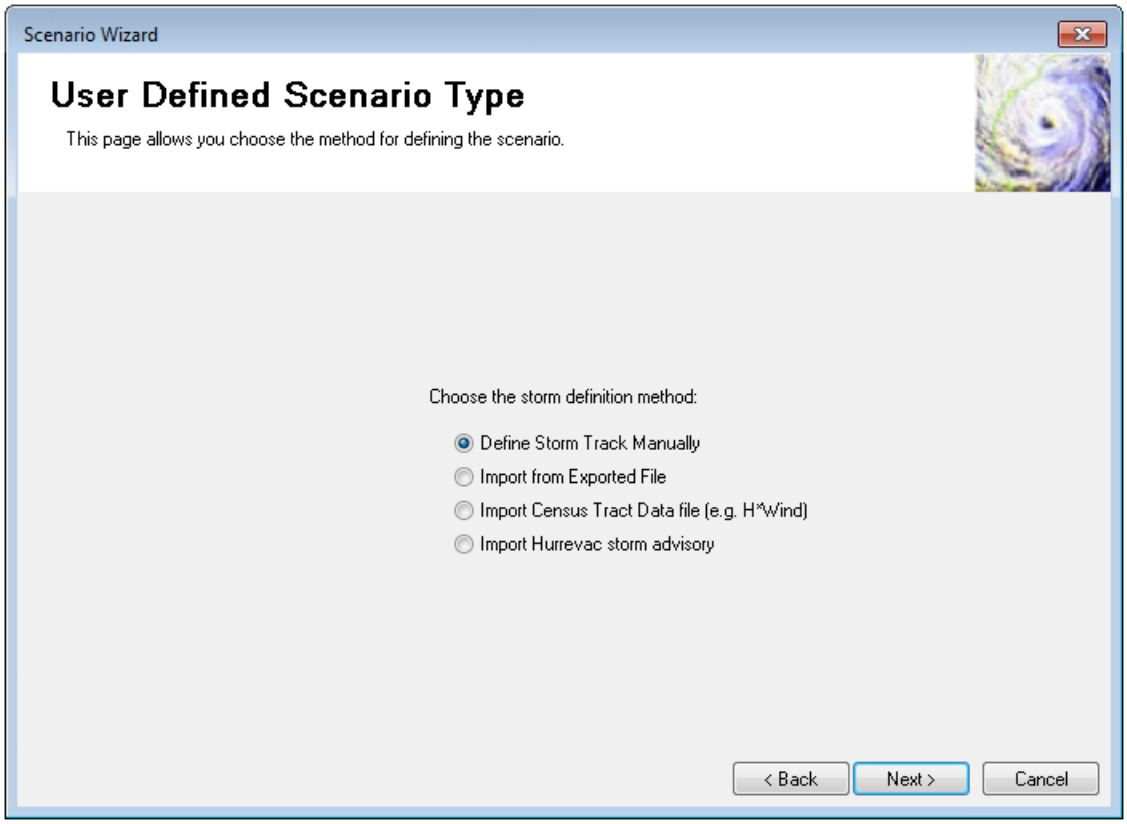
Attribute	Description	Why Is the Attribute Needed?
Record Identifier (ID)	A unique identifier for each record. Hazus creates its own value for each record (it does not prompt the user for one since there is no guarantee it is unique).	Hazus results will be displayed by the primary key generated when the data is imported.
Census Tract	Hazus will derive the census tract based on location information.	Hazus used the census tract information to look up the underlying information for wind damage modeling, such as tree cover.
Occupancy	Hazus will derive occupancy based on user supplied Wind Building Type.	Hazus analysis functions are a function of the occupancy and/or wind building type, per the Hazus classification.
Wind Building Type	Wind building type per the Hazus classification	Hazus uses the Wind Building Type to select the wind damage functions for wind damage analysis. Detailed list given in Appendices.
Wind Building Scheme Name	Hazus will derive based on location.	Hazus uses the scheme to derive wind damages.
Location	The location of the facility can be supplied as latitude/longitude if user directly enters values or directly (if the table imported is a feature class).	Hazus needs the location data to identify whether the facility is within the Study Region and to query underlying databases to conduct wind damage modeling.

10 Advanced Hazus Analysis: User-Defined Storm

Hazus allows users to manually enter a storm path with user-defined information. This step requires selecting options and inputting a storm path track. To find the page, follow these steps:

- Using the Scenario Wizard, select **Define Storm Track Manually**, as shown in Figure 10-1.
- Click **Next**.

Figure 10-1: Select Define Storm Track Manually

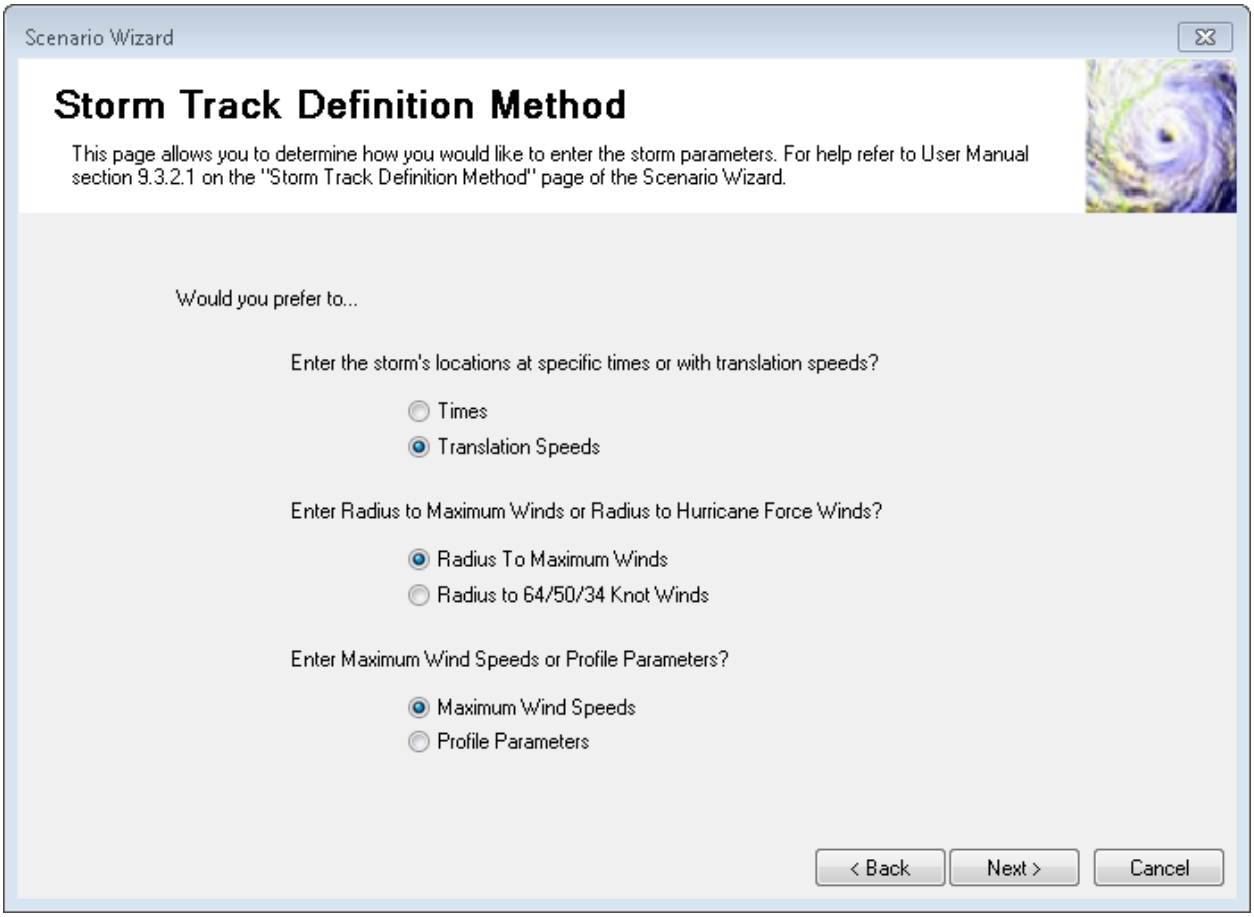


Next, choose from the following in the **Storm Track Definition Method** window (Figure 10-2):

- Storm's locations at specific **Times** or with **Translation Speeds**
- **Radius to Maximum Winds** or **Radius to Hurricane Force Winds**
- **Maximum Wind Speeds** or **Profile Parameters**

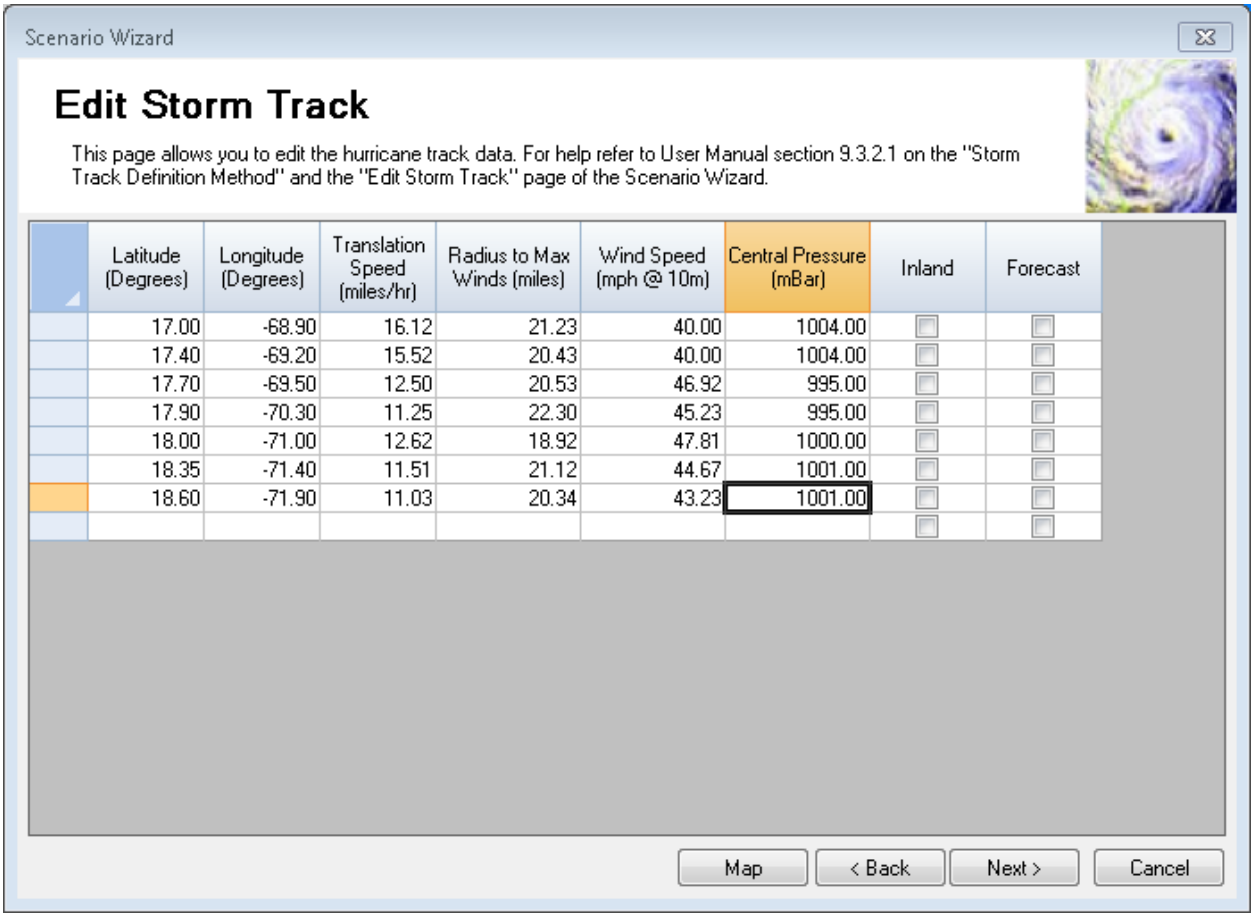
Then click **Next**.

Figure 10-2: Select Preferences for Storm Track Definition Method



The next window will show the **Edit Storm Track** table (Figure 10-3). The table will be blank and the user will need to fill out the attributes of the storm track except for the information that will populate automatically. The attributes will be based on the options the user selected in the Figure 10-2.

Figure 10-3: Insert Required Storm Track Data



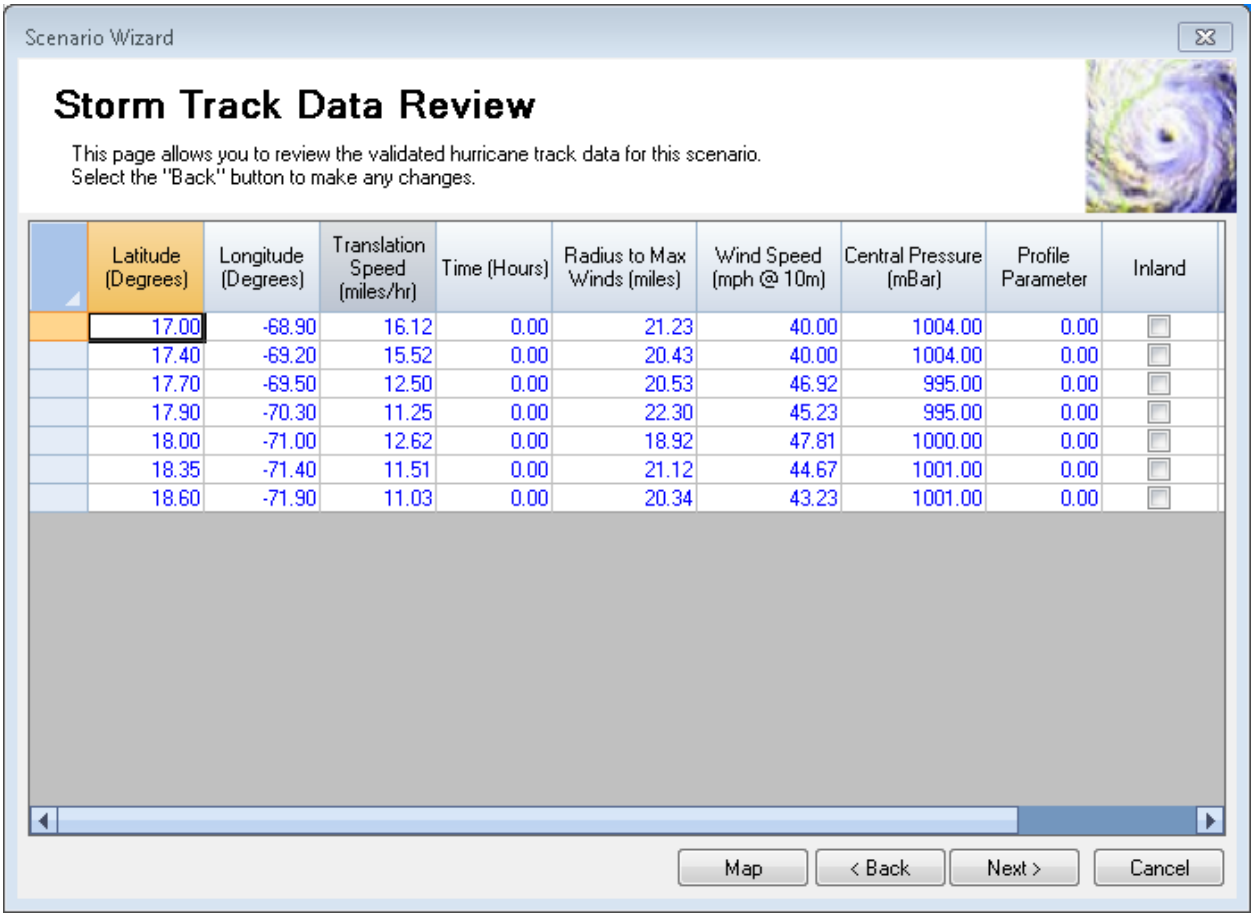
The user will provide the inputs listed below. Pay careful attention to the units of measure in the column headings.

- **Latitude** – Based on the selected storm track. All values will be in decimal degrees (North is positive).
- **Longitude** – Based on the locations of points on the selected storm track. All values will be in decimal degrees (East is positive).
- **Times** (not shown in Figure 10-3) – Elapsed time in hours at each point along the track. The first point should be zero.
- **Translation Speed** – Forward speed of the storm in mph at each point along the track. Typical translation speeds are 5 to 25 mph.
- **Radius to Maximum Winds** – Distance in miles from the center of the storm to the location of highest winds. Typical values are 6 to 60 miles. Intense storms generally have smaller radii to maximum winds.

- **Radius to Hurricane Winds**, 50 knot winds or 34 knot winds (not shown in Figure 10-3) – Greatest distance in miles from the center of the storm to hurricane-force winds (i.e., 74 mph sustained), 50 knot winds or 34 knot winds. These values are provided in NOAA National Hurricane Center (NHC) Hurricane Forecast/Advisories. Typical values are 10 to 200 miles.
- **Maximum Wind Spee**d – Maximum 1-minute sustained wind speed in mph of the storm at the current location. For reference, the following are the 1-minute sustained wind speeds for the five hurricane categories.
  - Category 1: 74 to 95 mph
  - Category 2: 96 to 110 mph
  - Category 3: 111 to 129 mph
  - Category 4: 130 to 156 mph
  - Category 5: >157 mph
- **Profile Parameters** (Holland B parameter) (not shown in Figure 10-3) – Distribution of atmospheric pressures as a function of distance from the center of the storm. Values are 0.5 to 2.5 with a typical value of 1.3.
- **Central Pressure** – Surface level atmospheric pressure in mbar at the center of the storm. For reference, the following are the general central pressure ranges for the five hurricane categories.
  - Category 1: >979 mbar
  - Category 2: 965 to 979 mbar
  - Category 3: 945 to 964 mbar
  - Category 4: 920 to 944 mbar
  - Category 5: <920 mbar
- **Inland** – Yes/no checkbox. The point is inland and the input data are from an NHC forecast or advisory. Hazus uses this information to estimate the Radius to Maximum Winds using the NHC Radius to Hurricane Winds.
- **Forecast** – Yes/no checkbox. The point is a forecast position and the user needs to estimate a range of expected losses, taking into account forecast uncertainties. Hazus uses this information to simulate a variety of potential tracks given the last known position and intensity. To run an analysis with the forecast uncertainties, the track must be defined using Time (not Translation Speed) and Maximum Wind Speed (not Profile Parameter). The times of the forecast points must be T+9 hrs, T+21 hrs, T+33 hrs, T+45 hrs, and T+69 hrs, where T is the time of the last known position. These are the time increments used in the official NHC forecasts and advisories. Note that it is not necessary to include all of the forecast positions from the advisory. The minimum number of permitted forecast points is one (T+9 hrs), and the maximum is five (T+69 hrs).

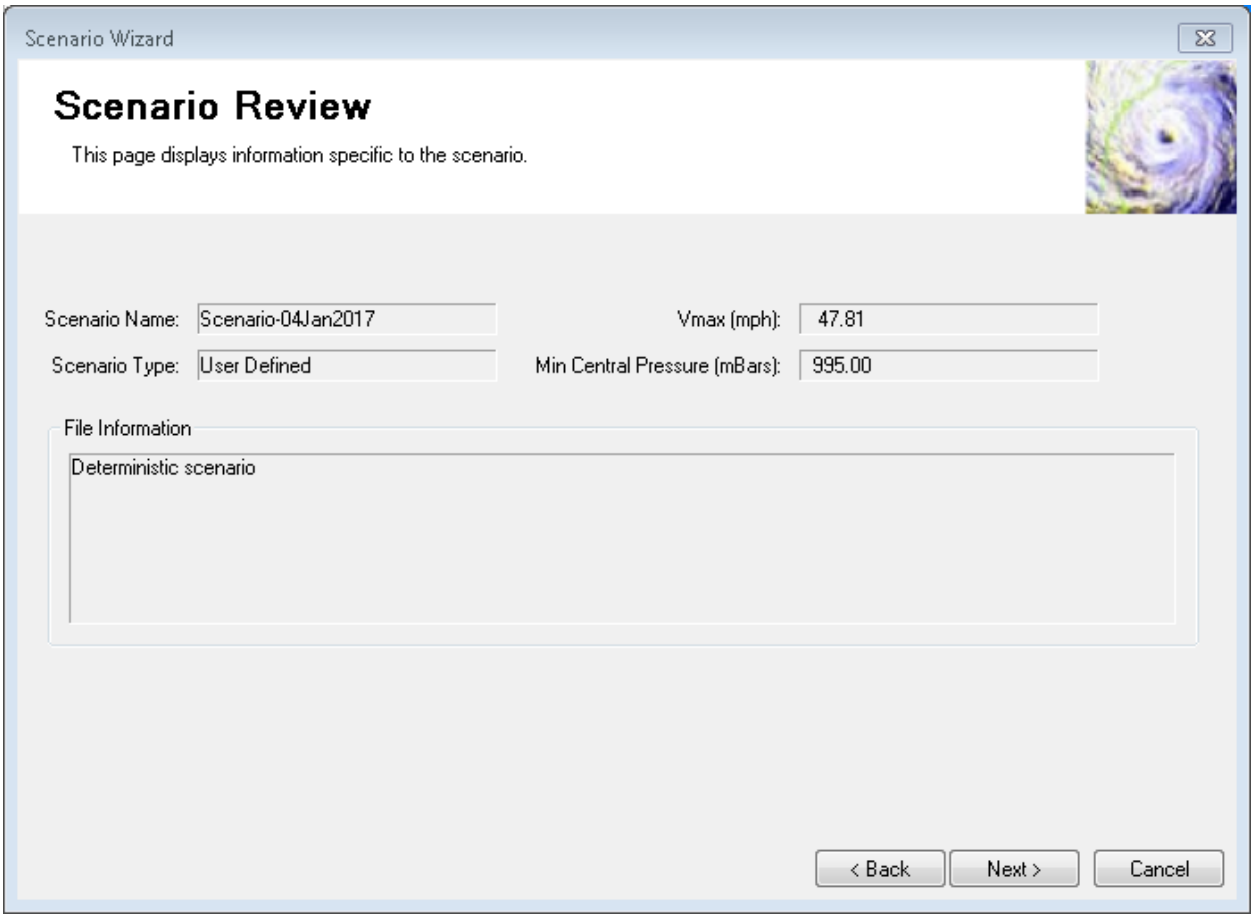
Once all information has been entered, click **Next** to process the Windfield Calculations. After the Windfield Calculations have been processed, Hazus will generate a review page, the **Storm Track Data Review** table shown in Figure 10-4.

Figure 10-4: Review Storm Track Data



After reviewing the information, click **Next** to bring up the **Scenario Review** table, shown in Figure 10-5. This will display information about the results of the scenario. After reviewing the information, click **Next** to activate the scenario.

Figure 10-5: Review Scenario



11 Advanced Hazus Analysis: Hurricane Surge Scenario

The Hazus tool can run a combined hurricane and flood hazard analysis for coastal areas. In order to run a combined hurricane and flood hazard, a multi-hazard (flood and hurricane) Study Region that includes a shoreline must be built. To build the Study Region, follow the workflow shown in Table 11-1. The inputs will be used to determine the extent of flooding due to a wind-driven storm and estimate the flood losses associated with the hurricane.

Table 11-1: Workflow to Build Multi-Hazard Study Region

Model	
Hurricane	• Define/Select Hurricane Scenario • Run Analysis with Surge-Only or Surge and Waves • Display Wind-Only Losses
Flood	• Select Coastal Surge • Define Topography • Define Scenario • Delineate Floodplain • Run Flood-Only Analysis • Run Combined Loss Analysis
Hurricane or Flood	• Display Combined Losses

11.1 Storm Surge Scenario Options

The storm surge scenario options are available for four hurricane scenario types:

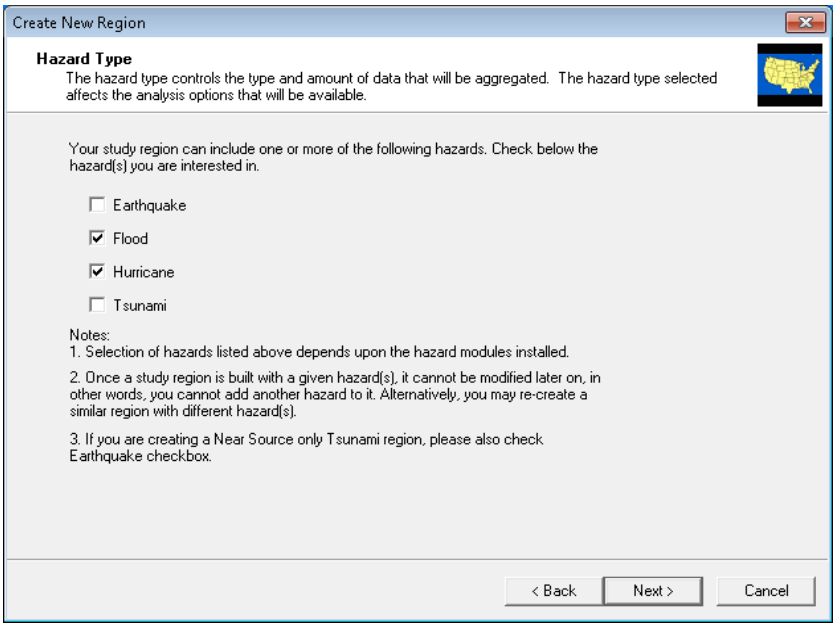
- User defined
- Hazus import
- Historic
- Hurrevac import (less than 24 hours before landfall); also see Section 6.3.3

The storm surge scenario options are not available for:

- .dat file
- Probabilistic

To run a coastal surge analysis, the Study Region must have been created for both Hurricane and Flood Hazard analysis. As shown in Chapter 3, start with create a New Region Wizard (Figure 11-1). Check both **Flood** and **Hurricane** hazard boxes and click **Next**.

Figure 11-1: Select Hazards for New Region

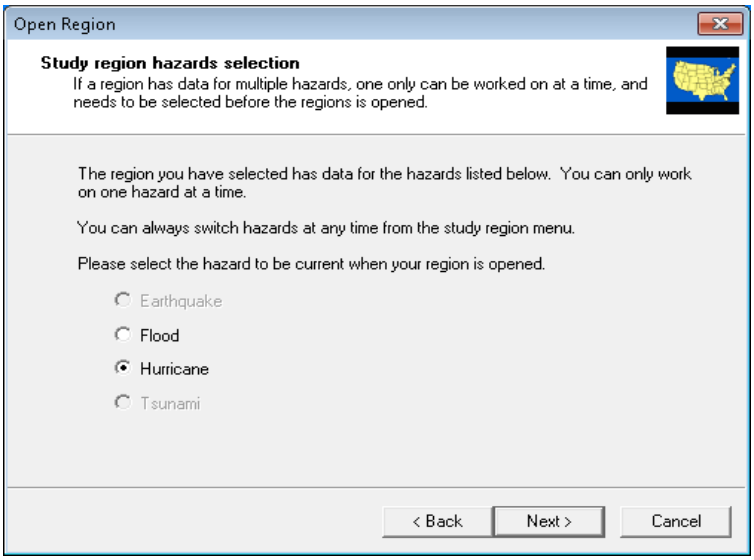


Specify the Study Region and finish the Create New Region wizard.

NOTE: Limiting coastal surge Study Regions to a single county is recommended. In some cases, a single county may need to be split into two regions.

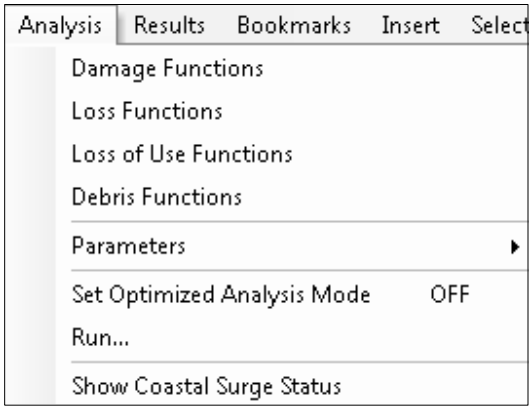
Open a region and select the new multi-hazard. When prompted, select the Hurricane Model to open first, as shown in Figure 11-2. Click **Next** and then click **Finish** to open the region.

Figure 11-2: Select Hurricane Model First in Study Region



Analysis / Set Optimized Analysis Mode must be "Off," as shown in Figure 11-3.

Figure 11-3: Ensure Optimized Analysis Mode is Off



Check **Hazard / Show Current** to make sure the scenario is set to manual, Hazus import, historical, or Hurrevac import (Figure 11-4). If the scenario needs to be changed, use **Hazard / Scenario** to open the Scenario Management Wizard discussed previously (Figure 11-5).

Figure 11-4: Review Scenario in Hazard / Show Current

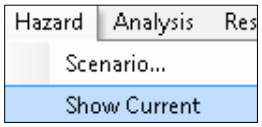
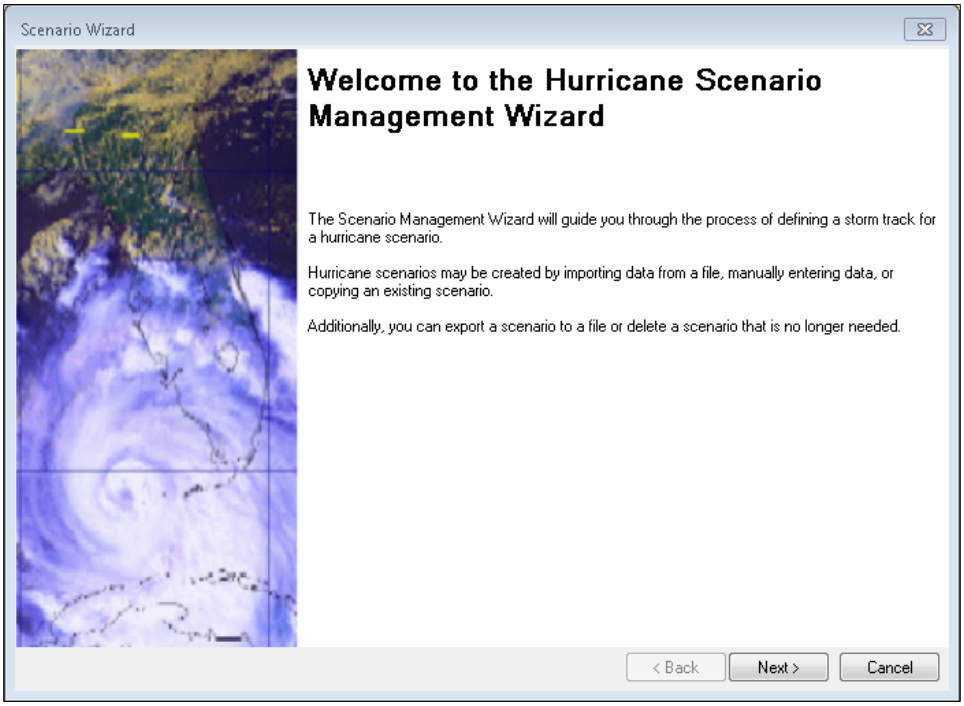


Figure 11-5: Scenario Management Wizard



11.2 Run Storm Surge Analysis

Open the **Analysis Options** from the **Analysis / Run** menu (Figure 11-6). When storm surge is selected, as shown in Figure 11-7, a storm surge analysis using the NOAA SLOSH model is executed in the Hurricane Model to produce estimates of coastal still water elevations. Note that the storm track that is used should extend beyond the outer boundary of the applicable SLOSH basin grids.

Figure 11-6: Analysis Run Storm Surge Menu

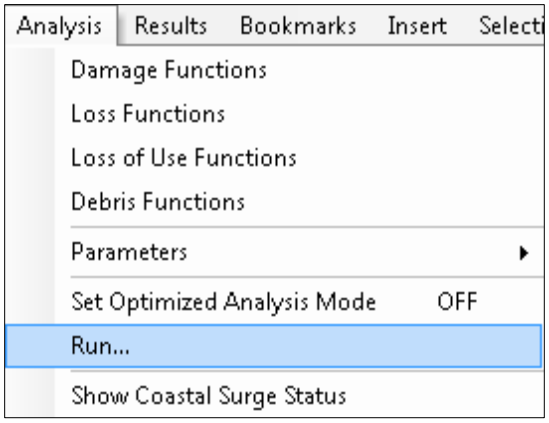
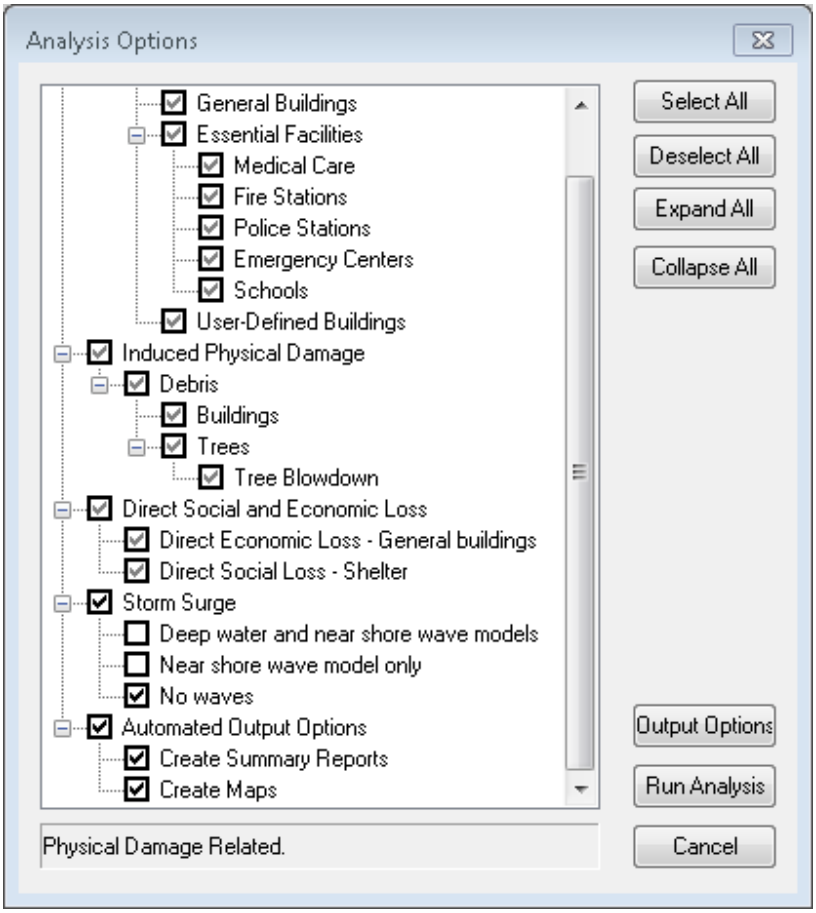


Figure 11-7: Analysis Options for Storm Surge



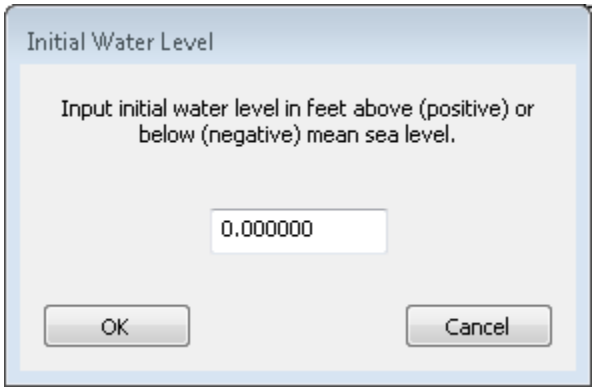
In addition, there are options for running coupled surge and wave analysis using the Delft University SWAN model if checked (refer to the Technical Manual for more details on the modeling approaches used for SWAN and SLOSH):

- **Deep water and near shore wave models**. A coarse analysis of the entire northwest Atlantic basin is run, and the results are then coupled into one or more nearshore wave grids, which are superimposed on the relevant SLOSH basin(s). This option is the most detailed and slowest running. The storm track used should also extend all the way out to 60 degrees west longitude when this option is selected.
- **Near shore wave model only**. This option runs a coupled surge and wave analysis within the relevant SLOSH basin(s) only. This option is faster than the first option but still significantly slower running than the "no waves" option.
- **No waves**. This option skips the SWAN model entirely. For this case, the Flood Model assumes depth-limited waves at the coastline rather than using significant wave heights produced by SWAN. This is the fastest option.

When appropriate boxes have been checked in the Analysis Options, click **Run Analysis**.

At the start of the analysis, the Hurricane Model prompts the user for an **initial water level** in feet with respect to the NAVD 1988 datum shown in Figure 11-8. This represents the water level along the coast that would have been expected (in the absence of the hurricane) near the center of the Study Region at the time of hurricane landfall. The initial water level can be estimated by using NOAA tide forecasts plus the pre-storm tidal anomaly (i.e., the difference between the forecast and observed water level 2 days before landfall).

Figure 11-8: Provide Initial Water Level



When running a coastal surge hazard analysis (Figure 11-9) in the Hurricane Model, a second progress dialog will appear after the wind-only damage and loss calculations are completed (Figure 11-10).

Figure 11-9: Run Analysis Progress Status Window

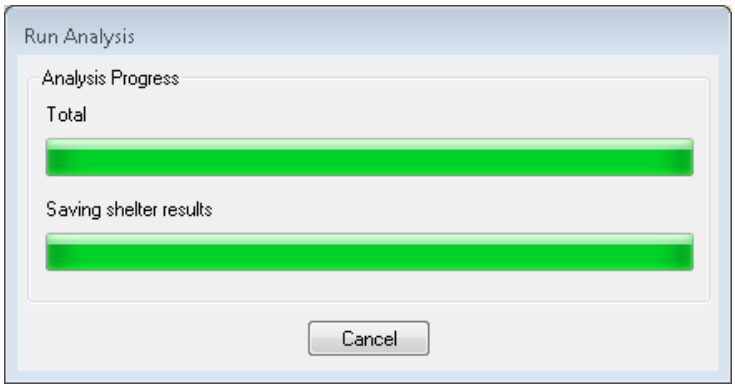
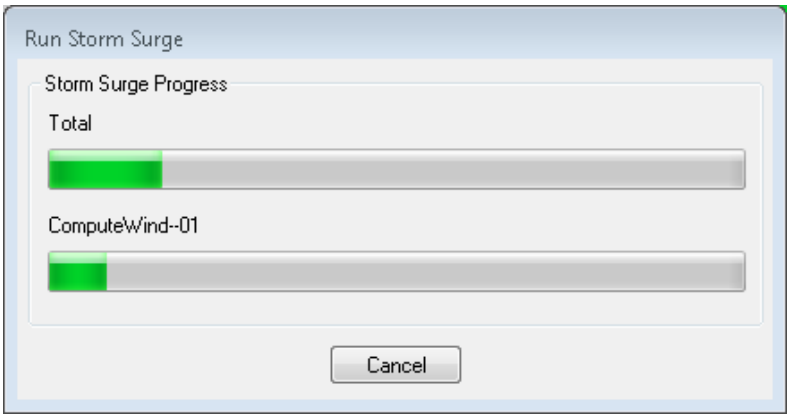
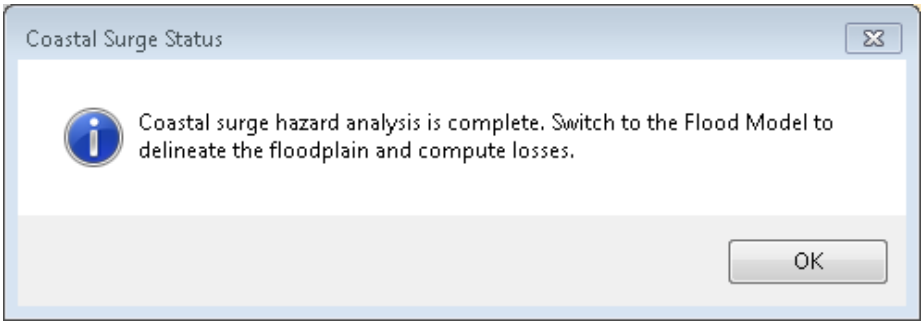


Figure 11-10: Run Storm Surge Progress Status Window



When a hurricane coastal storm surge analysis is run, two sets of direct building losses are produced: one set for the wind damage by itself and a second set for the combined wind and surge damage. When the coastal surge analysis is complete, click the **Analysis / Show Coastal Surge Status** to confirm that the analysis was successful, as shown by the status box in Figure 11-11.

Figure 11-11: Coastal Surge Status Window



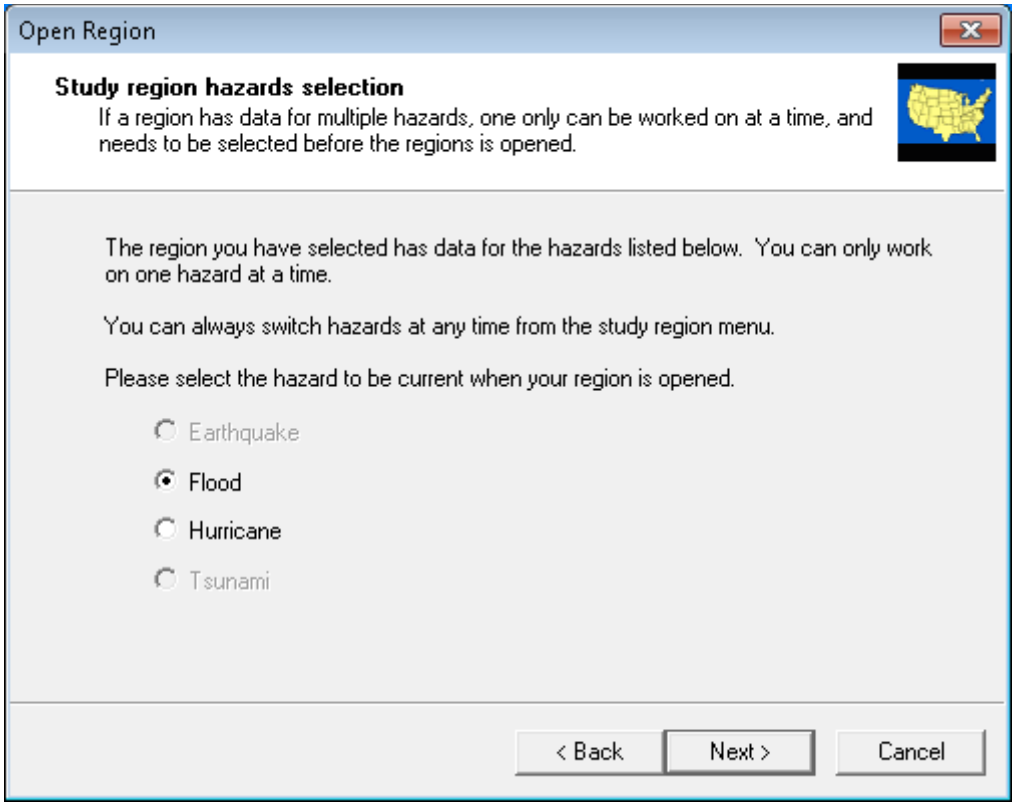
To obtain the combined wind and surge losses, users must run a Coastal Surge analysis and calculate the combined losses in the Flood Model. See further instructions in the Hazus Flood Model Manual.

11.3 Storm Surge

After the Hurricane Model has been run, reopen the Study Region in the Flood Model.

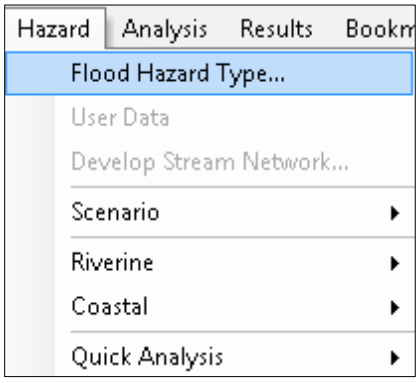
View as Flood, shown in Figure 11-12. Click **Next** and then click **Finish** to open region.

Figure 11-12: Select Flood Model in Study Region



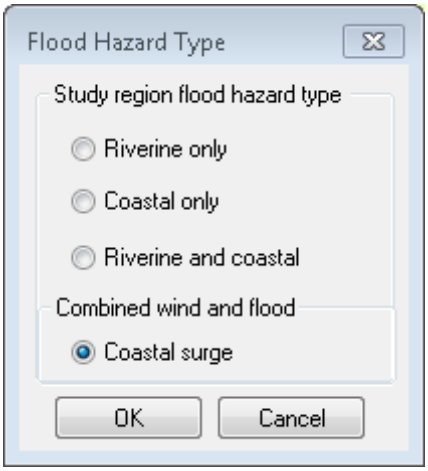
Open the Hazard menu and select Flood Hazard Type (Figure 11-13).

Figure 11-13: Select Flood Hazard Type



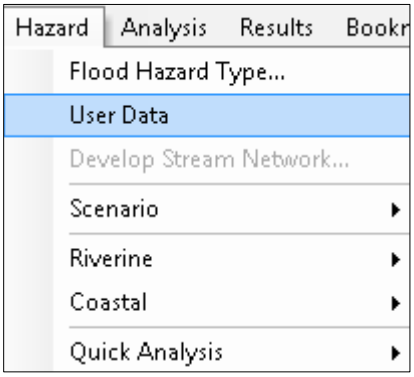
Select the Flood Hazard type “Coastal Surge” and click OK (Figure 11-14).

Figure 11-14: Select Coastal Surge



After the hazard type is set, the user must import a digital elevation model (DEM) for the Study Region by opening the Hazard menu and selecting the User Data dialog (Figure 11-15).

Figure 11-15: Select User Data to Import DEM



The User Data dialog will only contain two tabs, DEM and Coastal Surge. Use the Browse button to add the DEM to the Model (Figure 11-16). Figure 11-17 shows the Coastal Surge tab, where the Surge Elevation Grid (SLOSH) and Significant Wave Height Grid (SWAN) that were produced by the Hurricane Model are in the Study Region folder as surge.flt, surge.hdr (SLOSH), and waveht.flt, waveht.hdr (SWAN). When the DEM is uploaded, click OK. See the Hazus Flood Model Manual for more details about obtaining DEM data.

Figure 11-16: Add User Data DEM to Model

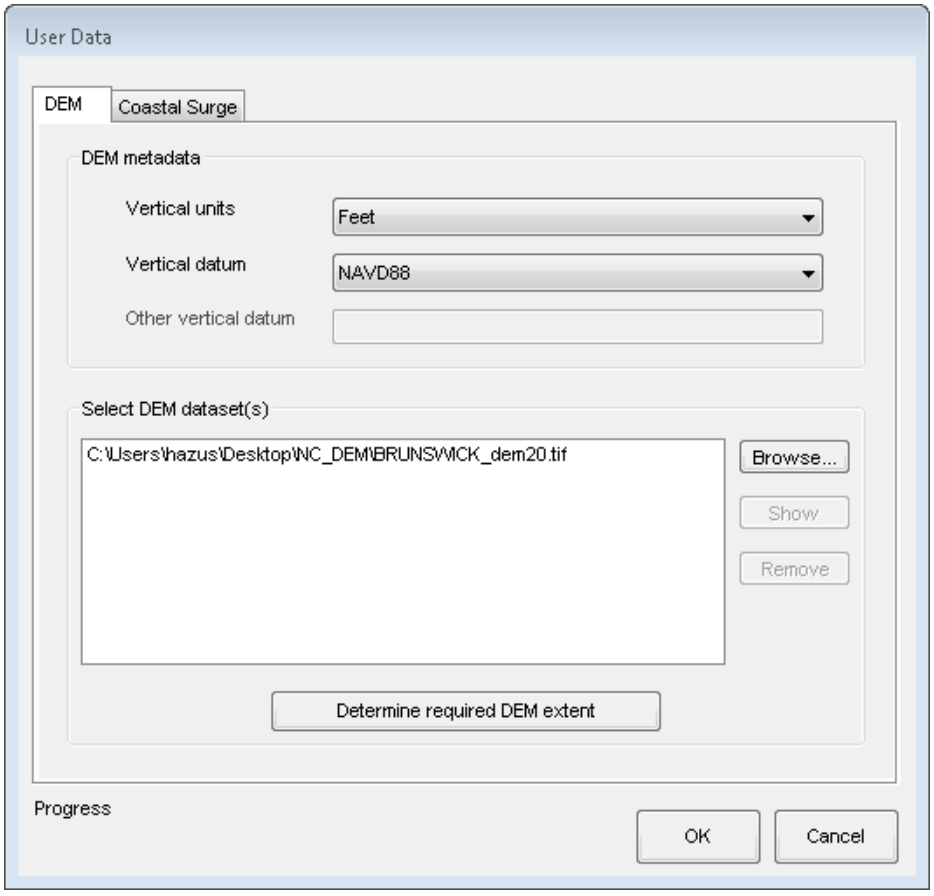
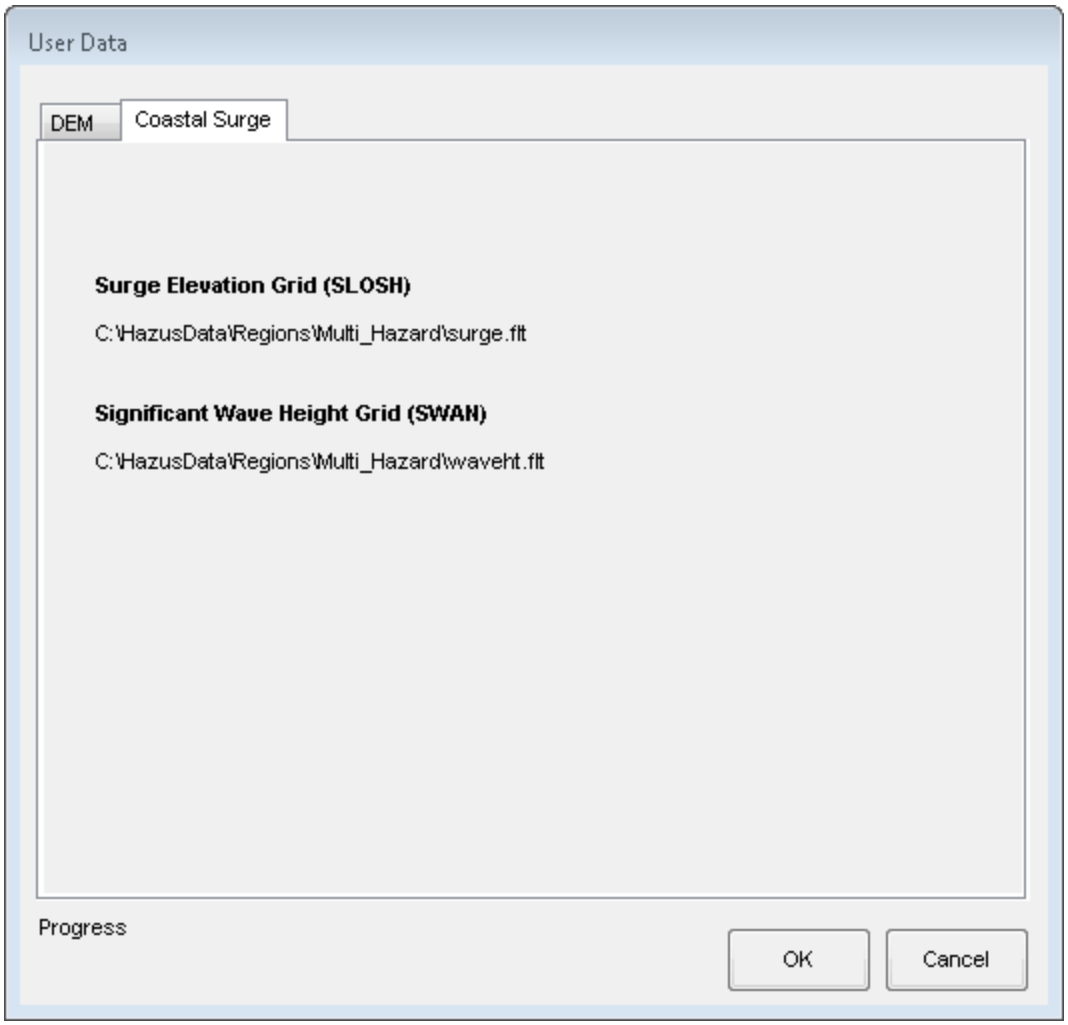


Figure 11-17: Review User Data in Coastal Surge Tab



When the DEM uploads successfully, the user needs to create a new scenario next, using **Hazard / Scenario / New** (Figure 11-18). Enter a unique name for the scenario and click **OK** (Figure 11-19). In the coastal surge scenarios, the surge and wave height files are automatically selected, and users do not need to select or save any features because the Hurricane Model supports only one scenario per Study Region.

Figure 11-18: Select New Scenario in Hazard Menu

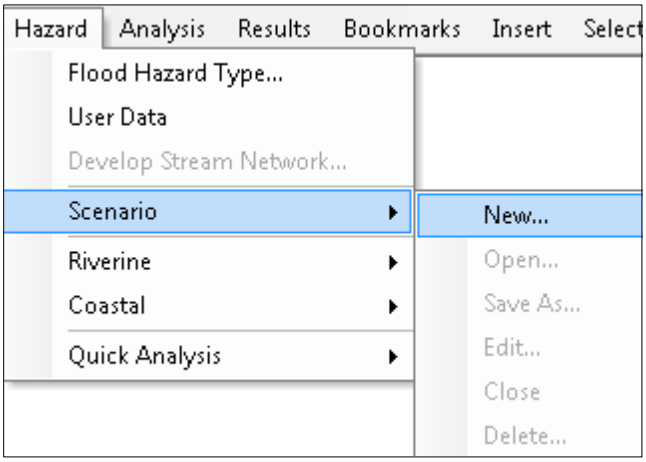
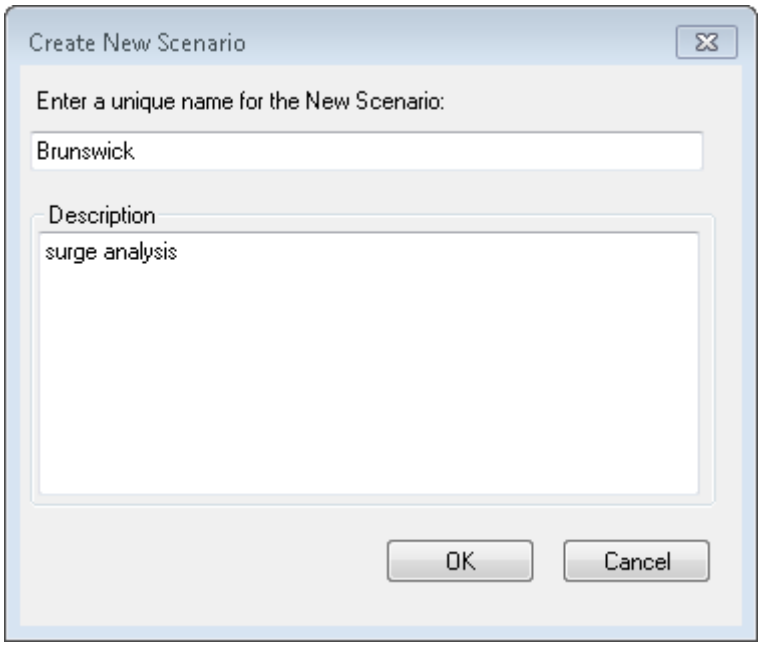
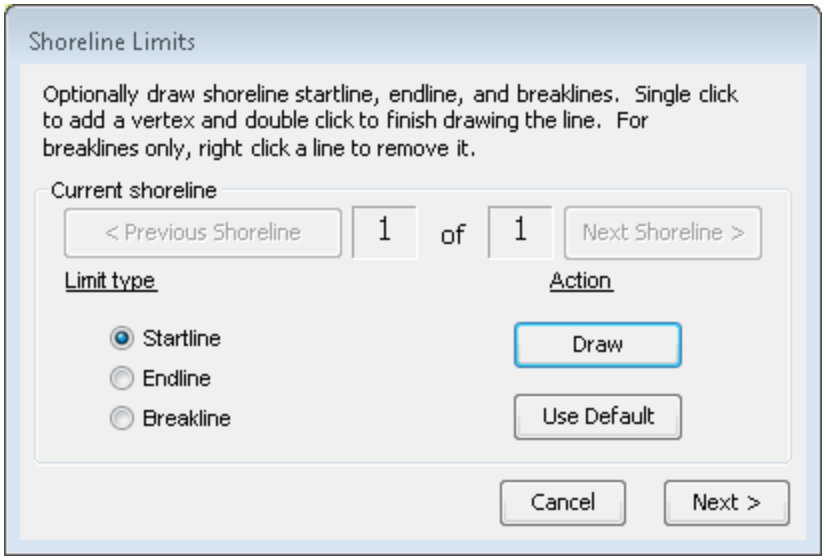


Figure 11-19: Provide Name for New Scenario



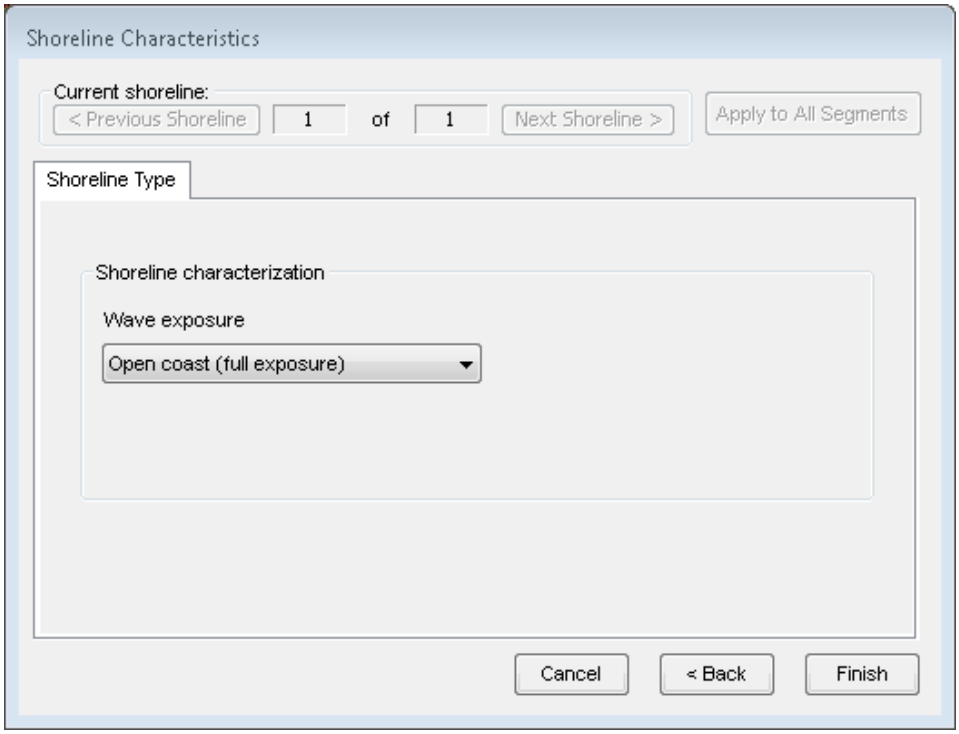
If the user selected “No Waves” in the Storm Surge analysis for the Hurricane Model, only the surge elevation grid was created for the Study Region. The wave height grid (waveht.flt) was not produced and the shoreline needs to be characterized. In this case, after creating a new scenario, the shoreline limits dialog will pop up, as shown in Figure 11-20.

Figure 11-20: Input Shoreline Limits



After clicking **Next**, there will be an additional shoreline characterization dialog, as shown in Figure 11-21. The Shoreline Type tab has one required input (wave exposure).

Figure 11-21: Select Shoreline Characteristics



The options for the wave exposure include:

- Open coast (full exposure): Any shoreline where the storm surge and waves come directly off open waters without the benefit of barrier islands or other land mass protection. Think in terms of lines of waves marching directly onto the shoreline uninterrupted. Full exposure is the Hazus default.
- Moderate exposure: Best represented by a shoreline that is slightly protected from the storm surge and associated waves. Moderate exposure might be a shoreline that has small islands or a low-lying sandbar that help break the direct force of the waves on the shoreline. A shoreline with moderate exposure might be angled to the direct line of the waves and will therefore receive a portion of the wave front.
- Minimal exposure: Best represented by a shoreline that is not in direct line with the storm surge or the waves. Minimal exposure might include an exposed shoreline that is running close to parallel to the storm surge and is therefore not bearing the brunt of the wave fronts.
- Sheltered: Best represented by the shoreline within a bay or protected by a larger barrier island. Sheltered could also be a shoreline along a large river inlet. The shoreline is sheltered from the wave front and is most likely subjected to stillwater flooding.

The default parameter is open coast (full exposure). At the top of the screen, the user can switch from one shoreline segment (if more than one) to another and back. If there are multiple segments and most have a single characteristic and a few have unique characteristics, the user can save time and effort by applying the common characteristic to all segments by pressing "Apply to All Segments" and then editing the unique segments.

After selections, click **Finish**.

Proceed to Delineate Floodplain by going to the Hazus Menu and selecting Coastal (Figure 11-22). When it is finished, the completion window will be shown as in Figure 11-23.

Figure 11-22: Select Coastal to Delineate Floodplain

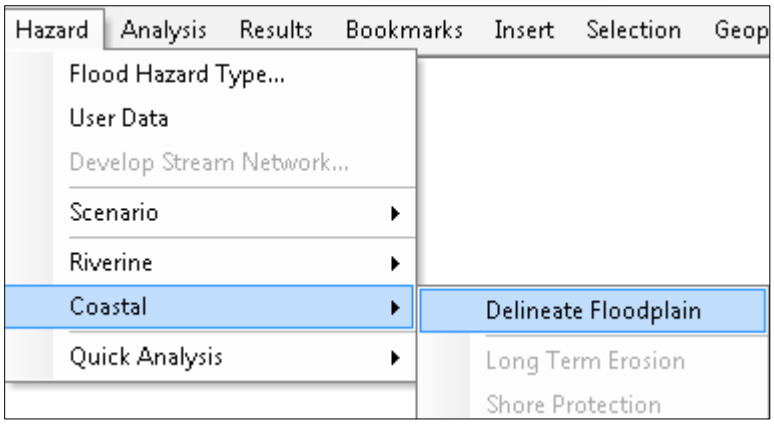


Figure 11-23: Delineate Floodplain Completion Status Window

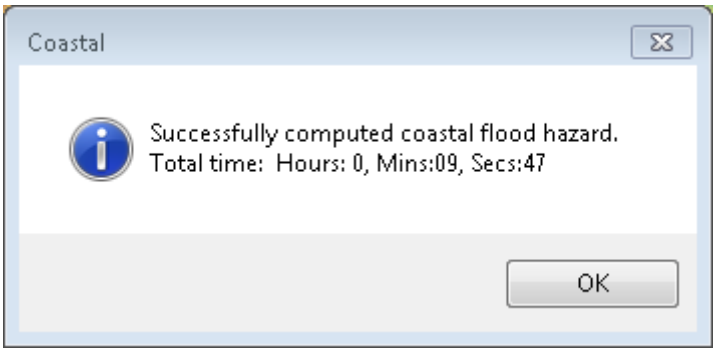
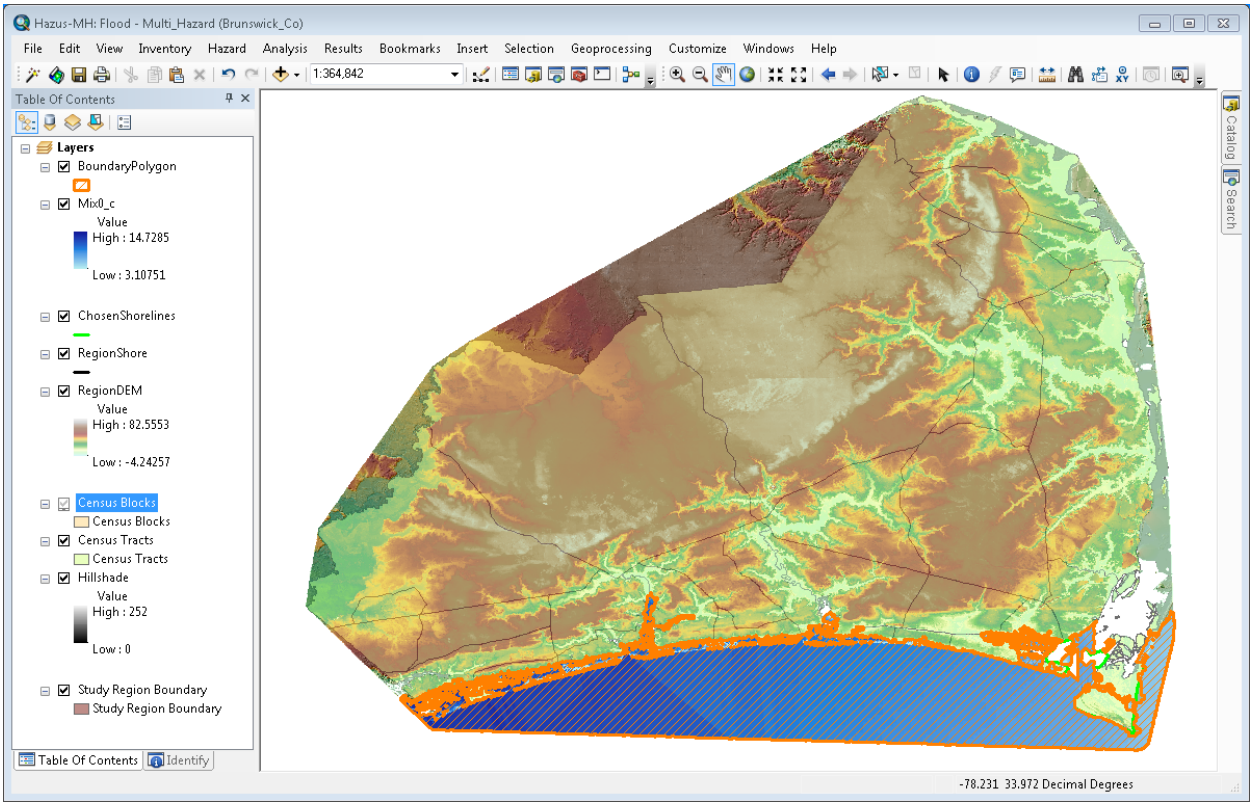


Figure 11-24 displays the completed hazard portion of a coastal surge model. The coastal surge model outputs a flood depth grid named “Mix0_c” to the map, which comprises SLOSH and wave height grids.

Figure 11-24: Example – Coastal Surge Floodplain Delineation



The next step to complete the analysis is by using the Analysis Menu and choose **Run** (Figure 11-25). Next, check the **General Building Stock Damage and Loss** option and click **OK (**Figure 11-26**)**.

Figure 11-25: Select Run in Analysis Menu

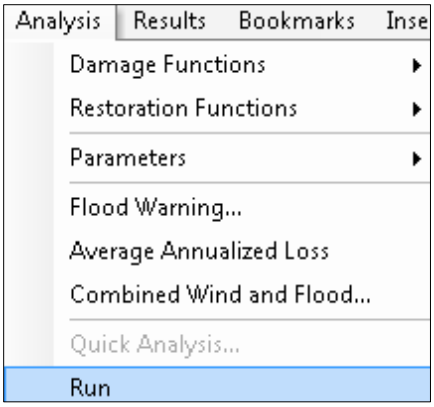
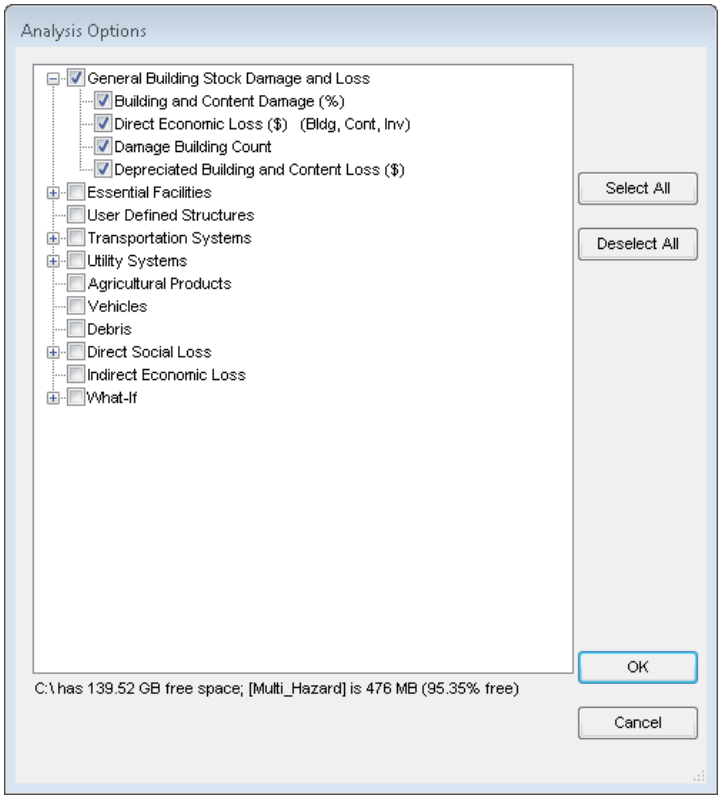


Figure 11-26: Select Preferred Analysis Options



The final step of a storm surge analysis is to calculate the combined hurricane wind and coastal storm surge losses, using the Analysis Menu and selecting **Combined Wind and Flood …** (Figure 11-27). When the combined losses are completed, click **OK** to the message box (Figure 11-28).

Figure 11-27: Select Combined Wind and Flood to Calculate Losses

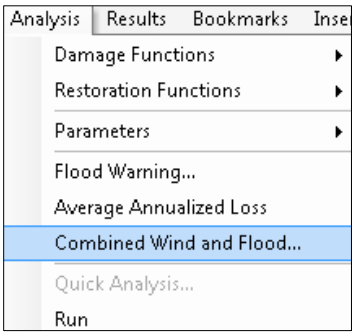
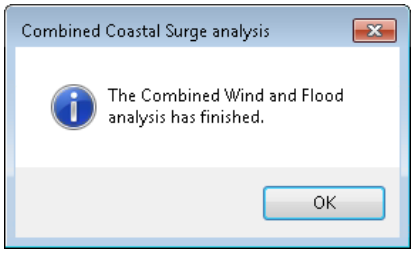


Figure 11-28: Combined Coastal Surge Status Window



When the analysis options have finished running, use the **Results Menu** (Figure 11-29) to **View Current Scenario Results By…**, select the scenario in the dropdown, and click **OK,** as shown in Figure 11-30.

Figure 11-29: Select View Current Scenario Results

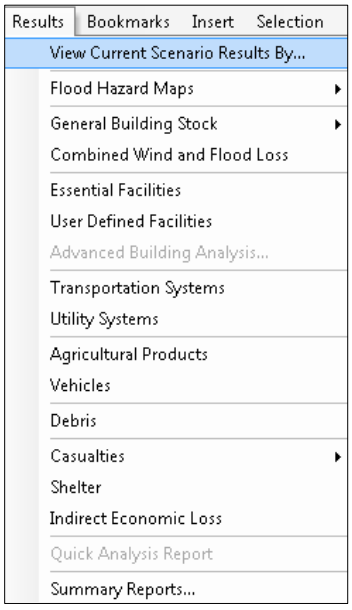
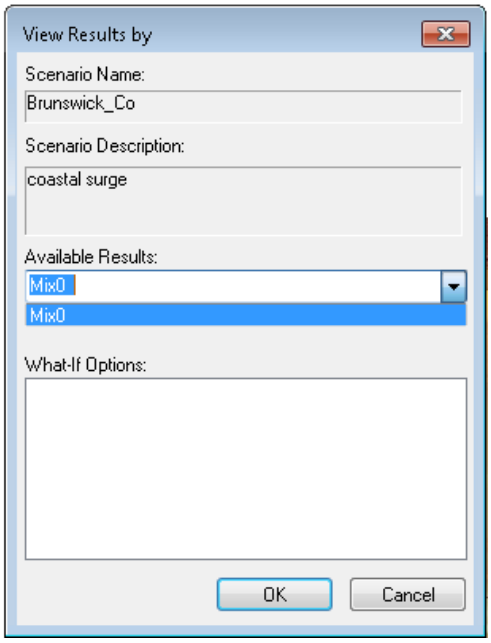


Figure 11-30: Select Available Results for Surge Analysis



The combined losses can be viewed either in the Flood Model or in the Hurricane Model using either the Results / Combined Wind and Surge Loss menu (Figure 11-31 and Figure 11-32) or the Results / Summary Reports / Direct Losses | Combined Wind and Surge Loss summary report. An example results table is shown in Figure 11-33.

Figure 11-31: Select Combined Wind and Flood Loss Results (Flood Module)

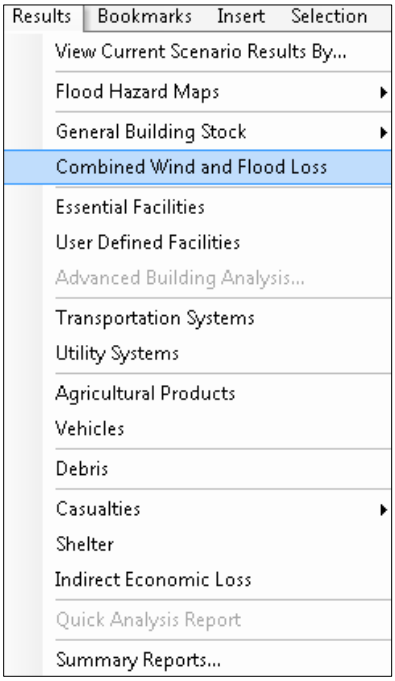


Figure 11-32: Select Combined Wind and Surge Loss (Hurricane Model)

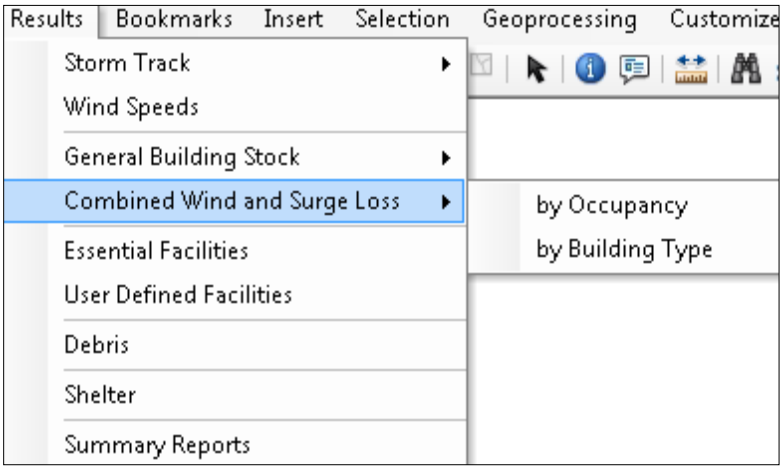
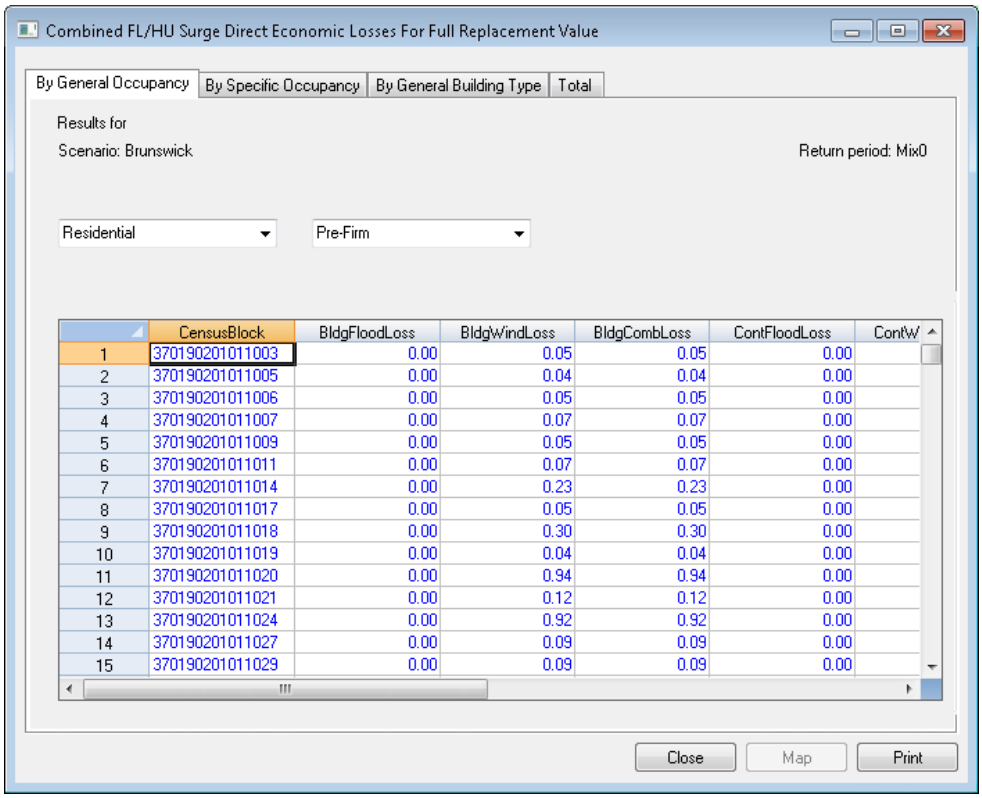


Figure 11-33: Example – Combined Surge Result Table



	CensusBlock	BldgFloodLoss	BldgWindLoss	BldgCombLoss	ContFloodLoss	ContW
1	370190201011003	0.00	0.05	0.05	0.00	
2	370190201011005	0.00	0.04	0.04	0.00	
3	370190201011006	0.00	0.05	0.05	0.00	
4	370190201011007	0.00	0.07	0.07	0.00	
5	370190201011009	0.00	0.05	0.05	0.00	
6	370190201011011	0.00	0.07	0.07	0.00	
7	370190201011014	0.00	0.23	0.23	0.00	
8	370190201011017	0.00	0.05	0.05	0.00	
9	370190201011018	0.00	0.30	0.30	0.00	
10	370190201011019	0.00	0.04	0.04	0.00	
11	370190201011020	0.00	0.94	0.94	0.00	
12	370190201011021	0.00	0.12	0.12	0.00	
13	370190201011024	0.00	0.92	0.92	0.00	
14	370190201011027	0.00	0.09	0.09	0.00	
15	370190201011029	0.00	0.09	0.09	0.00	

Note that combined wind and surge results are available for building, content, and inventory losses but not for relocation, income, rental, or wage losses. The radio buttons and dropdown boxes allow the user to filter the losses by occupancy or building type.

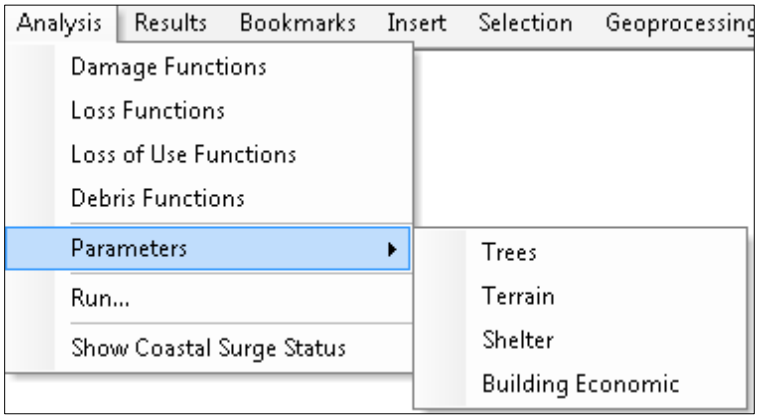
Hazus has a limit of one scenario for the Coastal Surge flood hazard type. If the user already completed the coastal surge model in a Study Region and decides to re-run the Hurricane Model, the user must delete the previous flood scenario and re-input the DEM in the User Data dialog in the Flood Model.

12 Advanced Hazus Analysis: Modifying Analysis Parameters

Users can modify Hazus default parameters used to calculate losses and associated results, such as shelter estimates. A majority of the parameters can be accessed in the **Analysis** Menu.

After selecting **Analysis**, users can select **Parameters** to define tree coverage, terrain data, shelter information, and parameters related to building economics, as shown in Figure 12-1.

Figure 12-1: Analysis / Parameters Menu



12.1 Tree Coverage

Select **Trees** to view, map, and edit the type, density, and height distribution of trees, as shown in Figure 12-2. The available tree types are:

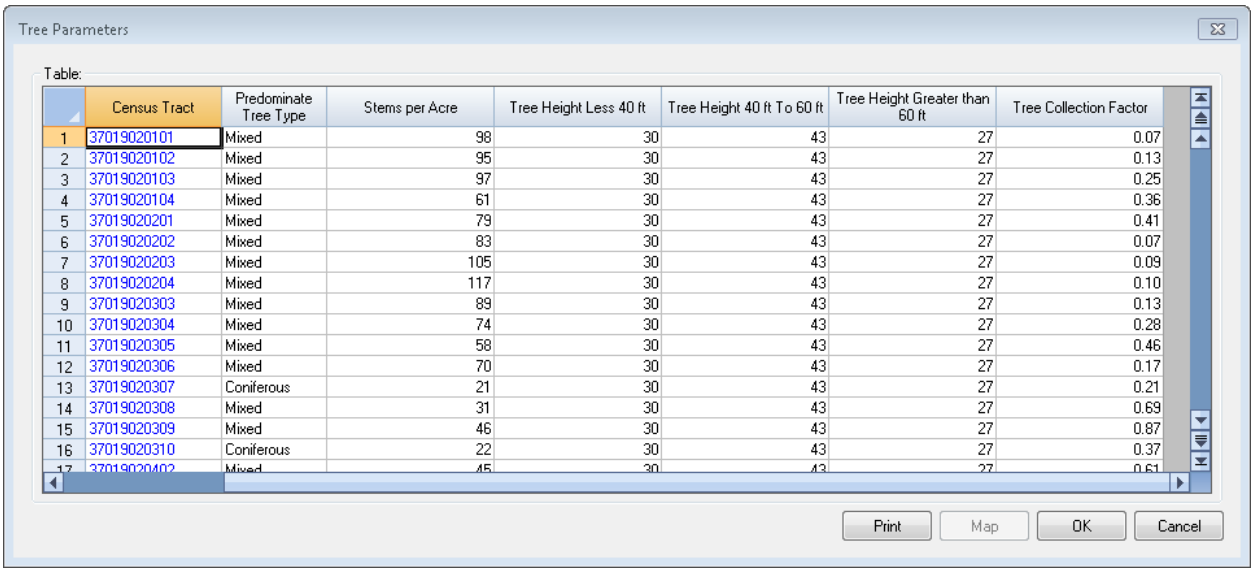
- Coniferous (>75% evergreens)
- Deciduous (>75% deciduous)
- Mixed

Using the entered information, the model calculates tree blowdown, called the Tree Collection Factor on the table, to estimate a tree debris collection factor for each census tract. The tree blowdown model only considers trees over 30 feet tall. The estimated tree debris factor is added as a loss for single-family housing to account for tree damage.

The Tree Collection Factor is a number between zero and one that represents the fraction of downed trees that would likely be collected and disposed at public expense:

- In sparsely developed census tracts, the tree collection factor should be near zero
- In heavily developed census tracts, the tree collection factor will be closer to one

Figure 12-2: Select Tree Parameters



12.2 Terrain Data

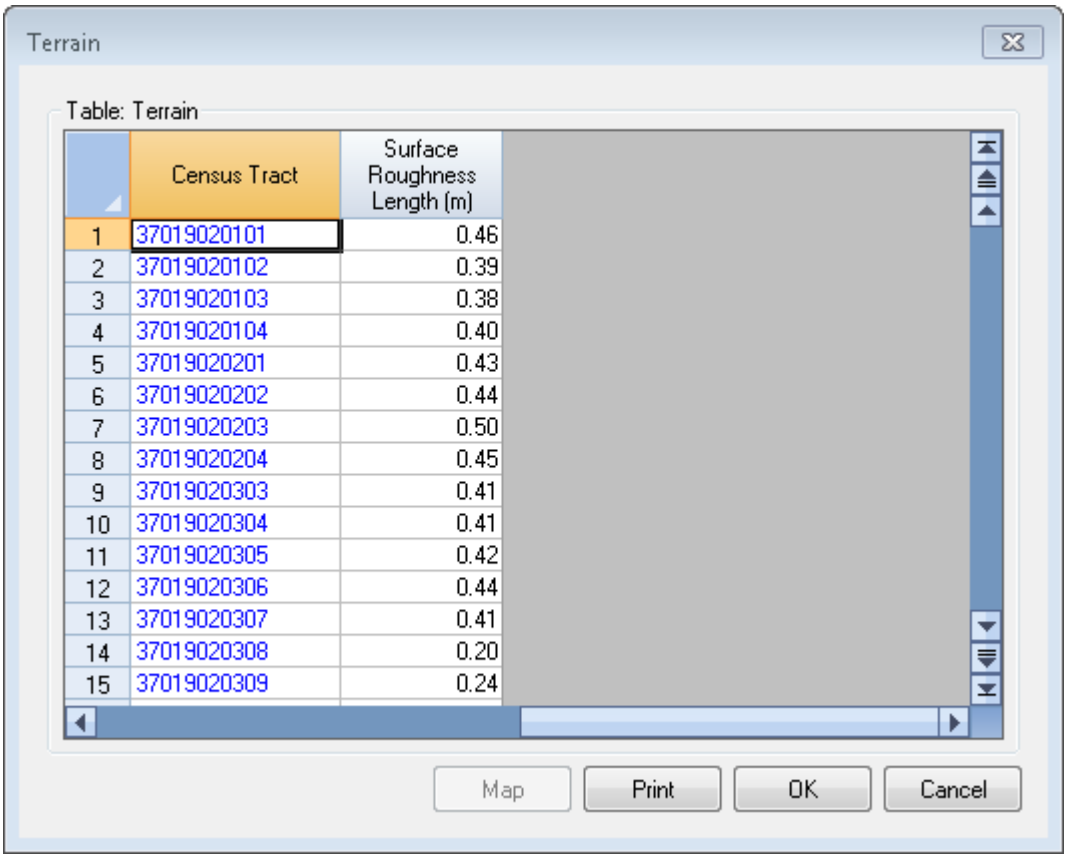
Hazus has default terrain data that is automatically imported based on census tract location. Select **Terrain** to view, map, and edit the surface roughness values for each census tract, as shown in Figure 12-3. Before modifying the default terrain data or importing substitute terrain data, however, it is strongly recommended that users consult with a wind engineer.

Local terrain (i.e., surface roughness) has a significant effect on the magnitude of the actual surface level wind speeds applied to buildings. Surface roughness lengths depend on vegetation height and density, building heights and densities, and other obstructions upwind from the point of interest.

The default surface roughness lengths provided with the Hurricane Model are derived from state and national land-use databases and have been validated through extensive comparisons with aerial photography. However, land-use conditions change over time and locations with the same land-use category may, in fact, have substantially different surface roughness.

It is important to recognize that the surface roughness values in the Hurricane Model are averaged over each census tract and are assumed to be independent of wind direction.

Figure 12-3: Select Terrain Parameters



12.3 Shelter Information

Emergency response organizations and local governments often need to have an estimate of the number of people seeking short-term public housing and long-term alternative housing. While the number of people seeking short-term public shelter is of great concern to emergency response organizations, the longer-term impacts on the housing stock are of great concern to local governments. The need for long-term alternative housing can occur in situations where repairs take longer than a few weeks. Long-term alternative housing needs can be met by importing mobile homes, building on vacant units, net emigration from the affected area, and eventually by the repair or reconstruction of new public and private housing.

Hazus provides two estimates related to sheltering:

- The number of people requiring short-term shelter

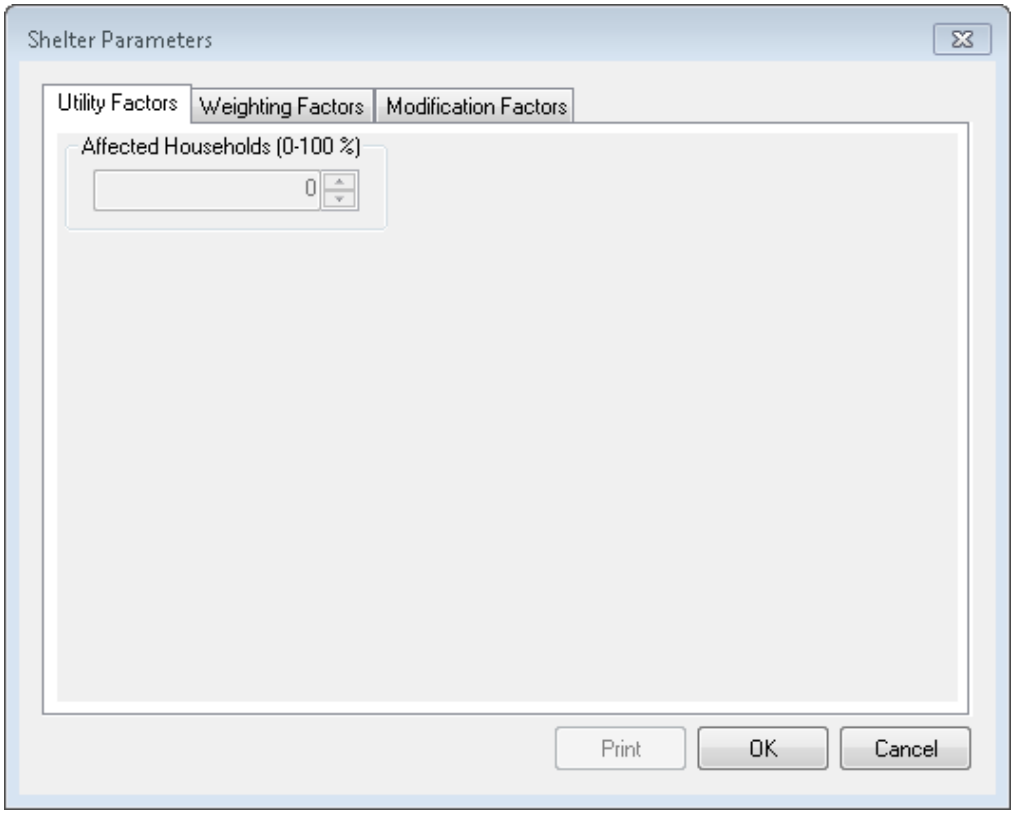
  The methodology for calculating short-term shelter requirements recognizes that only a portion of those displaced from their homes will seek short-term public shelter, and some will seek shelter even though their residence may have little, if any, damage.

- The total number of displaced households (due to loss of habitability)

  Loss of habitability is calculated directly from damage to the residential occupancy inventory and from loss of water and power.

From **Shelter Parameters**, users can select **Utility Factors**, **Weighting Factors**, and **Modification Factors**. The **Utility Factors** for the percentage of household affected by utility outages, the **Weighting Factors** for age, ethnicity, income, and ownership, and **Modification Factors** for income can be modified in the Shelter Parameters window (Figure 12-4).

Figure 12-4: Select Shelter Parameters



The **Weighting Factors** and **Modification Factors** are automatically populated using information provided in the default census database. The default census database can be viewed, modified, and mapped in the inventory module (Figure 12-5), as shown in Figure 12-6.

Figure 12-5: Inventory / Demographics Menu

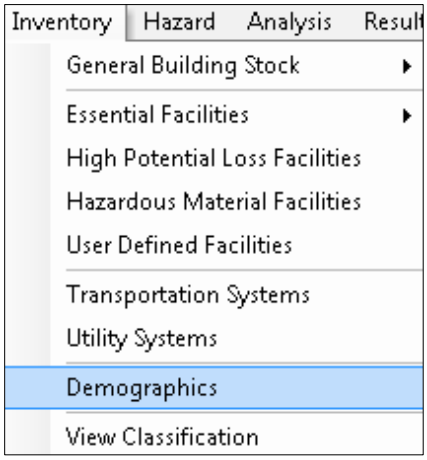
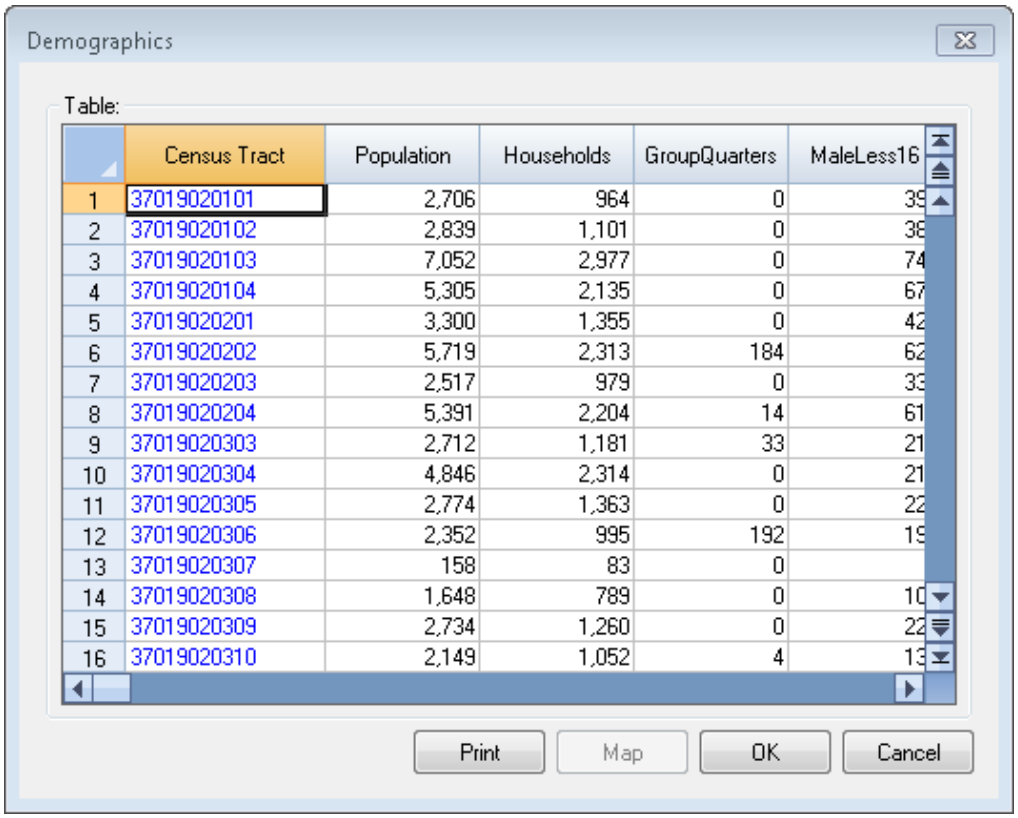


Figure 12-6: Example – Inventory Demographics Data Supplied in Hazus



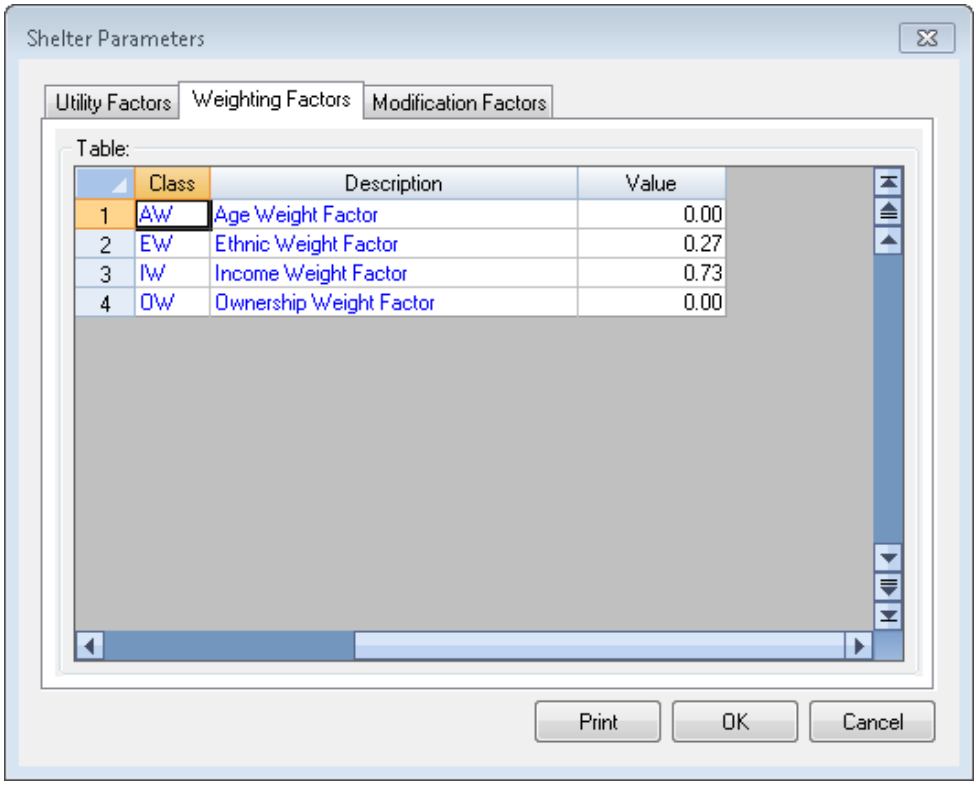
Modifying the **Weighting Factors** - Users have the option to weight the importance of the four factors that affect the fraction of households seeking short-term public shelter: income, ethnicity, ownership, and age. The importance factors must sum to one. Default values are shown in Table 12-1 and Figure 12-7.

Table 12-1: Hazus Default Values for Fraction of Households Likely to Seek Public Shelter If Dwelling Becomes Uninhabitable

Category	Description	Default
Income	Household Income < $10,000	0.62
	$10,000 < Household Income < $20,000	0.42
	$20,000 < Household Income < $30,000	0.29
	$30,000 < Household Income < $40,000	0.22
	$40,000 < Household Income	0.13
Ethnicity	White	0.24
	Black	0.48
	Hispanic	0.47
	Asian	0.26
	Native American	0.26

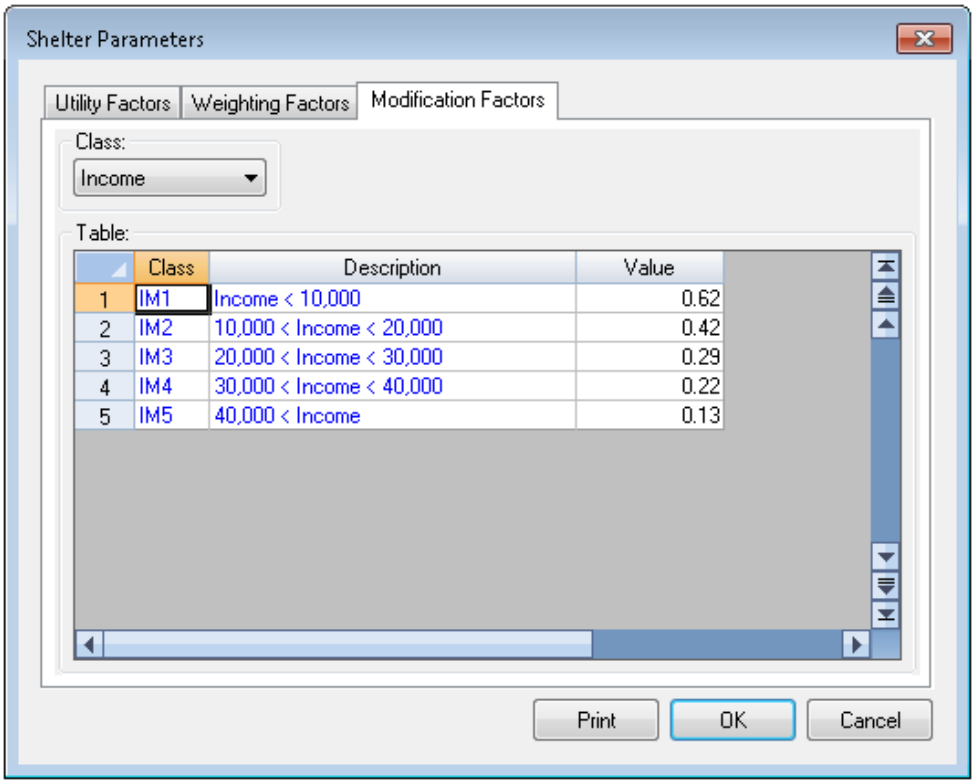
Category	Description	Default
Ownership	Own Dwelling Unit	0.40
	Rent Dwelling Unit	0.40
Age	Population Under 16 Years Old	0.40
	Population Between 16 and 65 Years Old	0.40
	Population Over 65 Years Old	0.40

Figure 12-7: Hazus Default Weighting Factors for Fraction of Households Likely to Seek Public Shelter If Dwelling Becomes Uninhabitable



Modifying the **Modification Factors** - Users have the option of changing each of the four weighting factors that govern how the demographic distribution for the study region is used to calculate that factor. For example, Figure 12-8 shows the default weights for ranges of incomes; the income weights can be adjusted from 0 to 1.0 to represent the likelihood that income level will influence the decision to seek shelter.

Figure 12-8: Default Weighting Factors for Demographic Distribution / Income



12.4 Building Economics

In addition to parameters that can be modified in the **Analysis** Menu, there are also Hazus parameters that can be adjusted in the **Inventory** Menu related to the cost of hurricane damages. The model converts estimates of damage to the built environment to dollar loss.

Losses that are directly derived from building damage are:

- Cost of repair and replacement of damaged and destroyed buildings
- Costs of damage to building contents
- Losses of building inventory (contents related to business activities)

Losses that are related to the length of time the facility is non-operational (or the immediate economic consequences of damage):

- Relocation expenses (for businesses and institutions)
- Capital-related income losses (a measure of the loss of productivity, services or sales)
- Wage losses (consistent with income loss)

- Rental income losses (to building owners)

The default economic data can be viewed and modified from within the **Inventory** menu (Figure 12-9). Select **Dollar Exposure** to view **Building**, **Contents**, and **Total**, shown in Figure 12-10. To modify the data, the Table Type must be set to "Specific Occupancy." The Dollar Exposure data cannot be modified when viewed by general occupancy, general building type, or specific building type. Default values are provided for contents (by occupancy) as a percentage of the replacement value of the facility.

Figure 12-9: Select Dollar Exposure

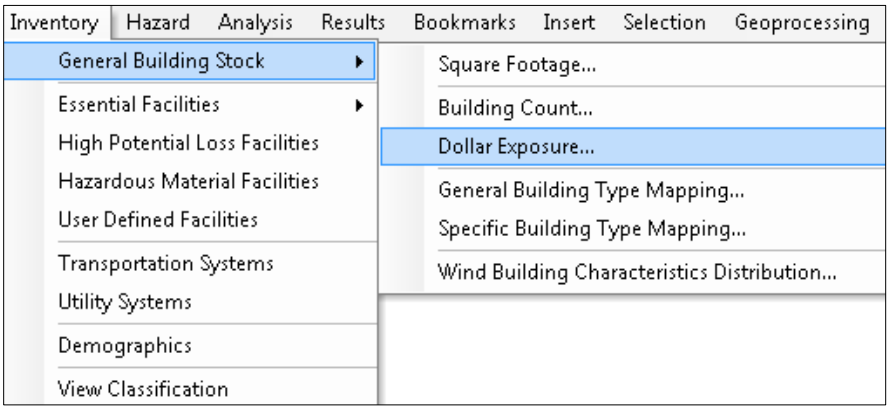
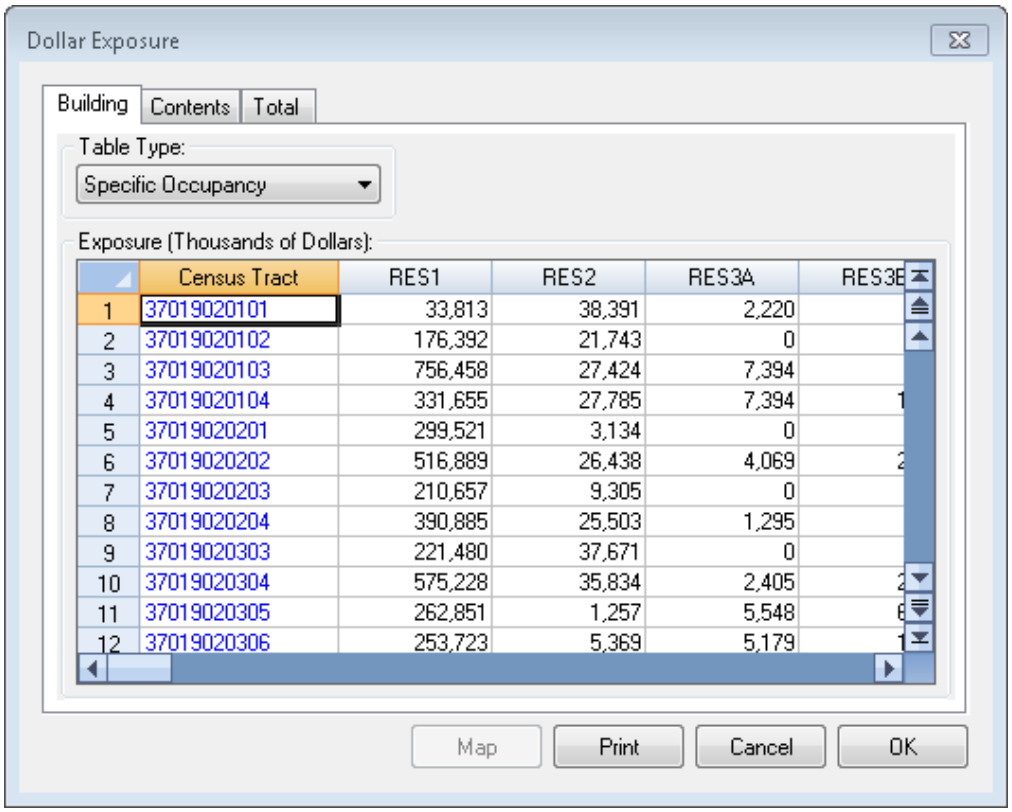


Figure 12-10: View and Modify Hazus Default Economic Data



The Building Economic data can be viewed and modified from within Hazus Inventory Menu, as shown in Figure 12-11. The window that is used to view and modify the other economic default data parameters is shown in Figure 12-12.

The default values of business inventory for this model are derived from annual gross sales by assuming that business inventory is some percentage of annual gross sales. These default values are based on judgment.

Building repair and clean-up estimates are provided with Hazus. These values include both the time to do the actual construction or repair and the additional delays which may include clean-up time, and time to obtain financing, permits and complete a design. All of these factors are built into the Building Loss of Use functions described previously.

Figure 12-11: Building Economic Menu

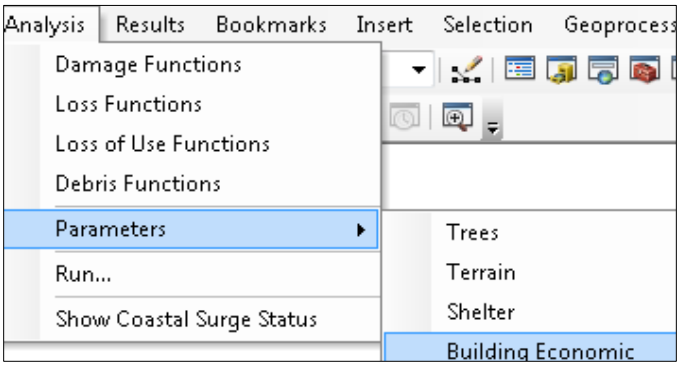
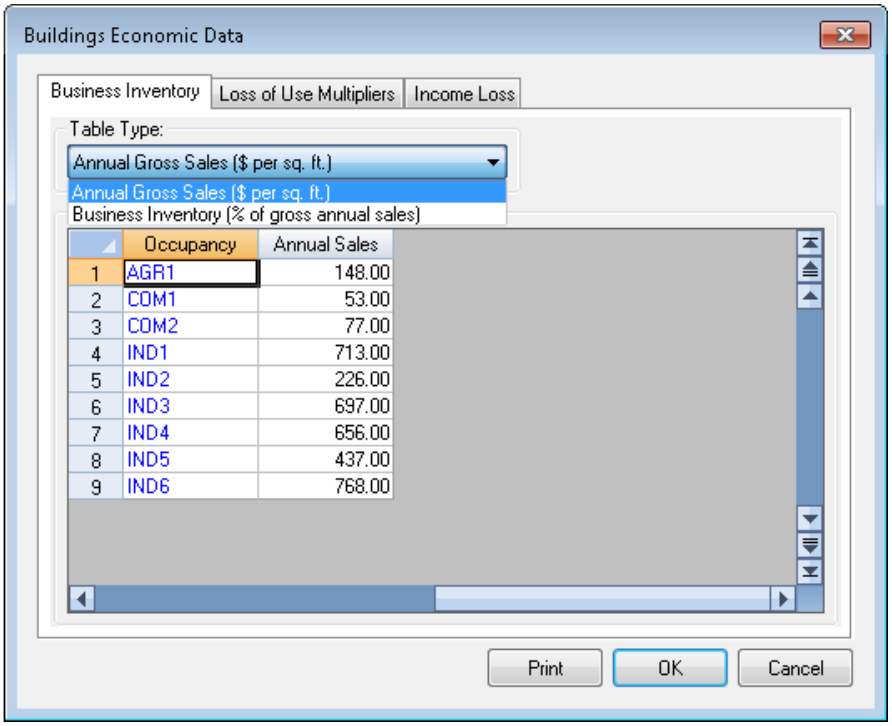


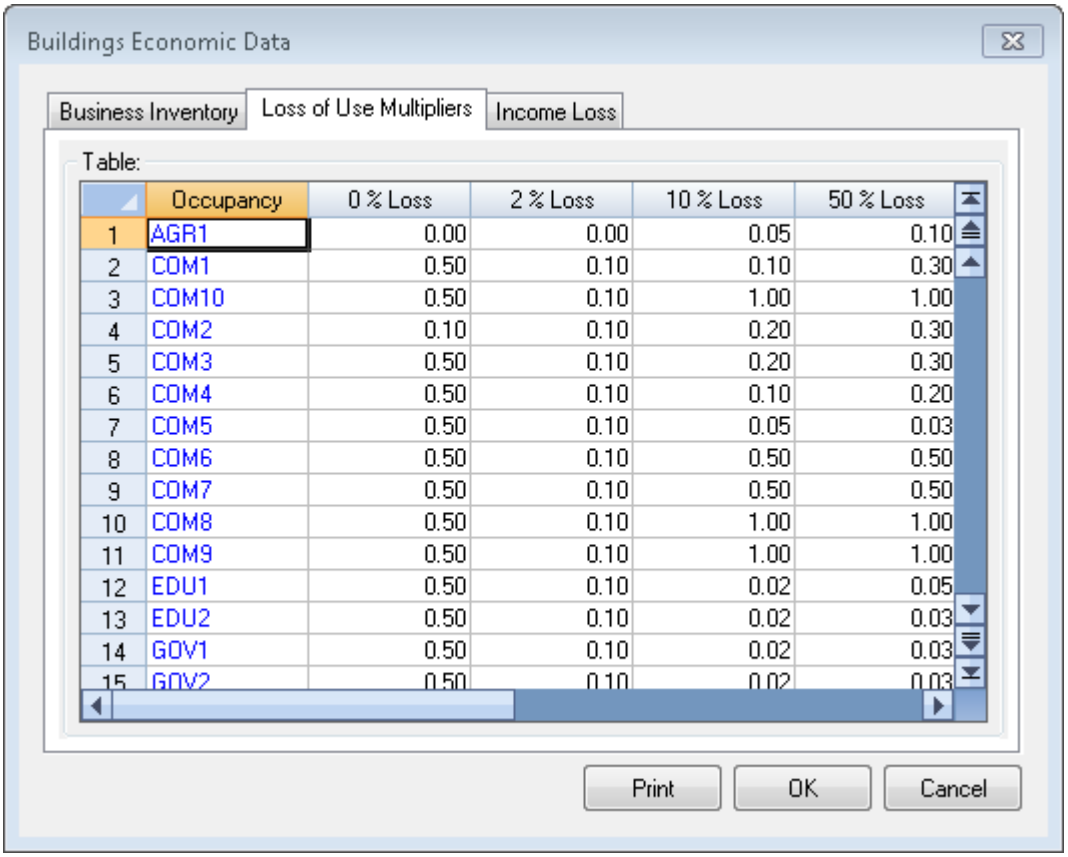
Figure 12-12: View and Modify Economic Data for Estimating Business Inventory Losses, Lost Income and Relocation Costs



12.4.1 Loss of Use Multipliers

Repair time does not translate directly into business or service interruption. For some businesses, building repair time is largely irrelevant, because these businesses can rent alternative space or use spare industrial/commercial capacity elsewhere. Therefore, Building Repair Time Multipliers have been developed to arrive at estimates of business interruption for economic purposes. These values are multiplied by the building cleanup and repair times. Building Repair Time Multipliers can be viewed using the window shown in Figure 12-13.

Figure 12-13: View Default Building Repair Time Multipliers



	Occupancy	0 % Loss	2 % Loss	10 % Loss	50 % Loss
1	AGR1	0.00	0.00	0.05	0.10
2	COM1	0.50	0.10	0.10	0.30
3	COM10	0.50	0.10	1.00	1.00
4	COM2	0.10	0.10	0.20	0.30
5	COM3	0.50	0.10	0.20	0.30
6	COM4	0.50	0.10	0.10	0.20
7	COM5	0.50	0.10	0.05	0.03
8	COM6	0.50	0.10	0.50	0.50
9	COM7	0.50	0.10	0.50	0.50
10	COM8	0.50	0.10	1.00	1.00
11	COM9	0.50	0.10	1.00	1.00
12	EDU1	0.50	0.10	0.02	0.05
13	EDU2	0.50	0.10	0.02	0.03
14	GOV1	0.50	0.10	0.02	0.03
15	GOV2	0.50	0.10	0.02	0.03

12.4.2 Income Loss

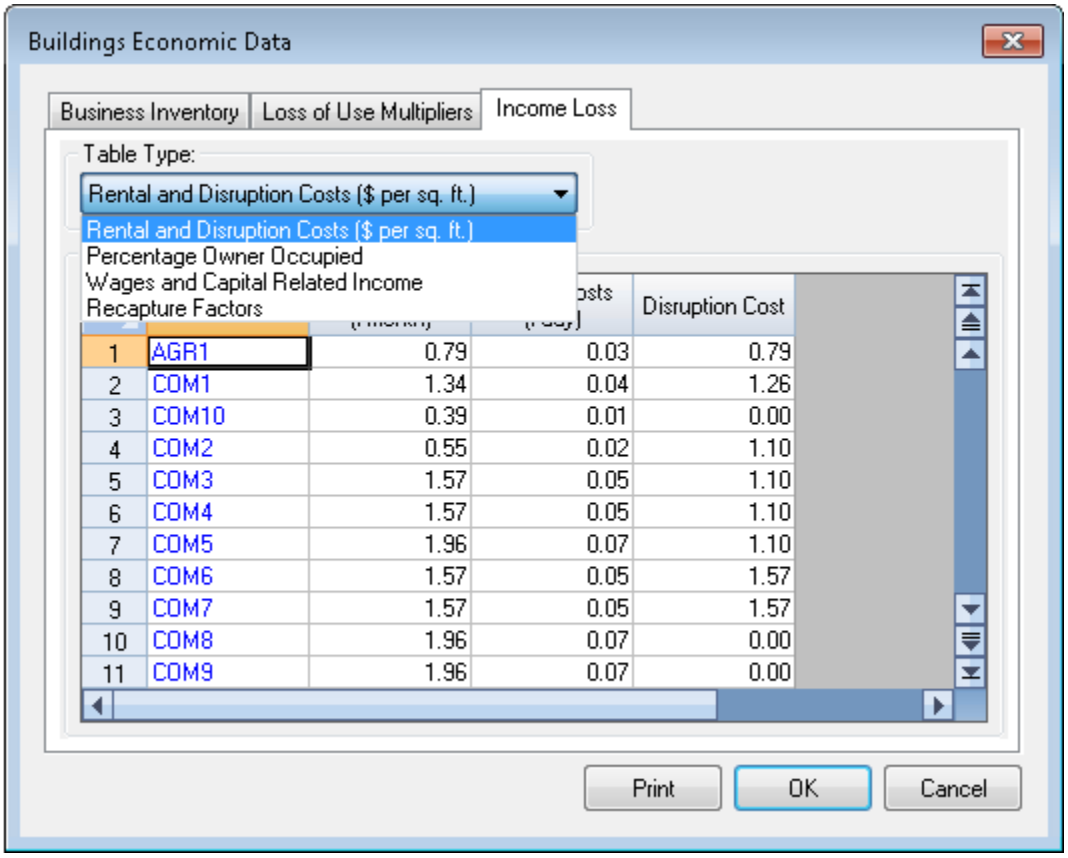
Figure 12-14 shows the last tab where Income Loss is calculated. This includes Rental and Disruption Costs, Percentage Owner Occupied, Wages and Capital Related Income and Recapture Factors.

Hazus only considers disruption costs that may include the cost of shifting and transferring and the rental of temporary space. Relocation expenses are assumed to be incurred only by building owners and measured in $ per square foot per month. Relocation expenses are then a function of the floor area, rental costs per day per square foot, disruption costs, and the expected days of loss of function for each damage state.

Capital-related income is a measure of the profitability of a commercial enterprise. Income losses occur when building damage disrupts commercial activity. Income losses are the product

of floor area, income realized per square foot and the expected days of loss of function for each damage state. The U.S. Department of Commerce's Bureau of Economic Analysis reports regional estimates of capital-related income by economic sector. Capital-related income per square foot of floor space can then be derived by dividing income by the floor space occupied by a specific sector. Income will vary considerably depending on regional economic conditions. Therefore, default values need to be adjusted for local conditions.

Figure 12-14: Income Loss Table



13 Acronyms and Abbreviations

.dat	census tract centroid hurricane wind data file
.hpr	Hazus Packaged Region, file extension used for exported Hazus study regions
.mdb	geodatabase file
AOML	Atlantic Oceanographic and Meteorological Laboratory
C	concrete
CECBH	Concrete, Engineered Commercial Building, High-Rise
CECBL	Concrete, Engineered Commercial Building, Low-Rise
CECBM	Concrete, Engineered Commercial Building, Mid-Rise
CERBH	Concrete, Engineered Residential Building, High-Rise
CERBL	Concrete, Engineered Residential Building, Low-Rise
CERBM	Concrete, Engineered Residential Building, Mid-Rise
DEM	digital elevation model
EF	Enhanced Fujita
FEMA	Federal Emergency Management Agency
GBS	General Building Stock
GBT	General Building Type
GIS	geographic information system
H*Wind	hurricane surface wind database
HPLF	high potential loss facilities
HRD	Hurricane Research Division
Hrs	hours
HUD	U.S. Department of Housing and Development
Hurrevac	hurricane evacuation tool
Kt	knot
LULC	land use/land cover
m	meter
M	masonry
mbar	millibar
MECBH	Masonry, Engineered Commercial Building, High-Rise
MECBL	Masonry, Engineered Commercial Building, Low-Rise
MECBM	Masonry, Engineered Commercial Building, Mid-Rise
MERBH	Masonry, Engineered Residential Building, High-Rise
MERBL	Masonry, Engineered Commercial Building, Low-Rise
MERBM	Masonry, Engineered Commercial Building, Mid-Rise

MH	manufactured home
MH76HUD	Manufactured Home, 1976 HUD
MHPHUD	Manufactured Home, Pre-HUD
MLRI	Masonry, Low-Rise Industrial/Warehouse/Factory Buildings
MLRM	Masonry, Low-Rise Strip Mall
MMUH	masonry multi-unit housing
mph	miles per hour
MSF	Masonry, Single Family
NAVD	North American Vertical Datum
NHC	National Hurricane Center
NIBS	National Institute of Building Sciences
NOAA	National Oceanic and Atmospheric Administration
OWSJ	open web steel joist
RM	reinforced masonry
S	steel
SBT	Specific Building Type
SECBH	Steel, Engineered Building, High-Rise
SECBL	Steel, Engineered Commercial Building, Low-Rise
SECBM	Steel, Engineered Commercial Building, Mid-Rise
SERBH	Steel, Engineered Residential Building, High-Rise
SERBL	Steel, Engineered Residential Building, Low-Rise
SERBM	Steel, Engineered Residential Building, Mid-Rise
SFBC	South Florida Building Code
SLOSH	Sea, Lake, and Overland Surges from Hurricanes (model)
SPM	Single-Ply Membrane
SPMBL	Steel, Pre-Engineered Metal Building, Large
SPMBM	Steel, Pre-Engineered Metal Building, Medium
SPMBS	Steel, Pre-Engineered Metal Building, Small
SWAN	Simulating WAves Nearshore (model)
SWR	Secondary Water Resistant
UDF	User- Defined Facilities
URM	unreinforced masonry
W	wood
WBC	Wind Building Characteristic
WMUH	Wood, Multi-Unit Housing
WSF	Wood, Single Family, One Story

14 Glossary

Central pressure. Surface level atmospheric pressure in millibars at the center of the storm at the current location.

Deterministic scenario. Considers the impact of a single-risk scenario.

Essential facilities. Facilities that, if damaged, would present an immediate threat to life, public health, and safety. As categorized in Hazus, essential facilities include hospitals, emergency operations centers, police stations, fire stations, and schools.

Forecast. To calculate weather trend in advance of a future storm with uncertainties.

Hazard. An act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.

Hazus. GIS-based risk assessment methodology and software application created by FEMA and the National Institute of Building Sciences for analyzing potential losses from floods, hurricane winds and storm surge, earthquakes, and tsunamis.

High Potential Loss Facilities. Facilities that, if damaged, could result in a high threat to life or release hazardous materials. Examples include nuclear power plants, dams, and military installations.

Hurricane Force Winds. 74 miles per hour sustained wind.

Hurrevac. Decision support tool for National Hurricane Program, administered by FEMA, U.S. Army Corps of Engineers, and the NOAA National Hurricane Center.

H*Wind. Hurricane surface wind database in .dat format.

Loss ratio. Loss as a fraction of the value of the local inventory (total value/loss).

Maximum sustained wind. The highest 1-minute surface wind speed in miles per hour in the circulation of a storm system at a particular location.

Mitigation. Action to reduce the potential loss of life and damage to property by reducing the impact of disasters.

Probabilistic scenario. Considers the associated impacts of many thousand potential storms that have tracks and intensities reflecting the full spectrum of Atlantic or Central Pacific hurricanes.

Profile parameter. Distribution of atmospheric pressures as a function of distance from the center of the storm.

Risk. Estimated impact that of hazard on people, services, facilities, and structures in a community.

Sustained wind. 1-minute average surface wind speed in the circulation of a storm system (in the eyewall); common indicator of the intensity of a storm.

SWAN (Simulating WAves Nearshore). Third-generation wave model, developed at Delft University of Technology that computes random, short-crested wind-generated waves in coastal regions and inland waters.

Translation speed. Forward speed of the storm in miles per hour at each point along the storm track.

User-defined facility. Building at a specific location that is added to the inventory.

Vulnerability. The susceptibility of an asset to physical injury, harm, damage or economic loss.

Appendix A: Building Classification System

Table A-1 describes the 39 Specific Building Types (SBTs) in the Hurricane Model. Each identifier begins with W (wood), M (masonry), C (concrete), S (steel), or MH (manufactured home), representing the General Building Type (GBT) to which the SBT belongs. Appendix C provides more complete descriptions of each SBT.

The Hurricane Model allows the user to distribute the building stock in each census tract to one or more of the 39 SBTs using an SBT Mapping Scheme. The SBT Mapping Scheme determines, for example, the percentage of Wood, Single Family Dwellings that are assigned to the Wood, Single Family, One Story (WSF1) or Wood, Single Family, Two Stories (WSF2) category based on the relative frequency of single vs. multi-story construction in a given geographic area. Default mapping schemes are provided by Hazus for the states covered by the Hurricane Model, but these can be modified on a state, county, or census tract basis if the user has access to more accurate information in the geographic area of interest.

Table A-2 lists the key construction characteristics that control the performance of a building under high-wind loads. These key construction characteristics are referred to as the Wind Building Characteristics (WBCs). Different subsets of the WBCs control the damage and loss estimates for each SBT. The significant WBCs for each SBT are shown as non-zero entries in Figure A-1. As an example, consider the Wood Multi-Unit Housing, One Story (WMUH1) category. The sixth column of Figure A-1 shows that there are five active WBCs for the WMUH1 category: roof shape, roof cover type, roof cover quality, roof deck attachment, and roof-wall connection.

Figure A-2 illustrates a subset of the 128 possible combinations of the WBCs for WMUH1 buildings.[2] Three predominant roof shapes are modeled: Hip, Gable, and Flat. For flat roofs, two roof coverings (Built-Up Roof [BUR] or Single-Ply Membrane [SPM]) and three roof-covering conditions (New, Good, or Poor) are considered. For all roof shapes, two roof-sheathing fastener conditions (6-penny nails or 8-penny nails[3]) and two roof-wall connection conditions (Strapped or Toe-Nailed) are modeled. Similar analyses of the remaining 38 SBTs in Table A-1 produces a total of 4818 distinct building classes in the Hurricane Model.

To reduce the amount of data collection and data entry required to characterize the building inventory, it is helpful to assume that the relative frequencies of the various WBCs can be adequately modeled as independent. This assumption allows us to determine the relative frequencies of the 24 WMUH1 cases illustrated in Figure A-2 with only 11 input values. In the hypothetical example shown, 60 percent of the WMUH1 buildings in the geographic area of interest have flat roofs, 50 percent of the flat roofs are covered with single-ply membranes, 60 percent of the flat roof covers are in good condition, 50 percent of the roof decks are fastened with 8-penny nails, and 30 percent of the roof-wall connections are made with straps or clips.

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[2] Due to space limitations, Figure A-2 does not include shutters, secondary water resistance, and two of the four roof deck attachment types. Each of these excluded items is effectively given 0 percent weight for the example shown in Figure A-2.

[3] To qualify for the 8-penny (8d) roof deck attachment category, the maximum nail spacing must not exceed 6 inches along the edges of each sheathing panel or 12 inches in the field of each sheathing panel.

Multiplying each set of these numbers together produces the percentages shown at the bottom of Figure A-2. For this illustration, the values are rounded to the nearest 1 percent.

Mitigation Options

A significant feature of the Hurricane Model is its ability to model the benefits of mitigation for all building types. The mitigation options available in the Hurricane Model are (1) strengthened roof-wall connections (i.e., straps or clips instead of simple toe-nailed connections), (2) upgraded roof sheathing attachments (i.e., fasteners that meet or exceed the nailing requirements of the 1994 South Florida Building Code), (3) pressure- and impact-resistant protection for all openings (e.g., shutters and doors meeting the Dade County or ASTM International [ASTM] large missile and pressure cycling standards), and (4) secondary water resistance to prevent water penetration through the roof decking after the loss of the roof covering. The specific mitigation options available for each SBT are summarized in Table A-3.

By including these options in the Hurricane Model, the benefits of promoting mitigation can be easily quantified by varying the percentages of buildings that have these features in a given geographic area and comparing the resulting loss estimates. In many hurricane-prone areas, the Hurricane Model will show that loss reductions of 70 percent or more can be achieved through mitigation.

Table A-1: Specific Building Types in the Hurricane Model

Type	Description
WSF1	Wood, Single Family, One Story
WSF2	Wood, Single Family, Two or More Stories
WMUH1	Wood, Multi-Unit Housing, One Story
WMUH2	Wood, Multi-Unit Housing, Two Stories
WMUH3	Wood, Multi-Unit Housing, Three or More Stories
MSF1	Masonry, Single Family, One Story
MSF2	Masonry, Single Family, Two or More Stories
MMUH1	Masonry, Multi-Unit Housing, One Story
MMUH2	Masonry, Multi-Unit Housing, Two Stories
MMUH3	Masonry, Multi-Unit Housing, Three or More Stories
MLRM1	Masonry, Low-Rise Strip Mall, Up to 15 Feet
MLRM2	Masonry, Low-Rise Strip Mall, More than 15 Feet
MLRI	Masonry, Low-Rise Industrial/Warehouse/Factory Buildings
MERBL	Masonry, Engineered Residential Building, Low-Rise (1–2 Stories)
MERBM	Masonry, Engineered Residential Building, Mid-Rise (3–5 Stories)
MERBH	Masonry, Engineered Residential Building, High-Rise (6+ Stories)
MECBL	Masonry, Engineered Commercial Building, Low-Rise (1–2 Stories)
MECBM	Masonry, Engineered Commercial Building, Mid-Rise (3–5 Stories)
MECBH	Masonry, Engineered Commercial Building, High-Rise (6+ Stories)

Type	Description
CERBL	Concrete, Engineered Residential Building, Low-Rise (1–2 Stories)
CERBM	Concrete, Engineered Residential Building, Mid-Rise (3–5 Stories)
CERBH	Concrete, Engineered Residential Building, High-Rise (6+ Stories)
CECBL	Concrete, Engineered Commercial Building, Low-Rise (1–2 Stories)
CECBM	Concrete, Engineered Commercial Building, Mid-Rise (3–5 Stories)
CECBH	Concrete, Engineered Commercial Building, High-Rise (6+ Stories)
SPMBS	Steel, Pre-Engineered Metal Building, Small
SPMBM	Steel, Pre-Engineered Metal Building, Medium
SPMBL	Steel, Pre-Engineered Metal Building, Large
SERBL	Steel, Engineered Residential Building, Low-Rise (1–2 Stories)
SERBM	Steel, Engineered Residential Building, Mid-Rise (3–5 Stories)
SERBH	Steel, Engineered Residential Building, High-Rise (6+ Stories)
SECBL	Steel, Engineered Commercial Building, Low-Rise (1–2 Stories)
SECBM	Steel, Engineered Commercial Building, Mid-Rise (3–5 Stories)
SECBH	Steel, Engineered Commercial Building, High-Rise (6+ Stories)
MHPHUD	Manufactured Home, Pre-HUD
MH76HUD	Manufactured Home, 1976 HUD
MH94HUD-I	Manufactured Home, 1994 HUD – Wind Zone I
MH94HUD-II	Manufactured Home, 1994 HUD – Wind Zone II
MH94HUD-III	Manufactured Home, 1994 HUD – Wind Zone III

Table A-2: Wind Building Characteristics

Characteristic	Value1	Value2	Value3	Value4
Roof Shape				
Roof Shape I	Hip	Gable		
Roof Shape II	Hip	Gable	Flat	
Roof Cover				
Roof Cover Type	Built-Up	Single-Ply		
Roof Cover Quality	Good	Poor		
Secondary Water Resistance	Yes	No		
Roof Deck				
Roof Deck Attach. I	6d Nails @ 6/12	8d Nails @ 6/12		
Roof Deck Attach. II	6d Nails @ 6/12	8d Nails @ 6/12	6d/8d Mix @ 6/6	8d @ 6/6

Characteristic	Value1	Value2	Value3	Value4
Roof Deck Age	New or Average	Old		
Roof Frame				
Roof Frame System	Wood Truss	Steel Joist		
Joist Spacing	4 ft.	6 ft.		
Roof-Wall Conn.	Toe-Nail	Strap		
Fenestrations				
Window Area	Low	Medium	High	
Shutters	Yes	No		
Garage I (Unshuttered Houses)	None	Weak Door	Standard Door	
Garage II (Shuttered Houses)	None	SFBC 94		
Other Characteristics				
Wind Debris	Residential	Res./Comm. Mix	Varies by Direction	No Missiles
Units Per Floor	Single-Unit	Multi-Unit		
Masonry Reinforcing	Yes (RM)	No (URM)		
Tie Downs	Yes	No		

Figure A-1: Active Wind Building Characteristics for each Specific Building Type

Wind Building Characteristic	Wood							Masonry														Concrete						Steel								MH				
	WSF1	WSF2	WSF1 (H)	WSF2 (H)	WMUH1	WMUH2	WMUH3	MSF1	MSF2	MSF1 (H)	MSF2 (H)	MMUH1	MMUH2	MMUH3	MLRM1	MLRM2	MLRI	MERBL	MERBM	MERBH	MECBL	MECBM	MECBH	CERBL	CERBM	CERBH	CECBL	CECBM	CECBH	SPMBS	SPMBM	SPMBL	SERBL	SERBM	SERBH	SECBL	SECBM	SECBH	MHPHUD	MH76HUD	MH94HUD I	MH94HUD-II	MH94HUD-III
Roof Shape																																										
- Roof Shape I	2	2	2	2				2	2	2	2																																
- Roof Shape II					3*	3*	3*					3*	3*	3*																														
Roof Cover																																										
- Roof Cover Type (H)			2*	2*						2*	2*																																
- Roof Cover Type					2^	2^	2^					2^	2^	2^	2	2		2	2	2	2	2	2	2	2	2	2	2	2				2	2	2	2	2	2					
- Roof Cover Quality					2^	2^	2^					2^	2^	2^																													
- Secondary Water Resistance	2	2	2^	2^	2`	2`	2`	2	2	2^	2^	2`	2`	2`	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	r/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Roof Deck																																										
- Roof Deck Attach. I					2	2	2					2	2	2	2#	2#																										
- Roof Deck Attach. II	4	4			4	4	4	4	4			4	4	4	4#	4#	n/a	n/a	n/a	n/a	n/a	n/a	n/a	r/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
- Roof Deck Attach. III (Metal)															2`	2`	2`	2	2	2	2	2	2							2`	2`	2`	2	2	2	2	2	2					
- Roof Deck Attach. (H)			2*	2*						2*	2*																																
- Roof Deck Age															2^	2^	2													2	2	2											
Roof Frame																																										
- Roof Frame System															2*	2*																										
- Joist Spacing																2~																										
- Truss Spacing (H)			2~																																						
- Roof-Wall Conn.	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2#	2#																										
Fenestrations																																										
- Window Area																		3	3	3	3	3	3	3	3	3	3	3	3				3	3	3	3	3	3					
- Shutters	2*	2*	2	2	2	2	2	2*	2*	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
- Garage I (Unshuttered Houses)	3^	3^						3^	3^																																		
- Garage II (Shuttered Houses)	2#	2#						2#	2#																																		
Other Characteristics																																										
- Wind Debris															4	4		4	4	4	4	4	4	4	4	4	4	4	4				4	4	4	4	4	4					
- Units Per Floor																2^																										
- Masonry Reinforcing								2	2			2	2	2	2	2	2																										
- Tie Downs																																								2	2	2	2	2
- Wall Construction (H)			2																																								
- Uplift Restraint (H)			2																																								
Combinations in HAZUS	160	160	200	40	128	128	128	320	320	40	40	256	256	256	352	544	12	96	96	96	96	96	96	48	48	48	48	48	48	6	6	6	96	96	96	96	96	96	4	4	4	4	4
																																							Total				4818

* branching characteristic

^ conditional characteristic (active if Shutters Not Installed OR if Roof Shape is Flat OR if Roof Frame System is Steel Joist OR if roof deck is superior and roof cover is shingle)

conditional characteristic (active if Shutters Installed or if Roof Frame System is Wood Truss)

~ conditional characteristic (active if Roof Frame System is Steel Joist and Number of Units is Multi-Unit OR if single wall and no uplift restraint)

` conditional characteristic (active if Roof Shape is Gable or Hip OR if Roof Deck is Metal and Roof Deck Age is New or Average)

Figure A-2: Sample Distribution of WMUH1 Wind Building Characteristics

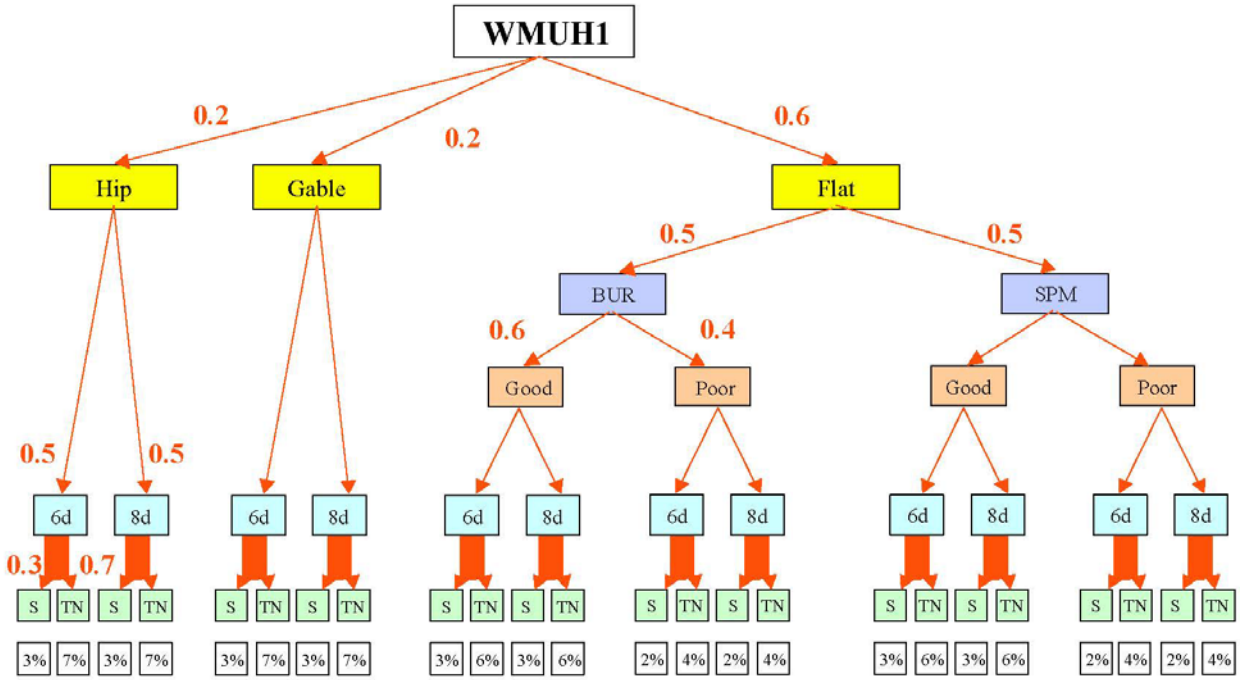

Table A-3: Mitigation Options

Hurricane Specific Building Types				Shutters on All Windows and Entry Doors	Roof-wall Connection Clips/Straps	Superior Roof Deck Attachment	Secondary Water Resistant	Manufactured Housing Tie Downs
Single Family	Wood	WSF1		Y	Y	Y	Y	
		WSF2		Y	Y	Y	Y	
	Masonry	MSF1		Y	Y	Y	Y	
		MSF2		Y	Y	Y	Y	
Multi-Unit Housing	Wood	WMUH1	Hip/Gable	Y	Y	Y	Y	
			Flat Roof	Y	Y	Y		
		WMUH2	Hip/Gable	Y	Y	Y	Y	
			Flat Roof	Y	Y	Y		
		WMUH3	Hip/Gable	Y	Y	Y	Y	
			Flat Roof	Y	Y	Y		
	Masonry	MMUH1	Hip/Gable	Y	Y	Y	Y	
			Flat Roof	Y	Y	Y		
		MMUH2	Hip/Gable	Y	Y	Y	Y	
			Flat Roof	Y	Y	Y		
		MMUH3	Hip/Gable	Y	Y	Y	Y	
			Flat Roof	Y	Y	Y		
Industrial Building Masonry		MLRI		Y		Y		
Low-Rise Strip Mall Masonry		MLRM1	Wood Truss	Y	Y	Y		
			OWSJ	Y		Y		
		MLRM2	Wood Truss	Y	Y	Y		
			OWSJ	Y		Y		
Engineered Buildings	Masonry	MERBL		Y		Y		
		MERBM		Y		Y		
		MERBH		Y		Y		
		MECBL		Y		Y		
		MECBM		Y		Y		

Hurricane Specific Building Types			Shutters on All Windows and Entry Doors	Roof-wall Connection Clips/Straps	Superior Roof Deck Attachment	Secondary Water Resistant	Manufactured Housing Tie Downs
		MECBH	Y		Y		
	Concrete	CERBL	Y		Y		
		CERBM	Y		Y		
		CERBH	Y		Y		
		CECBL	Y		Y		
		CECBM	Y		Y		
		CECBH	Y		Y		
	Steel	SERBL	Y		Y		
		SERBM	Y		Y		
		SERBH	Y		Y		
		SECBH	Y		Y		
		SECBL	Y		Y		
		SECBM	Y		Y		
Pre-Engineered Metal Buildings Steel		SPMBS	Y		Y		
		SPMBM	Y		Y		
		SPMBL	Y		Y		
Manufactured		MHPHUD	Y				Y
		MH76HUD	Y				Y
		MH94HUDI	Y				Y
		MH94HUDII	Y				Y
		MH94HUDIII	Y				Y

Appendix B: Model Building Types

B.1 Wood, Single Family, One Story (WSF1)

The WSF1 model building is a wood-framed, single-story, single-family house. See Section 6.4 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.2 Wood, Single Family, Two or More Stories (WSF2)

The WSF2 model building is a wood-framed, two-story, single-family house. See Section 6.4 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.3 Wood, Multi-Unit Housing, One Story (WMUH1)

The WMUH1 model building is a wood-framed, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. See Section 6.9 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.4 Wood, Multi-Unit Housing, Two Stories (WMUH2)

The WMUH2 model building is a wood-framed, two-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. See Section 6.9 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.5 Wood, Multi-Unit Housing, Three or More Stories (WMUH3)

The WMUH3 model building is a wood-framed, three-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. See Section 6.9 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.6 Masonry, Single Family, One Story (MSF1)

The MSF1 model building is a masonry wall, single-story, single-family house. The masonry walls can be either reinforced or unreinforced. See Section 6.4 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.7 Masonry, Single Family, Two or More Stories (MSF2)

The MSF2 model building is a masonry wall, two-story, single-family house. The masonry walls can be either reinforced or unreinforced. See Section 6.4 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.8 Masonry, Multi-Unit Housing, One Story (MMUH1)

The MMUH1 model building is a masonry wall, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. The masonry walls can be either reinforced or unreinforced. See Section 6.9 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.9 Masonry, Multi-Unit Housing, Two Stories (MMUH2)

The MMUH2 model building is a masonry wall, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. The masonry walls can be either reinforced or unreinforced. See Section 6.9 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.10 Masonry, Multi-Unit Housing, Three or More Stories (MMUH3)

The MMUH3 model building is a masonry wall, single-story, marginally engineered or non-engineered, multi-family dwelling or hotel/motel. The masonry walls can be either reinforced or unreinforced. See Section 6.9 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.11 Masonry, Low-Rise Strip Mall, Up to 15 Feet (MLRM1)

The MLRM1 model building is a masonry wall, low-rise strip mall building, up to 15 feet in height. The masonry walls can be either reinforced or unreinforced. See Section 6.10 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.12 Masonry, Low-Rise Strip Mall, More than 15 Feet (MLRM2)

The MLRM2 model building is a masonry wall, low-rise strip mall building, more than 15 feet in height. The masonry walls can be either reinforced or unreinforced. See Section 6.10 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.13 Masonry, Low-Rise Industrial/Warehouse/Factory Buildings (MLRI)

The MLRI model building is a 240,000-square-foot, masonry wall, industrial building or warehouse. The masonry walls can be either reinforced or unreinforced. See Section 6.13 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.14 Masonry, Engineered Residential Building, Low-Rise (MERBL)

The MERBL model building is a two-story, engineered, reinforced masonry wall, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.15 Masonry, Engineered Residential Building, Mid-Rise (MERBM)

The MERBM model building is a five-story, engineered, reinforced masonry wall, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.16 Masonry, Engineered Residential Building, High-Rise (MERBH)

The MERBH model building is an eight-story, engineered, reinforced masonry wall, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.17 Masonry, Engineered Commercial Building, Low-Rise (MECBL)

The MECBL model building is a two-story, engineered, reinforced masonry wall, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.18 Masonry, Engineered Commercial Building, Mid-Rise (MECBM)

The MECBM model building is a five-story, engineered, reinforced masonry wall, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.19 Masonry, Engineered Commercial Building, High-Rise (MECBH)

The MECBH model building is an eight-story, engineered, reinforced masonry wall, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.20 Concrete, Engineered Residential Building, Low-Rise (CERBL)

The CERBL model building is a two-story, engineered, reinforced concrete, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.21 Concrete, Engineered Residential Building, Mid-Rise (CERBM)

The CERBM model building is a five-story, engineered, reinforced concrete, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.22 Concrete, Engineered Residential Building, High-Rise (CERBH)

The CERBH model building is an eight-story, engineered, reinforced concrete, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.23 Concrete, Engineered Commercial Building, Low-Rise (CECBL)

The CECBL model building is a two-story, engineered, reinforced concrete, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.24 Concrete, Engineered Commercial Building, Mid-Rise (CECBM)

The CECBM model building is a five-story, engineered, reinforced concrete, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.25 Concrete, Engineered Commercial Building, High-Rise (CECBH)

The CECBH model building is an eight-story, engineered, reinforced concrete, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.26 Steel, Pre-Engineered Metal Building, Small (SPMBS)

The SPMBS model building is a 4,000-square-foot, pre-engineered, steel frame, metal clad building. See Section 6.11 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.27 Steel, Pre-Engineered Metal Building, Medium (SPMBM)

The SPMBM model building is a 50,000-square-foot, pre-engineered, steel frame, metal clad building. See Section 6.11 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.28 Steel, Pre-Engineered Metal Building, Large (SPMBL)

The SPMBL model building is a 500,000-square-foot, pre-engineered, steel frame, metal clad building. See Section 6.11 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.29 Steel, Engineered Residential Building, Low-Rise (SERBL)

The SERBL model building is a two-story, engineered, steel frame, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.30 Steel, Engineered Residential Building, Mid-Rise (SERBM)

The SERBM model building is a five-story, engineered, steel frame, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.31 Steel, Engineered Residential Building, High-Rise (SERBH)

The SERBH model building is an eight-story, engineered, steel frame, residential building with a compartmented floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.32 Steel, Engineered Commercial Building, Low-Rise (SECBL)

The SECBL model building is a two-story, engineered, steel frame, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.33 Steel, Engineered Commercial Building, Mid-Rise (SECBM)

The SECBM model building is a five-story, engineered, steel frame, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.34 Steel, Engineered Commercial Building, High-Rise (SECBH)

The SECBH model building is an eight-story, engineered, steel frame, commercial building with an open floor plan. See Section 6.12 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.35 Manufactured Home, Pre-Housing and Urban Development (MHPHUD)

The MHPHUD model building is a manufactured home built prior to the 1976 HUD standard. The home can be either tied-down or unrestrained. See Section 6.5 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.36 Manufactured Home, 1976 HUD (MH76HUD)

The MHPHUD model building is a manufactured home built to the 1976 HUD standard. The home can be either tied-down or unrestrained. See Section 6.5 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.37 Manufactured Home, 1994 HUD Region I (MH94HUD-I)

The MHPHUD model building is a manufactured home built to the 1994 HUD standard for Wind Zone I. The home can be either tied-down or unrestrained. See Section 6.5 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.38 Manufactured Home, 1994 HUD Region II (MH94HUD-II)

The MHPHUD model building is a manufactured home built to the 1994 HUD standard for Wind Zone II. The home can be either tied-down or unrestrained. See Section 6.5 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

B.39 Manufactured Home, 1994 HUD Region III (MH94HUD-III)

The MHPHUD model building is a manufactured home built to the 1994 HUD standard for Wind Zone III. The home can be either tied-down or unrestrained. See Section 6.5 of the Technical Manual for a detailed description of the building geometry and the component resistance values.

Appendix C: Data Model Dictionary

C.1 System Database Table List

Table Name	Primary Key	Description
clBldgTypeHu	idtSbtName	List of specific building type with a description of each (hu hazard)
huDamLossFun	AK_DL	Damage, loss, loss of use, and debris functions
huDamLossFunDescription	idtDamLossDescID	Damage, loss, loss of use, and debris classification
huDetermWindSpeedResults		Deterministic wind speed results (hu spec.)
huDetermWindSpeedResultsByTimeStep	ak_senario_tract_time	Deterministic wind speed results (hu spec.)
huErrorDef	idtErrID	List of error codes and strings used in the HU database and the HU user interface.
huGridProperties		Grid control grid properties
huGridPropertiesControl	PK_HU_GRIDCOL_TYPE	Grid control types
huGridPropertiesDataTypes	PK_HU_GRIDCOL_TYPE	Grid control cell data type
huGridPropertiesEditMode	PK_HU_GRIDCOL_TYPE	Grid control column edit modes
huGridPropertiesTextColor	PK_HU_GRIDCOL_TYPE	Grid control cell text color
huGridPropertiesWidth	PK_HU_GRIDCOL_TYPE	Grid control column width
huHistoricStormList	PK_Name	Historic storm list
huHistoricWindSpeedResults	AK_scnnametract	Historic storm wind speeds by historic storm
huListOfWindBldgTypes	itdwbID	Combination of Specific Building Type and its characteristics(hu hazard)
huOuputOptions	PK_huOuputOptions	Analysis option output scheme
huOutputOptionsByMap	PK_huOutputOptionsByMap	Analysis option map list
huOutputOptionsByMapFilterStr	PK_huOutputOptionsByMapFilterStr	Analysis option tree control name filter
huOutputOptionsByReport	PK_huOutputOptionsByReport	Analysis option report list
huOutputOptionsMapCol	PK_huOutputOptionsMapCol	Analysis option map enabled column names
huOutputOptionsMapFilters	PK_huOutputOptionsMapFilters	Analysis option tree control filter
huOutputOptionsMapRltsByFilter	PK_huOutputOptionsMapRltsByFilter	Analysis option map results filter
huOutputOptionsMapRltsType	PK_huOutputOptionsMapRltsType	Analysis option map results type
huOutputOptionsMapSchemes		Analysis option map schemes
huReports	PK_huReports	Analysis option report list
huScenario	idthuScenario	User-defined scenario list
huStormTrack		User-defined and historic storm scenario containing storm track information. (hu hazard)
huTableParams		Metadata documents
huTerrain	idtTerrain	Surface roughness table
huTractInlandDistance		Inland distance of tracts in 36 directions
huTreeBlowdownDensity	idtTreeDensity	Tree blowdown tree density
huTreeBlowdownFunctions	AK TreeBDown	Tree blowdown functions
huTreeBlowdownHeight	idtTreeHeight	Tree blowdown tree heights

Table Name	Primary Key	Description
huTreeBlowdownLossFunctions	AK TreeBDownLoss	Tree blowdown loss functions
huTreeBlowdownTreeType	PK_ TreeType	Tree blowdown tree types

C.2 System Database Table Columns List

Table Name	Column Name	Data Type	Description
clBldgTypeHu	SbtID	smallint	Specific buiding type ID
clBldgTypeHu	gbtDescription	char(100)	Specific buiding type description
clBldgTypeHu	gbtName	varchar(10)	General buiding type
clBldgTypeHu	sbtDescription	char(100)	General buiding type description
clBldgTypeHu	sbtName	varchar(10)	Hurricane specific building type ID
huDamLossFun	DamLossDescID	smallint	Damage or loss description
huDamLossFun	TerrainID	smallint	Surface roughness ID
huDamLossFun	WS100	real	Damage or loss function at 100 mph wind speed
huDamLossFun	WS105	real	Damage or loss function at 105 mph wind speed
huDamLossFun	WS110	real	Damage or loss function at 110 mph wind speed
huDamLossFun	WS115	real	Damage or loss function at 115 mph wind speed
huDamLossFun	WS120	real	Damage or loss function at 120 mph wind speed
huDamLossFun	WS125	real	Damage or loss function at 125 mph wind speed
huDamLossFun	WS130	real	Damage or loss function at 130 mph wind speed
huDamLossFun	WS135	real	Damage or loss function at 135 mph wind speed
huDamLossFun	WS140	real	Damage or loss function at 140 mph wind speed
huDamLossFun	WS145	real	Damage or loss function at 145 mph wind speed
huDamLossFun	WS150	real	Damage or loss function at 150 mph wind speed
huDamLossFun	WS155	real	Damage or loss function at 155 mph wind speed
huDamLossFun	WS160	real	Damage or loss function at 160 mph wind speed
huDamLossFun	WS165	real	Damage or loss function at 165 mph wind speed
huDamLossFun	WS170	real	Damage or loss function at 170 mph wind speed
huDamLossFun	WS175	real	Damage or loss function at 175 mph wind speed
huDamLossFun	WS180	real	Damage or loss function at 180 mph wind speed

Table Name	Column Name	Data Type	Description
huDamLossFun	WS185	real	Damage or loss function at 185 mph wind speed
huDamLossFun	WS190	real	Damage or loss function at 190 mph wind speed
huDamLossFun	WS195	real	Damage or loss function at 195 mph wind speed
huDamLossFun	WS200	real	Damage or loss function at 200 mph wind speed
huDamLossFun	WS205	real	Damage or loss function at 205 mph wind speed
huDamLossFun	WS210	real	Damage or loss function at 210 mph wind speed
huDamLossFun	WS215	real	Damage or loss function at 215 mph wind speed
huDamLossFun	WS220	real	Damage or loss function at 220 mph wind speed
huDamLossFun	WS225	real	Damage or loss function at 225 mph wind speed
huDamLossFun	WS230	real	Damage or loss function at 230 mph wind speed
huDamLossFun	WS235	real	Damage or loss function at 235 mph wind speed
huDamLossFun	WS240	real	Damage or loss function at 240 mph wind speed
huDamLossFun	WS245	real	Damage or loss function at 245 mph wind speed
huDamLossFun	WS250	real	Damage or loss function at 250 mph wind speed
huDamLossFun	WS50	real	Damage or loss function at 50 mph wind speed
huDamLossFun	WS55	real	Damage or loss function at 55 mph wind speed
huDamLossFun	WS60	real	Damage or loss function at 60 mph wind speed
huDamLossFun	WS65	real	Damage or loss function at 65 mph wind speed
huDamLossFun	WS70	real	Damage or loss function at 70 mph wind speed
huDamLossFun	WS75	real	Damage or loss function at 75 mph wind speed
huDamLossFun	WS80	real	Damage or loss function at 80 mph wind speed
huDamLossFun	WS85	real	Damage or loss function at 85 mph wind speed
huDamLossFun	WS90	real	Damage or loss function at 90 mph wind speed
huDamLossFun	WS95	real	Damage or loss function at 95 mph wind speed
huDamLossFun	wbID	smallint	Wind building type ID
huDamLossFunDescription	DamLossClass	char(20)	Damage or loss function classification

Table Name	Column Name	Data Type	Description
huDamLossFunDescription	DamLossDescID	smallint	Damage or loss description ID
huDamLossFunDescription	DamLossDescription	char(40)	Damage or loss description
huDetermWindSpeedResults	CenLat	decimal(11,6)	Tract centroid latitude
huDetermWindSpeedResults	CenLongit	decimal(11,6)	Tract centroid longitude
huDetermWindSpeedResults	DistToCoast	real	Tract centroid distance to coastline
huDetermWindSpeedResults	MaxSustained	smallint	Deterministic storm 1-min sustained wind speed results for each census tract (mph)
huDetermWindSpeedResults	PeakGust	smallint	Deterministic storm peak gust wind speed for each census tract (mph)
huDetermWindSpeedResults	Tract	char(11)	Tract number (11-char)
huDetermWindSpeedResults	WindSpeedDir	smallint	Wind speed direction
huDetermWindSpeedResults	huScenarioName	varchar(40)	User-defined scenario name
huDetermWindSpeedResultsByTimeStep	MinSustained	smallint	Deterministic storm 1-min sustained wind speed results for each census tract (mph)
huDetermWindSpeedResultsByTimeStep	PeakGust	smallint	Deterministic storm peak gust wind speed for each census tract (mph)
huDetermWindSpeedResultsByTimeStep	StepID	int	ID
huDetermWindSpeedResultsByTimeStep	TimeStep	real	Time step
huDetermWindSpeedResultsByTimeStep	Tract	char(11)	Tract number (11-char)
huDetermWindSpeedResultsByTimeStep	WindSpeedDir	smallint	Wind speed direction
huDetermWindSpeedResultsByTimeStep	WindSpeedDirDeg	real	Wind speed direction in degrees
huDetermWindSpeedResultsByTimeStep	huScenarioName	varchar(40)	User-defined scenario name
huErrorDef	ErrID	smallint	Error definition ID
huErrorDef	ErrMsg	varchar(256)	Error definition message
huGridProperties	GridName	varchar(50)	Grid name
huGridProperties	HU_GRIDCOL_CONTROL	varchar(50)	Control type
huGridProperties	HU_GRIDCOL_EDITMOD E	varchar(50)	Edit mode
huGridProperties	HU_GRIDCOL_EXTNAME	varchar(50)	Column display name
huGridProperties	HU_GRIDCOL_INDEX	int	Grid index
huGridProperties	HU_GRIDCOL_INTNAME	varchar(50)	Table column name
huGridProperties	HU_GRIDCOL_TOOLTIP	varchar(1024)	Column tool tip
huGridProperties	HU_GRIDCOL_TXTCOLO R	varchar(50)	Column color
huGridProperties	HU_GRIDCOL_TYPE	varchar(50)	Column data type
huGridProperties	HU_GRIDCOL_WIDTH	varchar(50)	Column width
huGridPropertiesControl	HU_GRIDCOL_CONTROL	varchar(50)	Control type
huGridPropertiesControl	value	int	Control type value
huGridPropertiesDataTypes	HU_GRIDCOL_TYPE	varchar(50)	Column data type

Table Name	Column Name	Data Type	Description
huGridPropertiesDataTypes	value	int	Column data type value
huGridPropertiesEditMode	HU_GRIDCOL_EDITMOD E	varchar(50)	Column edit mode
huGridPropertiesEditMode	value	int	Column edit mode value
huGridPropertiesTextColor	HU_GRIDCOL_TEXTCOL OR	varchar(50)	Column text color
huGridPropertiesTextColor	value	int	Column text color value
huGridPropertiesWidth	HU_GRIDCOL_WIDTH	varchar(50)	Column width
huGridPropertiesWidth	value	real	Column width value
huHistoricStormList	CurrentScenario	bit	Current historic storm flag
huHistoricStormList	Event	smallint	Event
huHistoricStormList	LandFallStates	varchar(50)	Landfall states
huHistoricStormList	NumStatesAffected	smallint	Number of states affected
huHistoricStormList	PeakGust	smallint	Peak gust wind speed
huHistoricStormList	StatesAffected	varchar(50)	States affected list
huHistoricStormList	StormNumber	smallint	Storm number
huHistoricStormList	Year	smallint	Storm year
huHistoricStormList	bSSCurrent	smallint	Current storm flag
huHistoricStormList	huScenarioName	varchar(40)	Historic storm name
huHistoricWindSpeedResults	MinSustained	smallint	Minimum sustained wind speed
huHistoricWindSpeedResults	PeakGust	smallint	Peak gust wind speed
huHistoricWindSpeedResults	Tract	char(11)	Census tract
huHistoricWindSpeedResults	huScenarioName	varchar(40)	Historic storm name
huListOfWindBldgTypes	CaseID	int	Wind building case ID
huListOfWindBldgTypes	charDescription	varchar(100)	Wind building description
huListOfWindBldgTypes	nWindChar	smallint	Wind building number of character sets (5 char per set)
huListOfWindBldgTypes	sbtName	varchar(10)	Hurricane specific building type ID
huListOfWindBldgTypes	wbID	smallint	Wind building type ID
huOuputOptions	OptionSchemeID	smallint	Option scheme ID
huOuputOptions	OptionSchemeName	varchar(100)	Option scheme name
huOuputOptions	RptExportType	smallint	Report export type
huOutputOptionsByMap	ColID	smallint	Map enabled column ID
huOutputOptionsByMap	OptionSchemeID	smallint	Option scheme ID
huOutputOptionsByMap	RltsID	smallint	Results ID
huOutputOptionsByMap	StrID	smallint	String ID
huOutputOptionsByMap	bAvailable	bit	Map available flag
huOutputOptionsByMap	bMapSelected	bit	Map selected flag
huOutputOptionsByMapFilterStr	Return_Period	varchar(25)	Return period
huOutputOptionsByMapFilterStr	StrID	smallint	String ID
huOutputOptionsByMapFilterStr	strFilters	varchar(50)	Filter string

Table Name	Column Name	Data Type	Description
huOutputOptionsByReport	OptionSchemeID	smallint	Option scheme ID
huOutputOptionsByReport	ReportID	smallint	Report ID
huOutputOptionsByReport	bReportSelected	bit	Report selected flag
huOutputOptionsMapCol	ALT_Return_Period	varchar(25)	Return period display name
huOutputOptionsMapCol	ColID	smallint	Column ID
huOutputOptionsMapCol	GridName	varchar(50)	Grid name
huOutputOptionsMapCol	HU_GRIDCOL_INTNAME	varchar(50)	Internal column name
huOutputOptionsMapCol	LegendColName	varchar(50)	Map legend display name
huOutputOptionsMapCol	LegendUnits	varchar(10)	Map legend units
huOutputOptionsMapFilters	AltTable	varchar(50)	Alternate table name
huOutputOptionsMapFilters	ColName	varchar(50)	Map column name
huOutputOptionsMapFilters	ColValue	varchar(50)	Map column value
huOutputOptionsMapFilters	DisplayOrder	smallint	User interface display order
huOutputOptionsMapFilters	FilterID	smallint	Map filter ID
huOutputOptionsMapFilters	FilterStr	char(5)	Map filter string
huOutputOptionsMapFilters	FilterType	varchar(50)	Map filter type
huOutputOptionsMapFilters	FilterValue	varchar(50)	Map filter value
huOutputOptionsMapFilters	ehuInventoryClass	varchar(25)	Inventory class
huOutputOptionsMapRltsByFilter	FilterID	smallint	Filter ID
huOutputOptionsMapRltsByFilter	RltsID	smallint	Results ID
huOutputOptionsMapRltsType	ColName	varchar(50)	Results column name
huOutputOptionsMapRltsType	ColValue	varchar(50)	Results column value
huOutputOptionsMapRltsType	DisplayOrder	smallint	Display order
huOutputOptionsMapRltsType	GenRlts	varchar(100)	General results
huOutputOptionsMapRltsType	GeoRes	tinyint	Tract or block resolution
huOutputOptionsMapRltsType	Legend	varchar(50)	Legend name
huOutputOptionsMapRltsType	MapOrder	smallint	Map order
huOutputOptionsMapRltsType	RltsID	smallint	Results ID
huOutputOptionsMapRltsType	SecondaryTableName	varchar(100)	Secondary table name
huOutputOptionsMapRltsType	SpecRlts	varchar(100)	Specific results
huOutputOptionsMapRltsType	TableName	varchar(100)	Table name
huOutputOptionsMapRltsType	ehu_MAPDISPLAY_SCHE ME	varchar(50)	Map display scheme
huOutputOptionsMapSchemes	eVal	int	Value
huOutputOptionsMapSchemes	ehu_MAPDISPLAY_SCHE ME	varchar(50)	Map display scheme
huReports	DialogReportName	varchar(50)	Dialog report name
huReports	DialogTabName	varchar(50)	Dialog tab name
huReports	DisplayOrder	smallint	Display order
huReports	ExportFileName	varchar(50)	Export file name

Table Name	Column Name	Data Type	Description
huReports	FileName	varchar(50)	File name
huReports	ReportID	smallint	ID
huReports	ReportName	varchar(50)	Report name
huReports	ReportType	varchar(50)	Report type
huReports	ScenarioType	varchar(25)	Scenario type
huReports	TemplateLoc	varchar(10)	Report template location
huScenario	Info	nvarchar(1000)	Description
huScenario	Type	tinyint	User-defined scenario type
huScenario	bCentralPressure	bit	Central pressure flag
huScenario	bMaxWindSpeed	bit	Maximum wind speed flag
huScenario	bProfileParameter	bit	Profile parameter flag
huScenario	bRadiusType	bit	Radius to maximum winds flag
huScenario	bSSCurrent	bit	Current hurricane scenario flag
huScenario	bTimeStep	bit	Time step flag
huScenario	bTranslationSpeed	bit	Translation speed flag
huScenario	huScenarioName	varchar(40)	Hurricane scenario name
huStormTrack	CentralPressure	real	Deterministic storm track central pressure (mbar)
huStormTrack	Latitude	real	Deterministic storm track latitude
huStormTrack	Longitude	real	Deterministic storm track longitude
huStormTrack	MaxWindSpeed	real	Deterministic storm track maximum wind speed (mph @ 10m)
huStormTrack	NewCentralPressure	real	Calculated central pressure
huStormTrack	NewTranslationSpeed	real	Calculated translation speed
huStormTrack	PointIndex	int	Deterministic storm track point index
huStormTrack	ProfileParameter	real	Deterministic storm track profile parameter
huStormTrack	RadiusToHurrWinds	real	Hurricane wind speed
huStormTrack	RadiusToMaxWinds	real	Deterministic storm track radius to maximum winds (km)
huStormTrack	TimeStep	real	Deterministic storm track time step between storm tracks (hours)
huStormTrack	TranslationSpeed	real	Deterministic storm track translation speed between storm tracks (m/s)
huStormTrack	WindSpeedFactor	real	Wind speed factor
huStormTrack	huScenarioName	varchar(40)	Scenario name
huStormTrack	huStormTrackPtID	smallint	Deterministic hurricane storm scenario ID
huTableParams	HzMetaDataDoc	varchar(50)	Hazard (HZ) document name
huTableParams	huMetaDataDoc	varchar(50)	Hurricane (HU) document name
huTableParams	huTableName	varchar(100)	HU table name
huTableParams	hzTableName	varchar(100)	HZ table name
huTerrain	SRDescription	varchar(25)	Surface roughness description

Table Name	Column Name	Data Type	Description
huTerrain	SurfaceRoughness	real	Surface roughness value (meters)
huTerrain	TerrainID	smallint	Surface roughness ID
huTractInlandDistance	Cnt	smallint	Direction count
huTractInlandDistance	Lat	decimal(11,6)	Centroid latitude
huTractInlandDistance	Long	decimal(11,6)	Centroid longitude
huTractInlandDistance	MinDistance	smallint	Centroid minimum distance
huTractInlandDistance	Tract	char(11)	Census tract
huTractInlandDistance	d1	real	Direction 1 of 36
huTractInlandDistance	d2	real	Direction 2 of 36
huTractInlandDistance	d3	real	Direction 3 of 36
huTractInlandDistance	d4	real	Direction 4 of 36
huTractInlandDistance	d5	real	Direction 5 of 36
huTractInlandDistance	d6	real	Direction 6 of 36
huTractInlandDistance	d7	real	Direction 7 of 36
huTractInlandDistance	d8	real	Direction 8 of 36
huTractInlandDistance	d9	real	Direction 9 of 36
huTractInlandDistance	d10	real	Direction 10 of 36
huTractInlandDistance	d11	real	Direction 11 of 36
huTractInlandDistance	d12	real	Direction 12 of 36
huTractInlandDistance	d13	real	Direction 13 of 36
huTractInlandDistance	d14	real	Direction 14 of 36
huTractInlandDistance	d15	real	Direction 15 of 36
huTractInlandDistance	d16	real	Direction 16 of 36
huTractInlandDistance	d17	real	Direction 17 of 36
huTractInlandDistance	d18	real	Direction 18 of 36
huTractInlandDistance	d19	real	Direction 19 of 36
huTractInlandDistance	d20	real	Direction 20 of 36
huTractInlandDistance	d21	real	Direction 21 of 36
huTractInlandDistance	d22	real	Direction 22 of 36
huTractInlandDistance	d23	real	Direction 23 of 36
huTractInlandDistance	d24	real	Direction 24 of 36
huTractInlandDistance	d25	real	Direction 25 of 36
huTractInlandDistance	d26	real	Direction 26 of 36
huTractInlandDistance	d27	real	Direction 27 of 36
huTractInlandDistance	d28	real	Direction 28 of 36
huTractInlandDistance	d29	real	Direction 29 of 36
huTractInlandDistance	d30	real	Direction 30 of 36
huTractInlandDistance	d31	real	Direction 31 of 36
huTractInlandDistance	d32	real	Direction 32 of 36
huTractInlandDistance	d33	real	Direction 33 of 36

Table Name	Column Name	Data Type	Description
huTractInlandDistance	d34	real	Direction 34 of 36
huTractInlandDistance	d35	real	Direction 35 of 36
huTractInlandDistance	d36	real	Direction 36 of 36
huTreeBlowdownDensity	Description	varchar(100)	Tree density description
huTreeBlowdownDensity	TreeDensity	varchar(10)	Tree density
huTreeBlowdownFunctions	TreeDensity	varchar(10)	Tree function type
huTreeBlowdownFunctions	TreeHeight	varchar(10)	Tree height
huTreeBlowdownFunctions	TreeType	varchar(20)	Tree type
huTreeBlowdownFunctions	WS100	real	Damage or loss function at 100 mph wind speed
huTreeBlowdownFunctions	WS105	real	Damage or loss function at 105 mph wind speed
huTreeBlowdownFunctions	WS110	real	Damage or loss function at 110 mph wind speed
huTreeBlowdownFunctions	WS115	real	Damage or loss function at 115 mph wind speed
huTreeBlowdownFunctions	WS120	real	Damage or loss function at 120 mph wind speed
huTreeBlowdownFunctions	WS125	real	Damage or loss function at 125 mph wind speed
huTreeBlowdownFunctions	WS130	real	Damage or loss function at 130 mph wind speed
huTreeBlowdownFunctions	WS135	real	Damage or loss function at 135 mph wind speed
huTreeBlowdownFunctions	WS140	real	Damage or loss function at 140 mph wind speed
huTreeBlowdownFunctions	WS145	real	Damage or loss function at 145 mph wind speed
huTreeBlowdownFunctions	WS150	real	Damage or loss function at 150 mph wind speed
huTreeBlowdownFunctions	WS155	real	Damage or loss function at 155 mph wind speed
huTreeBlowdownFunctions	WS160	real	Damage or loss function at 160 mph wind speed
huTreeBlowdownFunctions	WS165	real	Damage or loss function at 165 mph wind speed
huTreeBlowdownFunctions	WS170	real	Damage or loss function at 170 mph wind speed
huTreeBlowdownFunctions	WS175	real	Damage or loss function at 175 mph wind speed
huTreeBlowdownFunctions	WS180	real	Damage or loss function at 180 mph wind speed
huTreeBlowdownFunctions	WS185	real	Damage or loss function at 185 mph wind speed
huTreeBlowdownFunctions	WS190	real	Damage or loss function at 190 mph wind speed
huTreeBlowdownFunctions	WS195	real	Damage or loss function at 195 mph wind speed

Table Name	Column Name	Data Type	Description
huTreeBlowdownFunctions	WS200	real	Damage or loss function at 200 mph wind speed
huTreeBlowdownFunctions	WS205	real	Damage or loss function at 205 mph wind speed
huTreeBlowdownFunctions	WS210	real	Damage or loss function at 210 mph wind speed
huTreeBlowdownFunctions	WS215	real	Damage or loss function at 215 mph wind speed
huTreeBlowdownFunctions	WS220	real	Damage or loss function at 220 mph wind speed
huTreeBlowdownFunctions	WS225	real	Damage or loss function at 225 mph wind speed
huTreeBlowdownFunctions	WS230	real	Damage or loss function at 230 mph wind speed
huTreeBlowdownFunctions	WS235	real	Damage or loss function at 235 mph wind speed
huTreeBlowdownFunctions	WS240	real	Damage or loss function at 240 mph wind speed
huTreeBlowdownFunctions	WS245	real	Damage or loss function at 245 mph wind speed
huTreeBlowdownFunctions	WS250	real	Damage or loss function at 250 mph wind speed
huTreeBlowdownFunctions	WS50	real	Damage or loss function at 50 mph wind speed
huTreeBlowdownFunctions	WS55	real	Damage or loss function at 55 mph wind speed
huTreeBlowdownFunctions	WS60	real	Damage or loss function at 60 mph wind speed
huTreeBlowdownFunctions	WS65	real	Damage or loss function at 65 mph wind speed
huTreeBlowdownFunctions	WS70	real	Damage or loss function at 70 mph wind speed
huTreeBlowdownFunctions	WS75	real	Damage or loss function at 75 mph wind speed
huTreeBlowdownFunctions	WS80	real	Damage or loss function at 80 mph wind speed
huTreeBlowdownFunctions	WS85	real	Damage or loss function at 85 mph wind speed
huTreeBlowdownFunctions	WS90	real	Damage or loss function at 90 mph wind speed
huTreeBlowdownFunctions	WS95	real	Damage or loss function at 95 mph wind speed
huTreeBlowdownHeight	Description	varchar(100)	Damage or loss function classification
huTreeBlowdownHeight	TreeHeight	varchar(10)	Damage or loss description
huTreeBlowdownLossFunctions	LossType	varchar(20)	Loss type
huTreeBlowdownLossFunctions	TreeDensity	varchar(10)	Damage or loss description
huTreeBlowdownLossFunctions	TreeHeight	varchar(10)	Wind building type ID
huTreeBlowdownLossFunctions	TreeType	varchar(20)	Surface roughness ID

Table Name	Column Name	Data Type	Description
huTreeBlowdownLossFunctions	WS100	real	Damage or loss function at 100 mph wind speed
huTreeBlowdownLossFunctions	WS105	real	Damage or loss function at 105 mph wind speed
huTreeBlowdownLossFunctions	WS110	real	Damage or loss function at 110 mph wind speed
huTreeBlowdownLossFunctions	WS115	real	Damage or loss function at 115 mph wind speed
huTreeBlowdownLossFunctions	WS120	real	Damage or loss function at 120 mph wind speed
huTreeBlowdownLossFunctions	WS125	real	Damage or loss function at 125 mph wind speed
huTreeBlowdownLossFunctions	WS130	real	Damage or loss function at 130 mph wind speed
huTreeBlowdownLossFunctions	WS135	real	Damage or loss function at 135 mph wind speed
huTreeBlowdownLossFunctions	WS140	real	Damage or loss function at 140 mph wind speed
huTreeBlowdownLossFunctions	WS145	real	Damage or loss function at 145 mph wind speed
huTreeBlowdownLossFunctions	WS150	real	Damage or loss function at 150 mph wind speed
huTreeBlowdownLossFunctions	WS155	real	Damage or loss function at 155 mph wind speed
huTreeBlowdownLossFunctions	WS160	real	Damage or loss function at 160 mph wind speed
huTreeBlowdownLossFunctions	WS165	real	Damage or loss function at 165 mph wind speed
huTreeBlowdownLossFunctions	WS170	real	Damage or loss function at 170 mph wind speed
huTreeBlowdownLossFunctions	WS175	real	Damage or loss function at 175 mph wind speed
huTreeBlowdownLossFunctions	WS180	real	Damage or loss function at 180 mph wind speed
huTreeBlowdownLossFunctions	WS185	real	Damage or loss function at 185 mph wind speed
huTreeBlowdownLossFunctions	WS190	real	Damage or loss function at 190 mph wind speed
huTreeBlowdownLossFunctions	WS195	real	Damage or loss function at 195 mph wind speed
huTreeBlowdownLossFunctions	WS200	real	Damage or loss function at 200 mph wind speed
huTreeBlowdownLossFunctions	WS205	real	Damage or loss function at 205 mph wind speed
huTreeBlowdownLossFunctions	WS210	real	Damage or loss function at 210 mph wind speed
huTreeBlowdownLossFunctions	WS215	real	Damage or loss function at 215 mph wind speed
huTreeBlowdownLossFunctions	WS220	real	Damage or loss function at 220 mph wind speed

Table Name	Column Name	Data Type	Description
huTreeBlowdownLossFunctions	WS225	real	Damage or loss function at 225 mph wind speed
huTreeBlowdownLossFunctions	WS230	real	Damage or loss function at 230 mph wind speed
huTreeBlowdownLossFunctions	WS235	real	Damage or loss function at 235 mph wind speed
huTreeBlowdownLossFunctions	WS240	real	Damage or loss function at 240 mph wind speed
huTreeBlowdownLossFunctions	WS245	real	Damage or loss function at 245 mph wind speed
huTreeBlowdownLossFunctions	WS250	real	Damage or loss function at 250 mph wind speed
huTreeBlowdownLossFunctions	WS50	real	Damage or loss function at 50 mph wind speed
huTreeBlowdownLossFunctions	WS55	real	Damage or loss function at 55 mph wind speed
huTreeBlowdownLossFunctions	WS60	real	Damage or loss function at 60 mph wind speed
huTreeBlowdownLossFunctions	WS65	real	Damage or loss function at 65 mph wind speed
huTreeBlowdownLossFunctions	WS70	real	Damage or loss function at 70 mph wind speed
huTreeBlowdownLossFunctions	WS75	real	Damage or loss function at 75 mph wind speed
huTreeBlowdownLossFunctions	WS80	real	Damage or loss function at 80 mph wind speed
huTreeBlowdownLossFunctions	WS85	real	Damage or loss function at 85 mph wind speed
huTreeBlowdownLossFunctions	WS90	real	Damage or loss function at 90 mph wind speed
huTreeBlowdownLossFunctions	WS95	real	Damage or loss function at 95 mph wind speed
huTreeBlowdownLossFunctions	bGarage	bit	Garage exist flag
huTreeBlowdownLossFunctions	sbtName	varchar(10)	Hurricane specific building type
huTreeBlowdownTreeType	Description	varchar(100)	Damage or loss function classification
huTreeBlowdownTreeType	TreeType	varchar(20)	Damage or loss description

C.3 Template Database Table List

Name	Primary Key	Description
clBldgTypeHu	idtsbtName	Hurricane list of specific building stock and description
clOccupancy	idtOccupancy	General and specific occupancy classifications
huAnalysisOpt	idtOptID	Sets the hurricane analysis options for the user
huAnalysisRunParameters	<None>	Analysis run level by census tract or census block
huBldgCharCase	PK_CaseID	Continental US/Hawaii wind building filter
huBldgCharTree	<None>	Wind buiding characteristics tree control filter

Name	Primary Key	Description
huBldgCharValidity	idtbcvID	Matches valid building characteristics to the hurricane specific building types
huBldgCharWt	AK_hubmaplist_wbid	Contains the total weighted average for each unique building type (4325 types for each bldg char scheme)
huBldgCountBldgTypeB	idtKey	Building count by building type by census block
huBldgCountBldgTypeT	idtKey	Building count table by census tract by specific bldg type; unique to each hazard since specific bldg type classification varies by hazard
huBldgEconBIAnnGrossSales	PK_Occupancy	Annual gross sales ($ per sqf)
huBldgEconBIBusinessInv	PK_Occupancy	Business inventory (% of gross annual sales)
huBldgEconILOwnerOcc	PKOccupancy	Building economic owner occupancy
huBldgEconILRecaptureFactors	PKOccupancy	Building economic recapture factors
huBldgEconILRentalCost	PKOccupancy	Building economic rental costs
huBldgEconILWageCapIncome	PKOccupancy	Building economic wage income caps
huBldgEconLossTypes	pkEconLossType	Building economic loss types
huBldgEconRTBusInterruption	PKOccupancy	Building economic business interruption
huBldgMapping	Key_2	Hurricane specific wind building characteristic distribution
huBldgMappingList	idthuBldgSchemeNam e	Hurricane building character scheme list used for naming the characteristic distributions for each building type
huBldgMappingListExt	PK_HUBLDGMAPPI NGLISTExt	Mapping scheme name list extension; allows the mapping scheme name to be greater than 25 characters
huBldgMapping_Updates	<None>	MR1 wind building mapping scheme updates
huBldgMapping_UpdatesMR2	<None>	MR2 wind building mapping scheme updates
huBldgTypeResultsB	Key_2	Damage and loss results by building type by block
huBldgTypeResultsT	Key_2	Damage and loss results by building type by tract
huCareFlty	idtKey	Hurricane care facility
huCensusBlock	idtKey	Hurricane census block data
huDebrisAndShelterDamTypesByRP	idtDLType	Hurricane damage and loss classification by return period for debris and shelter
huDebrisResultsB	Key_2	Hurricane debris results by block
huDebrisResultsT	Key_2	Hurricane debris results by tract
huEfOccMapping	PKEFClass	Essential facilities occupancy to specific occupancy mapping
huEmergencyCtr	idtKey	Hurricane emergency center facility
huExposureBldgTypeB	idtKey	Hurricane dollar exposure by building type by census block
huExposureBldgTypeT	idtKey	Hurricane dollar exposure by building type by census tract
huExposureContentBldgTypeB	idtKey	Hurricane dollar content exposure by building type by census block
huExposureContentBldgTypeT	idtKey	Hurricane dollar content exposure by building type by census tract
huFireStation	idtKey	Hurricane fire station
huGbsOccMapping	idtKey	Hurricane general building stock occupancy mapping
huGbsOccMappingList	idthuOccMapScheme Name	Hurricane list of occupancy mapping schemes for the general building stock
huGbsOccMappingListExt	PK_HUGBSOCCMAP PINGLISTExt	General occupancy mapping scheme list; extends name from 25 to 255 characters

Name	Primary Key	Description
huGenAnalysisOpt	idtGenOptID	Sets the hurricane gen analysis options for the user
huHazardMapWindSpeed	idtHazardMapWSKey	Wind speeds by return period for each census tract; use to display default wind speed map layers
huHazardMapWindSpeedB	idtHazardMapWSKey	Wind speeds by return period for each census block; use to display default wind speed map layers
huInCast	<None>	InCast hurricane data
huListOfBldgChar	idtBldgCharID	Hurricane building characteristics
huListOfWindBldgTypes	idtwbID	Hurricane list of hurricane wind building types
huOccResultsB	Key_2	Hurricane damage and loss results by occupancy by block
huOccResultsT	Key_2	Hurricane damage and loss results by occupancy by tract
huPoliceStation	idtKey	Hurricane police station facility
huRPWindSpeeds	idtKey	Wind speeds by return period for each census tract
huRPWindSpeedsB	idtKey	Wind speeds by return period for each census block
huRapidLossResults	<None>	Rapid loss results
huReports	<None>	Hurricane summary report list
huResultsBldgEconOutputAndEmpOccB	idtKey	Building economic loss results by occupancy by block
huResultsBldgEconOutputAndEmpOccT	idtKey	Building economic loss results by occupancy by tract
huResultsCareFlty	idtKey	Medical care facilities results
huResultsEmergCtr	idtKey	Emergency center facilities results
huResultsFireStation	idtKey	Fire station results
huResultsPoliceStation	idtKey	Police station results
huResultsSchool	idtKey	School results
huResultsUserDefined	idtKey	User-defined facilities results
huReturn Periods	idtReturnPeriod	List of return periods
huSchool	idtKey	Hurricane school facility
huShelterCategoryWeights	PKClass	Shelter category weights
huShelterDSProb	PKWeightFactor	Default values for damage state probabilities
huShelterRelModFactors	PKClass	Hurricane specific shelter relative modification factors
huShelterResultsB	Key_2	Hurricane shelter results by block
huShelterResultsT	Key_2	Hurricane shelter results by tract
huShelterUtilityFactors	pk_Class	Hurricane shelter utility factors
huSqFootageBldgTypeB	idtKey	Square footage by specific bldg type (hu specific)
huSqFootageBldgTypeT	idtKey	Square footage by specific bldg type (hu specific)
huSummaryDamage	Key_2	Summary damage results by tract
huSummaryDamageB	AK_huSumDamB	Summary damage results by block
huSummaryLoss	Key_2	Summary loss results by tract
huSummaryLossB	Key_2	Summary loss results by block
huTemplateScenario	Key_1	Current scenario
huTerrain	idtKey	Hurricane surface roughness for each census tract in the Study Region
huTerrainB	idtKey	Hurricane surface roughness for each census block in the Study Region

Name	Primary Key	Description
huTract	idtKey	Hurricane census tract dat;.the Study Region hurricane census tract data is written to the huterrain table in the template
huTreeParameters	PK_tract	Tree parameters by tract
huTreeParametersB	PK_block	Tree parameters by block
huUserDefinedFlty	idtKey	Hurricane user-defined facilities
hzSurgeFRCombByBldgTypeB	Key	Surge combined wind/flood results by general building type
hzSurgeFRCombSOccupB	Key	Surge combined wind/flood results by specific occupancy
huEfBldgCharWt	Key	Contains the total weighted average for each unique building type
huEfBldgEconRTBusInterruption	Key	Building economic business interruption
huEfBldgMapping	Key	Hurricane specific wind building characteristic distribution
huEfBldgMappingList	Key	Hurricane building character scheme list used for naming the characteristic distributions for each building type
huEfBldgMappingListExt	Key	Mapping scheme name list extension; allows the mapping scheme name to be greater than 25 characters

C.4 Template Database Table Columns List

Table	Name	Data Type	Description
clBldgTypeHu	sbtName	varchar(10)	Hurricane specific building type name
clBldgTypeHu	SbtID	smallint	Hurricane specific building type ID
clBldgTypeHu	gbtName	varchar(10)	General building type
clBldgTypeHu	sbtDescription	char(100)	Hurricane specific building type description
clBldgTypeHu	gbtDescription	char(100)	General building type description
clOccupancy	SoccDescription	char(100)	Specific occupancy description
clOccupancy	GoccDescription	char(100)	General occupancy description
clOccupancy	GoccName	varchar(20)	General occupancy
clOccupancy	Occupancy	char(5)	Specific occupancy class
clOccupancy	SoccID	smallint	Specific occupancy ID
huAnalysisOpt	OptValue	smallint	Hurricane analysis option value
huAnalysisOpt	huAnalysisOpt	varchar(10)	Hurricane analysis option
huAnalysisRunParameters	OptimizationType	int	Type
huAnalysisRunParameters	OptimizationDesc	char(50)	Description
huAnalysisRunParameters	bValue	bit	Analysis flag
huAnalysisRunParameters	ValidValues	char(50)	Flag description
huBldgCharCase	CaseName	varchar(25)	Location name
huBldgCharCase	CaseDescription	varchar(255)	Location description
huBldgCharCase	CaseID	int	Location filter
huBldgCharTree	CharType	varchar(40)	Character category
huBldgCharTree	sbtName	varchar(10)	Specific building type
huBldgCharTree	CaseID	int	Location filter

Table	Name	Data Type	Description
huBldgCharTree	ExcludedBldgCharTypeList	varchar(100)	Excluded building characteristics from tree control
huBldgCharTree	BldgChar	char(5)	Building characteristic
huBldgCharValidity	CaseID	int	Location filter
huBldgCharValidity	sbtName	varchar(10)	Hurricane specific building type name
huBldgCharValidity	BldgCharID	int	Hurricane list of wind building characteristic ID
huBldgCharValidity	bcvID	smallint	Hurricane building characteristic validity ID
huBldgCharWt	WtPercent	real	Hurricane wind building type characteristic total distribution value
huBldgCharWt	wbID	smallint	wbID should be one to one relationship with the huWindBldgChar table in the system database
huBldgCharWt	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huBldgCountBldgTypeB	MERBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MERBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MERBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MLRM1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MLRIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MLRM2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MMUH3i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CECBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CECBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CECBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SPMBSi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MECBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MECBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MECBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CERBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CERBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CERBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SPMBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SECBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SECBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SECBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SERBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SERBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MH94HUDIIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MH94HUDIIIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MHPHUDi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MH94HUDIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MH76HUDi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MMUH2i	int	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huBldgCountBldgTypeB	MSF1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	WMUH3i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	WMUH2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MSF2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	MMUH1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	SERBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	CensusBlock	char(15)	Full census block number
huBldgCountBldgTypeB	SPMBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	WMUH1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	WSF1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeB	WSF2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	WSF2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	WMUH1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	WSF1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MSF2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MSF1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	WMUH2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	WMUH3i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	Tract	char(11)	Census tract
huBldgCountBldgTypeT	MECBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MECBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MECBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MERBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	CERBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	CERBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	CERBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	CECBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MMUH3i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MLRM1i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MMUH2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MERBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MERBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MLRM2i	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MLRIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MH94HUDIIIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SECBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MHPHUDi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SECBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SECBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MH94HUDIIi	int	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huBldgCountBldgTypeT	MH76HUDi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MH94HUDIi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	CECBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SPMBSi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SPMBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	CECBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SERBHi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SERBMi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SPMBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	SERBLi	int	Hurricane specific building type count or exposure
huBldgCountBldgTypeT	MMUH1i	int	Hurricane specific building type count or exposure
huBldgEconBIAnnGrossSales	Value	real	Gross annual sales factor
huBldgEconBIAnnGrossSales	Occupancy	char(5)	Specific occupancy class
huBldgEconBIBusinessInv	Occupancy	char(5)	Specific occupancy class
huBldgEconBIBusinessInv	Value	real	Business inventory factor
huBldgEconILOwnerOcc	OwnerOcc	real	Owner occupancy factor
huBldgEconILOwnerOcc	Occupancy	char(5)	Specific occupancy
huBldgEconILRecaptureFactors	Income	real	Income factor
huBldgEconILRecaptureFactors	Employment	real	Employment factor
huBldgEconILRecaptureFactors	Occupancy	char(5)	Specific occupancy
huBldgEconILRecaptureFactors	Wage	real	Wage factor
huBldgEconILRecaptureFactors	OutputRecapture	real	Output recapture factor
huBldgEconILRentalCost	RentalCostMonth	real	Rental cost per month factor
huBldgEconILRentalCost	Occupancy	char(5)	Specific occupancy
huBldgEconILRentalCost	DisruptionCost	real	Disruption factor
huBldgEconILRentalCost	RentalCostDay	real	Rental cost per day factor
huBldgEconILWageCapIncome	OutputDay	real	Output in days
huBldgEconILWageCapIncome	Occupancy	char(5)	Specific occupancy class
huBldgEconILWageCapIncome	IncomeYear	real	Income per year factor
huBldgEconILWageCapIncome	IncomeDay	real	Income per day factor
huBldgEconILWageCapIncome	Employment	real	Employment factor
huBldgEconILWageCapIncome	WageDay	real	Wage per day factor
huBldgEconLossTypes	Description	varchar(25)	Economic loss type description
huBldgEconLossTypes	EconLossType	varchar(12)	Economic loss type
huBldgEconRTBusInterruption	None	real	Building economic no damage state
huBldgEconRTBusInterruption	MinorDS	real	Building economic minor damage state
huBldgEconRTBusInterruption	Occupancy	char(5)	Specific occupancy class
huBldgEconRTBusInterruption	ModerateDS	real	Building economic moderate damage state
huBldgEconRTBusInterruption	CompleteDS	real	Building economic complete damage state
huBldgEconRTBusInterruption	SevereDS	real	Building economic severe damage state

Table	Name	Data Type	Description
huBldgMapping	sbtName	varchar(10)	Hurricane specific building type name
huBldgMapping	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huBldgMapping	PercentDist	real	Hurricane building characteristic distribution
huBldgMapping	BldgCharID	int	Hurricane list of wind building characteristic ID
huBldgMappingList	SchemeDescription	varchar(40)	Hurricane mapping scheme list description
huBldgMappingList	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huBldgMappingList	SchemeUpdated	datetime	Hurricane mapping scheme list updated date
huBldgMappingList	Updateable	bit	Editable flag
huBldgMappingList	SchemeCreated	datetime	Hurricane scheme creation date
huBldgMappingList	CaseID	int	Location filter
huBldgMappingListExt	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huBldgMappingListExt	huBldgSchemeNameExt	varchar(255)	Wind building mapping scheme displayed
huBldgMapping_Updates	BLDGCHARID	int	Wind building characteristic ID
huBldgMapping_Updates	PercentDist	real	Wind building percent distribution
huBldgMapping_Updates	sbtName	varchar(10)	Specific building type
huBldgMapping_Updates	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huBldgMapping_UpdatesMR2	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huBldgMapping_UpdatesMR2	sbtName	varchar(10)	Specific building type
huBldgMapping_UpdatesMR2	BLDGCHARID	int	Building characteristic ID
huBldgMapping_UpdatesMR2	PercentDist	real	Percent distribution
huBldgTypeResultsB	Severe	real	Hurricane probability of severe damage
huBldgTypeResultsB	At Least Severe	real	Hurricane probability of least severe damage
huBldgTypeResultsB	At Least Moderate	real	Hurricane probability of least moderate damage
huBldgTypeResultsB	Moderate	real	Hurricane probability of moderate damage
huBldgTypeResultsB	At Least Minor	real	Hurricane probability of least minor
huBldgTypeResultsB	CensusBlock	char(15)	Full census block number
huBldgTypeResultsB	Complete	real	Hurricane probability of complete damage
huBldgTypeResultsB	huScenarioName	varchar(40)	Hurricane scenario name
huBldgTypeResultsB	bCurrent	bit	Hurricane results current flag
huBldgTypeResultsB	sbtName	varchar(10)	Hurricane specific building type name
huBldgTypeResultsB	Building	real	Building loss
huBldgTypeResultsB	Content	real	Content loss
huBldgTypeResultsB	Inventory	real	Inventory loss
huBldgTypeResultsB	Total	real	Total loss
huBldgTypeResultsB	Return_Period	varchar(25)	Return period
huBldgTypeResultsB	Minor	real	Hurricane probability of minor damage
huBldgTypeResultsB	Wage	real	Wage loss
huBldgTypeResultsB	Rental	real	Rental loss
huBldgTypeResultsB	No Damage	real	Hurricane probability of no damage
huBldgTypeResultsB	Relocation Cost	real	Relocation cost

Table	Name	Data Type	Description
huBldgTypeResultsB	Income	real	Income loss
huBldgTypeResultsT	Return_Period	varchar(25)	Return period
huBldgTypeResultsT	Total	real	Total loss
huBldgTypeResultsT	Building	real	Building loss
huBldgTypeResultsT	sbtName	varchar(10)	Hurricane specific building type name
huBldgTypeResultsT	Tract	char(11)	Census tract
huBldgTypeResultsT	Complete	real	Hurricane probability of complete damage
huBldgTypeResultsT	Content	real	Content loss
huBldgTypeResultsT	Inventory	real	Inventory loss
huBldgTypeResultsT	Relocation Cost	real	Relocation loss
huBldgTypeResultsT	At Least Moderate	real	Hurricane probability of at least moderate damage
huBldgTypeResultsT	Severe	real	Hurricane probability of severe damage
huBldgTypeResultsT	At Least Severe	real	Hurricane probability of at least severe damage
huBldgTypeResultsT	No Damage	real	Hurricane probability of no damage
huBldgTypeResultsT	Minor	real	Hurricane probability of minor damage
huBldgTypeResultsT	Income	real	Income loss
huBldgTypeResultsT	Rental	real	Rental loss
huBldgTypeResultsT	Wage	real	Wage loss
huBldgTypeResultsT	Moderate	real	Hurricane probability of moderate damage
huBldgTypeResultsT	At Least Minor	real	Hurricane probability of at least minor damage
huBldgTypeResultsT	bCurrent	bit	Hurricane results current flag
huBldgTypeResultsT	huScenarioName	varchar(40)	Hurricane scenario name
huCareFlty	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huCareFlty	sbtName	varchar(10)	Hurricane specific building type name
huCareFlty	CareFltyId	char(8)	Emergency care facility
huCensusBlock	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huCensusBlock	SurfaceRoughness	real	Surface roughness by block
huCensusBlock	WindGridIndex	smallint	Wind grid index by block
huCensusBlock	huOccMapSchemeName	varchar(20)	Hurricane general building stock occupancy mapping list ID
huCensusBlock	CensusBlock	char(15)	Full census block number
huDebrisAndShelterDamTypesByRP	DLType	char(12)	Damage type
huDebrisAndShelterDamTypesByRP	Type	char(5)	Damage type
huDebrisResultsB	huScenarioName	varchar(40)	Hurricane scenario name
huDebrisResultsB	bCurrent	bit	Hurricane results current flag
huDebrisResultsB	CensusBlock	char(15)	Full census block number
huDebrisResultsB	Return_Period	varchar(25)	Return period
huDebrisResultsB	BrickAndWood	int	Hurricane debris results for brick and wood
huDebrisResultsB	TreeVolume	real	Tree debris by volume

Table	Name	Data Type	Description
huDebrisResultsB	Tree	int	Tree debris
huDebrisResultsB	ConcreteAndSteel	int	Hurricane debris results for concrete and steel
huDebrisResultsT	bCurrent	bit	Hurricane results current flag
huDebrisResultsT	TreeVolume	real	Tree debris volume
huDebrisResultsT	huScenarioName	varchar(40)	Hurricane scenario name
huDebrisResultsT	Return_Period	varchar(25)	Return period
huDebrisResultsT	Tract	char(11)	Census tract
huDebrisResultsT	BrickAndWood	int	Hurricane debris results for brick and wood
huDebrisResultsT	ConcreteAndSteel	int	Hurricane debris results for concrete and steel
huDebrisResultsT	Tree	int	Tree debris
huEfOccMapping	Occupancy	char(10)	Occupancy type
huEfOccMapping	EFClass	char(5)	Essential facility occupancy
huEmergencyCtr	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huEmergencyCtr	sbtName	varchar(10)	Hurricane specific building type name
huEmergencyCtr	EocId	char(8)	Facility ID
huExposureBldgTypeB	SPMBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SPMBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CECBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SPMBSi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CECBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MH94HUDIIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MH94HUDIIIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MH94HUDIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MH76HUDi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SERBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SERBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SERBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SECBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SECBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	SECBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MHPHUDi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MSF2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MSF1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	WMUH3i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MMUH1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MMUH2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MMUH3i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	WSF1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CensusBlock	char(15)	Full census block number
huExposureBldgTypeB	WMUH2i	int	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huExposureBldgTypeB	WSF2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	WMUH1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CECBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CERBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MECBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MECBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CERBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	CERBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MLRM1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MLRIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MLRM2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MECBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MERBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MERBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeB	MERBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MMUH3i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	CECBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	CECBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SPMBSi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	CERBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	CECBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	CERBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	CERBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SECBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SERBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SECBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SPMBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SPMBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SERBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SERBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	SECBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	WSF1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	WSF2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	Tract	char(11)	Census tract
huExposureBldgTypeT	MLRM1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	WMUH3i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	WMUH1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	WMUH2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MECBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MECBLi	int	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huExposureBldgTypeT	MERBHi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MECBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MLRM2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MLRIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MERBMi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MERBLi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MSF1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MHPHUDi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MH94HUDIIIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MH76HUDi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MH94HUDIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MH94HUDIIi	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MSF2i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MMUH1i	int	Hurricane specific building type count or exposure
huExposureBldgTypeT	MMUH2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MH94HUDIIIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MH94HUDIIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MH94HUDIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CERBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CECBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CECBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CERBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SPMBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SPMBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SERBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SPMBSi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CECBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MH76HUDi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SECBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MHPHUDi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SERBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SERBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SECBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	SECBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CERBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MSF1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	WMUH3i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MSF2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MMUH1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MMUH2i	int	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huExposureContentBldgTypeB	WSF1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	WMUH2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	WSF2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	WMUH1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	CensusBlock	char(15)	Census block
huExposureContentBldgTypeB	MECBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MERBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MECBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MECBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MMUH3i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MLRM2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MLRM1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MERBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MLRIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeB	MERBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SECBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MHPHUDi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SECBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	Tract	char(11)	Census tract
huExposureContentBldgTypeT	WSF1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MH94HUDIIIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MH76HUDi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MH94HUDIIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MH94HUDIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SECBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	CERBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	CECBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	CECBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MECBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	CERBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	CERBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MECBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SERBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SERBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SERBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	CECBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SPMBSi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SPMBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	SPMBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	WSF2i	int	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huExposureContentBldgTypeT	MSF2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MSF1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MMUH1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MMUH2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	WMUH1i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	WMUH3i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	WMUH2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MECBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MERBMi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MERBLi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MERBHi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MMUH3i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MLRM2i	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MLRIi	int	Hurricane specific building type count or exposure
huExposureContentBldgTypeT	MLRM1i	int	Hurricane specific building type count or exposure
huFireStation	sbtName	varchar(10)	Hurricane specific building type name
huFireStation	FireStationId	char(8)	Fire station ID
huFireStation	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huGbsOccMapping	CECBLp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	CERBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	CERBHp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MECBLp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MECBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	CERBLp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MECBHp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	CECBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MMUH3p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MLRM1p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MMUH2p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MMUH1p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MERBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MLRM2p	tinyint	Hurricane specific building types percentage of occupancy class

Table	Name	Data Type	Description
huGbsOccMapping	MERBLp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MLRIp	tinyint	Hurricane specific building types percentage of
huGbsOccMapping	huOccMapSchemeName	varchar(20)	Hurricane general building stock occupancy mapping list ID
huGbsOccMapping	WSF1p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	WSF2p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	Occupancy	char(5)	Specific occupancy class
huGbsOccMapping	MSF2p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MSF1p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	WMUH1p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	WMUH3p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	WMUH2p	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MERBHp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MHPHUDp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MH76HUDp	tinyint	Hurricane specific building types percentage of Occupancy class
huGbsOccMapping	SECBHp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SECBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MH94HUDIIIp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MH94HUDIp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	MH94HUDIIp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	CECBHp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SPMBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SPMBLp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SPMBSp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SECBLp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SERBHp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMapping	SERBLp	tinyint	Hurricane specific building types percentage of occupancy class

Table	Name	Data Type	Description
huGbsOccMapping	SERBMp	tinyint	Hurricane specific building types percentage of occupancy class
huGbsOccMappingList	SchemeUpdated	datetime	Hurricane mapping scheme list updated date
huGbsOccMappingList	Updateable	bit	Mapping scheme editable
huGbsOccMappingList	CaseID	int	Location filter
huGbsOccMappingList	SchemeCreated	datetime	Hurricane scheme creation date
huGbsOccMappingList	SchemeDescription	varchar(40)	Hurricane mapping scheme list description
huGbsOccMappingList	huOccMapSchemeName	varchar(20)	Hurricane general building stock occupancy mapping list ID
huGbsOccMappingListExt	huOccMapSchemeName	varchar(20)	General occupancy mapping scheme name
huGbsOccMappingListExt	huOccMapSchemeNameExt	varchar(255)	General occupancy mapping scheme name long
huGenAnalysisOpt	Reserved	smallint	Hurricane analysis option
huGenAnalysisOpt	huGenAnalysisOpt	int	General analysis option
huHazardMapWindSpeed	Tract	char(11)	Census tract
huHazardMapWindSpeed	f20yr	real	Probabilistic storm wind speed for return period 2 (mph)
huHazardMapWindSpeed	f10yr	real	Probabilistic storm wind speed for return period 1 (mph)
huHazardMapWindSpeed	f50yr	real	Probabilistic storm wind speed for return period 3 (mph)
huHazardMapWindSpeed	f200yr	real	Probabilistic storm wind speed for return period 5 (mph)
huHazardMapWindSpeed	f500yr	real	Probabilistic storm wind speed for return period 6 (mph)
huHazardMapWindSpeed	f1000yr	real	Probabilistic storm wind speed for return period 7 (mph)
huHazardMapWindSpeed	f100yr	real	Probabilistic storm wind speed for return period 4 (mph)
huHazardMapWindSpeedB	CensusBlock	char(15)	Census block
huHazardMapWindSpeedB	f10yr	real	Probabilistic storm wind speed for return period 1 (mph)
huHazardMapWindSpeedB	f1000yr	real	Probabilistic storm wind speed for return period 7 (mph)
huHazardMapWindSpeedB	f500yr	real	Probabilistic storm wind speed for return period 6 (mph)
huHazardMapWindSpeedB	f200yr	real	Probabilistic storm wind speed for return period 5 (mph)
huHazardMapWindSpeedB	f20yr	real	Probabilistic storm wind speed for return period 2 (mph)
huHazardMapWindSpeedB	f100yr	real	Probabilistic storm wind speed for return period 4 (mph)
huHazardMapWindSpeedB	f50yr	real	Probabilistic storm wind speed for return period 3 (mph)
huInCast	ShieldingHeight	varchar(45)	Shielding height
huInCast	WindShielding	varchar(15)	Wind shielding height
huInCast	Topography	varchar(15)	Topography

Table	Name	Data Type	Description
huInCast	WindDebrisSource	varchar(30)	Wind debris source
huInCast	WindSpeedType	varchar(15)	Wind speed type
huInCast	RoofSlope	varchar(25)	Roof slope
huInCast	WallExposure	int	Wall exposure
huInCast	MHTieDowns	varchar(11)	Manufactured home tie down
huInCast	WindExposure	varchar(25)	Wind exposures
huInCast	WindDesignYear	smallint	Wind speed design year
huInCast	hzIncastID	int	Incast ID
huInCast	WindSpeed	smallint	Wind speed
huInCast	ShutterCde	varchar(30)	Shelter code
huInCast	GarageDoors	varchar(15)	Garage doors
huInCast	RollUpDoors	varchar(15)	Roll up doors
huInCast	RoofSheathing	varchar(30)	Roof sheathing
huInCast	ShutterType	varchar(15)	Shutter type
huInCast	WindDesignCode	varchar(15)	Wind design code
huInCast	DeckAttach	varchar(12)	Deck attachment type
huInCast	DoorProtection	varchar(15)	Door protection
huInCast	OtherDoorArea	varchar(15)	Other door area
huInCast	MHWindZone	varchar(15)	MH wind zone
huInCast	MHCode	varchar(30)	MH code
huInCast	Protection	varchar(25)	Protection type
huInCast	RoofPerimeter	varchar(30)	Roof perimeter
huInCast	RoofCovering	varchar(45)	Roof cover
huInCast	NailSize	varchar(15)	Deck nail size
huInCast	NailSpacing	varchar(15)	Deck nail spacing
huInCast	GlassConstr	varchar(15)	Glass construction type
huInCast	Glass	varchar(30)	Glass type
huInCast	Openings	varchar(15)	Opening type
huInCast	WallAnchorage	varchar(15)	Wall anchors
huInCast	Cladding	varchar(45)	Wall cladding
huInCast	RoofShape	varchar(15)	Roof shape
huInCast	GableBracing	varchar(15)	Gable end bracing
huInCast	FrameSpacing	varchar(15)	Wall framing spacing
huListOfBldgChar	bcDescription	varchar(100)	Hurricane list of wind building characteristic description
huListOfBldgChar	CharType	varchar(40)	Wind building characteristic type
huListOfBldgChar	BldgCharID	int	Hurricane list of wind building characteristic ID
huListOfBldgChar	bcName	varchar(25)	Building characteristic name
huListOfBldgChar	BldgChar	char(5)	Hurricane list of wind building characteristic names
huListOfWindBldgTypes	wbID	smallint	Hurricane wind building type ID (equivalent to wbID in system database)

Table	Name	Data Type	Description
huListOfWindBldgTypes	sbtName	varchar(10)	Hurricane specific building type name
huListOfWindBldgTypes	CaseID	int	Location filter
huListOfWindBldgTypes	nWindChar	smallint	Hurricane number of wind building characteristics per wind building type
huListOfWindBldgTypes	charDescription	char(100)	Hurricane list of wind building types description
huOccResultsB	At Least Minor	real	Hurricane probability of at least minor damage
huOccResultsB	Moderate	real	Hurricane probability of moderate damage
huOccResultsB	Minor	real	Hurricane probability of minor damage
huOccResultsB	No Damage	real	Hurricane probability of no damage
huOccResultsB	Wage	real	Wage loss
huOccResultsB	huScenarioName	varchar(40)	Hurricane scenario name
huOccResultsB	bCurrent	bit	Hurricane results current flag
huOccResultsB	At Least Moderate	real	Hurricane probability of at least moderate damage
huOccResultsB	At Least Severe	real	Hurricane probability of at least severe damage
huOccResultsB	Severe	real	Hurricane probability of severe damage
huOccResultsB	Complete	real	Hurricane probability of complete damage
huOccResultsB	Return_Period	varchar(25)	Return period
huOccResultsB	Total	real	Total loss
huOccResultsB	Occupancy	char(5)	Specific occupancy class
huOccResultsB	CensusBlock	char(15)	Full census block number
huOccResultsB	Rental	real	Rental loss
huOccResultsB	Relocation Cost	real	Relocation cost
huOccResultsB	Income	real	Income loss
huOccResultsB	Building	real	Building loss
huOccResultsB	Inventory	real	Inventory loss
huOccResultsB	Content	real	Content loss
huOccResultsT	huScenarioName	varchar(40)	Hurricane scenario name
huOccResultsT	bCurrent	bit	Hurricane results current flag
huOccResultsT	At Least Minor	real	Hurricane probability of at least minor
huOccResultsT	Moderate	real	Hurricane probability of moderate damage
huOccResultsT	Minor	real	Hurricane probability of minor damage
huOccResultsT	No Damage	real	Hurricane probability of no damage
huOccResultsT	Wage	real	Wage loss
huOccResultsT	Complete	real	Hurricane probability of complete damage
huOccResultsT	At Least Moderate	real	Hurricane probability of at least moderate damage
huOccResultsT	At Least Severe	real	Hurricane probability of at least severe damage
huOccResultsT	Severe	real	Hurricane probability of severe damage
huOccResultsT	Tract	char(11)	Census tract
huOccResultsT	Total	real	Total loss
huOccResultsT	Building	real	Building loss

Table	Name	Data Type	Description
huOccResultsT	Return_Period	varchar(25)	Return period
huOccResultsT	Occupancy	char(5)	Specific occupancy class
huOccResultsT	Rental	real	Rental loss
huOccResultsT	Income	real	Income loss
huOccResultsT	Content	real	Content loss
huOccResultsT	Relocation Cost	real	Relocation cost
huOccResultsT	Inventory	real	Inventory loss
huPoliceStation	PoliceStationId	char(8)	Facility ID
huPoliceStation	sbtName	varchar(10)	Hurricane specific building type name
huPoliceStation	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huRPWindSpeeds	wRtnP2	smallint	Probabilistic storm wind speed for return period 2 (mph)
huRPWindSpeeds	wRtnP3	smallint	Probabilistic storm wind speed for return period 3 (mph)
huRPWindSpeeds	Tract	char(11)	Census tract
huRPWindSpeeds	wRtnP1	smallint	Probabilistic storm wind speed for return period 1 (mph)
huRPWindSpeeds	wRtnP7	smallint	Probabilistic storm wind speed for return period 7 (mph)
huRPWindSpeeds	wRtnP4	smallint	Probabilistic storm wind speed for return period 4 (mph)
huRPWindSpeeds	wRtnP6	smallint	Probabilistic storm wind speed for return period 6 (mph)
huRPWindSpeeds	wRtnP5	smallint	Probabilistic storm wind speed for return period 5 (mph)
huRPWindSpeedsB	wRtnP7	smallint	Probabilistic storm wind speed for return period 7 (mph)
huRPWindSpeedsB	wRtnP4	smallint	Probabilistic storm wind speed for return period 4 (mph)
huRPWindSpeedsB	wRtnP3	smallint	Probabilistic storm wind speed for return period 3 (mph)
huRPWindSpeedsB	wRtnP2	smallint	Probabilistic storm wind speed for return period 2 (mph)
huRPWindSpeedsB	wRtnP5	smallint	Probabilistic storm wind speed for return period 5 (mph)
huRPWindSpeedsB	wRtnP6	smallint	Probabilistic storm wind speed for return period 6 (mph)
huRPWindSpeedsB	CensusBlock	char(15)	Census block
huRPWindSpeedsB	wRtnP1	smallint	Probabilistic storm wind speed for return period 1 (mph)
huRapidLossResults	LossType	varchar(50)	Loss type (building, content, etc.)
huRapidLossResults	Percentile	smallint	Percentile
huRapidLossResults	ResultsType	varchar(50)	Results type
huRapidLossResults	ResultsValue	real	Results value
huRapidLossResults	huScenarioName	varchar(40)	Hurricane scenario name
huReports	FileName	varchar(50)	Long report name

Table	Name	Data Type	Description
huReports	bAvailable	smallint	Available flag
huReports	ReportName	varchar(50)	Short report name
huReports	TabName	varchar(50)	Report tab name
huResultsBldgEconOutputAndEmpOccB	EconLossType	varchar(12)	Loss type (building, content, etc.)
huResultsBldgEconOutputAndEmpOccB	RES2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	IND6I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	IND2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	IND5I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	IND3I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	IND4I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	IND1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	EDU1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	EDU2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	GOV2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	AGR1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	REL1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	Return_Period	varchar(25)	Return period
huResultsBldgEconOutputAndEmpOccB	huScenarioName	varchar(40)	Hurricane scenario name
huResultsBldgEconOutputAndEmpOccB	CensusBlock	char(15)	Census block
huResultsBldgEconOutputAndEmpOccB	GOV1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES3FI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES3EI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES4I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES5I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES6I	real	Building economic output results by occupancy

Table	Name	Data Type	Description
huResultsBldgEconOutputAndEmpOccB	RES3CI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES3DI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES3BI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	RES3AI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM10I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM7I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM6I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM8I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM9I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM5I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM3I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccB	COM4I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	EconLossType	varchar(12)	Loss type (building, content, etc.)
huResultsBldgEconOutputAndEmpOccT	Return_Period	varchar(25)	Return period
huResultsBldgEconOutputAndEmpOccT	COM1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES6I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES5I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM5I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM3I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM4I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM6I	real	Building economic output results by occupancy

Table	Name	Data Type	Description
huResultsBldgEconOutputAndEmpOccT	RES3BI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES3CI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES3AI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES4I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES3FI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES3DI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES3EI	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	huScenarioName	varchar(40)	Hurricane scenario name
huResultsBldgEconOutputAndEmpOccT	REL1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	GOV1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	AGR1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	IND6I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	EDU2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	GOV2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	EDU1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM7I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM9I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM10I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	COM8I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	IND5I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	IND4I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	IND1I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	IND3I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	IND2I	real	Building economic output results by occupancy
huResultsBldgEconOutputAndEmpOccT	RES2I	real	Building economic output results by occupancy

Table	Name	Data Type	Description
huResultsBldgEconOutputAndEmpOccT	Tract	char(11)	Census tract
huResultsCareFlty	Minor	real	Hurricane probability of minor damage
huResultsCareFlty	Moderate	real	Hurricane probability of moderate damage
huResultsCareFlty	LossOfUse	real	Loss of use in days
huResultsCareFlty	bCurrent	bit	Hurricane results current flag
huResultsCareFlty	huScenarioName	varchar(40)	Hurricane scenario name
huResultsCareFlty	Severe	real	Hurricane probability of severe damage
huResultsCareFlty	Complete	real	Hurricane probability of complete damage
huResultsCareFlty	Return_Period	varchar(25)	Return period
huResultsCareFlty	CareFltyId	char(8)	Facility ID
huResultsEmergCtr	Severe	real	Hurricane probability of severe damage
huResultsEmergCtr	Complete	real	Hurricane probability of complete damage
huResultsEmergCtr	huScenarioName	varchar(40)	Hurricane scenario name
huResultsEmergCtr	LossOfUse	real	Loss of use in days
huResultsEmergCtr	Moderate	real	Hurricane probability of moderate damage
huResultsEmergCtr	Minor	real	Hurricane probability of minor damage
huResultsEmergCtr	bCurrent	bit	Hurricane results current flag
huResultsEmergCtr	Return_Period	varchar(25)	Return period
huResultsEmergCtr	EocId	char(8)	Facility ID
huResultsFireStation	Complete	real	Hurricane probability of complete damage
huResultsFireStation	Severe	real	Hurricane probability of severe damage
huResultsFireStation	huScenarioName	varchar(40)	Hurricane scenario name
huResultsFireStation	Minor	real	Hurricane probability of minor damage
huResultsFireStation	bCurrent	bit	Hurricane results current flag
huResultsFireStation	LossOfUse	real	Loss of use in days
huResultsFireStation	Moderate	real	Hurricane probability of moderate damage
huResultsFireStation	Return_Period	varchar(25)	Return period
huResultsFireStation	FireStationId	char(8)	Facility ID
huResultsPoliceStation	LossOfUse	real	Loss of use in days
huResultsPoliceStation	Minor	real	Hurricane probability of minor damage
huResultsPoliceStation	bCurrent	bit	Hurricane results current flag
huResultsPoliceStation	huScenarioName	varchar(40)	Hurricane scenario name
huResultsPoliceStation	Return_Period	varchar(25)	Return period
huResultsPoliceStation	PoliceStationId	char(8)	Facility ID
huResultsPoliceStation	Moderate	real	Hurricane probability of moderate damage
huResultsPoliceStation	Complete	real	Hurricane probability of complete damage
huResultsPoliceStation	Severe	real	Hurricane probability of severe damage
huResultsSchool	Minor	real	Hurricane probability of minor damage
huResultsSchool	Moderate	real	Hurricane probability of moderate damage

Table	Name	Data Type	Description
huResultsSchool	LossOfUse	real	Loss of use in days
huResultsSchool	SchoolId	char(8)	Facility ID
huResultsSchool	Return_Period	varchar(25)	Return period
huResultsSchool	Severe	real	Hurricane probability of severe damage
huResultsSchool	huScenarioName	varchar(40)	Hurricane scenario name
huResultsSchool	Complete	real	Hurricane probability of complete damage
huResultsSchool	bCurrent	bit	Hurricane results current flag
huResultsUserDefined	Moderate	real	Hurricane probability of moderate damage
huResultsUserDefined	Minor	real	Hurricane probability of minor damage
huResultsUserDefined	bCurrent	bit	Hurricane results current flag
huResultsUserDefined	Severe	real	Hurricane probability of severe damage
huResultsUserDefined	Complete	real	Hurricane probability of complete damage
huResultsUserDefined	huScenarioName	varchar(40)	Hurricane scenario name
huResultsUserDefined	Return_Period	varchar(25)	Return period
huResultsUserDefined	UserDefinedFltyId	char(8)	Facility ID
huReturn Periods	RPString	varchar(25)	Return period description
huReturn Periods	Return_Period	varchar(25)	Return period
huSchool	sbtName	varchar(10)	Hurricane specific building type name
huSchool	SchoolId	char(8)	Facility ID
huSchool	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huShelterCategoryWeights	Value	real	Shelter category weight value
huShelterCategoryWeights	Class	char(5)	Shelter category weight class
huShelterCategoryWeights	Description	varchar(100)	Shelter category weight description
huShelterDSProb	Value	real	Shelter damage state probability value
huShelterDSProb	WeightFactor	char(5)	Shelter damage state probability weight factor
huShelterDSProb	Description	varchar(100)	Shelter damage state probability description
huShelterRelModFactors	Value	real	Shelter relocation modification factor value
huShelterRelModFactors	Class	char(5)	Shelter relocation modification factor class
huShelterRelModFactors	Description	varchar(100)	Shelter relocation modification factor description
huShelterResultsB	huScenarioName	varchar(40)	Hurricane scenario name
huShelterResultsB	Return_Period	varchar(25)	Return period
huShelterResultsB	DisplacedHouseHolds	int	Hurricane shelter displaced households results
huShelterResultsB	CensusBlock	char(15)	Full census block number
huShelterResultsB	bCurrent	bit	Hurricane results current flag
huShelterResultsB	ShortTermShelterNeeds	int	Hurricane shelter short term needs results
huShelterResultsT	Return_Period	varchar(25)	Return period
huShelterResultsT	DisplacedHouseHolds	int	Hurricane shelter displaced households results
huShelterResultsT	Tract	char(11)	Census tract
huShelterResultsT	huScenarioName	varchar(40)	Hurricane scenario name
huShelterResultsT	ShortTermShelterNeeds	int	Hurricane shelter short term needs results

Table	Name	Data Type	Description
huShelterResultsT	bCurrent	bit	Hurricane results current flag
huShelterUtilityFactors	Description	varchar(100)	Shelter utility description
huShelterUtilityFactors	Class	char(5)	Shelter utility class
huShelterUtilityFactors	Value	real	Shelter utility factor
huSqFootageBldgTypeB	CECBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	CERBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	CERBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	CECBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	CECBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SPMBSi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MERBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MERBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	CERBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MECBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MECBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MECBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MERBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MH76HUDi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MHPHUDi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SECBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MH94HUDIIIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MH94HUDIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MH94HUDIIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SPMBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SERBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SPMBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SECBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SECBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SERBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	SERBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	CensusBlock	char(15)	Full census block number
huSqFootageBldgTypeB	MSF1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	WMUH3i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MSF2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MMUH1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	WSF1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	WMUH2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	WSF2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	WMUH1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MLRIi	real	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huSqFootageBldgTypeB	MLRM2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MMUH2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MLRM1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeB	MMUH3i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	CECBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MERBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	CERBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MERBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MLRIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MERBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MECBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MECBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	CERBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MECBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	CERBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MLRM2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SECBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SECBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SERBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MH76HUDi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SECBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MHPHUDi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	CECBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SPMBSi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	CECBHi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SERBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SERBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SPMBMi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	SPMBLi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MH94HUDIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	WSF1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	WSF2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	WMUH1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MH94HUDIIIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	Tract	char(11)	Census tract
huSqFootageBldgTypeT	MH94HUDIIi	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MLRM1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MMUH2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MMUH1i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MMUH3i	real	Hurricane specific building type count or exposure

Table	Name	Data Type	Description
huSqFootageBldgTypeT	WMUH2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	WMUH3i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MSF2i	real	Hurricane specific building type count or exposure
huSqFootageBldgTypeT	MSF1i	real	Hurricane specific building type count or exposure
huSummaryDamage	ShelterDisp	real	Shelter displacement
huSummaryDamage	ComDamage	real	Complete damage
huSummaryDamage	SevDamage	real	Severe damage
huSummaryDamage	ShelterShortTerm	real	Short term shelter requirements
huSummaryDamage	huScenarioName	varchar(40)	Hurricane scenario name
huSummaryDamage	Tract	char(11)	Census tract
huSummaryDamage	ReturnPeriod	varchar(25)	Return period
huSummaryDamage	GenBldgOrGenOcc	varchar(20)	General buiding or general occupancy
huSummaryDamage	ModDamage	real	Moderate damage
huSummaryDamage	NonDamage	real	No damage
huSummaryDamage	MinDamage	real	Minor damage
huSummaryDamageB	ShelterShortTerm	real	Short term shelter requirements
huSummaryDamageB	ModDamage	real	Moderate damage
huSummaryDamageB	MinDamage	real	Minimal damage
huSummaryDamageB	NonDamage	real	No damage
huSummaryDamageB	SevDamage	real	Severe damage
huSummaryDamageB	ComDamage	real	Complete damage
huSummaryDamageB	ShelterDisp	real	Shelter displacement
huSummaryDamageB	huScenarioName	varchar(40)	Hurricane scenario name
huSummaryDamageB	ReturnPeriod	varchar(25)	Return period
huSummaryDamageB	CensusBlock	char(15)	Census block
huSummaryDamageB	GenBldgOrGenOcc	varchar(20)	General buiding or general occupancy
huSummaryLoss	RelLoss	real	Relocation loss
huSummaryLoss	InvLoss	real	Inventory loss
huSummaryLoss	ConLoss	real	Content loss
huSummaryLoss	WagLoss	real	Wage loss
huSummaryLoss	IncLoss	real	Income loss
huSummaryLoss	RenLoss	real	Rental loss
huSummaryLoss	huScenarioName	varchar(40)	Hurricane scenario name
huSummaryLoss	GenBldgOrGenOcc	varchar(20)	General buiding or general occupancy
huSummaryLoss	Tract	char(11)	Census tract
huSummaryLoss	BuiLoss	real	Building loss
huSummaryLoss	ReturnPeriod	varchar(25)	Return period
huSummaryLoss	TotLoss	real	Total loss
huSummaryLossB	TotLoss	real	Total loss
huSummaryLossB	ReturnPeriod	varchar(25)	Return period

Table	Name	Data Type	Description
huSummaryLossB	GenBldgOrGenOcc	varchar(20)	General buiding or general occupancy
huSummaryLossB	BuiLoss	real	Building loss
huSummaryLossB	ConLoss	real	Content loss
huSummaryLossB	InvLoss	real	Inventory loss
huSummaryLossB	WagLoss	real	Wage loss
huSummaryLossB	huScenarioName	varchar(40)	Hurricane scenario name
huSummaryLossB	RelLoss	real	Relocation loss
huSummaryLossB	IncLoss	real	Income loss
huSummaryLossB	CensusBlock	char(15)	Full census block number
huSummaryLossB	RenLoss	real	Rental loss
huTemplateScenario	CurrentScenario	varchar(40)	Current hurricane scenario name
huTemplateScenario	ScenarioType	Varchar(20)	Scenario type
huTemplateScenario	lRunCnt	Int	Run count
huTemplateScenario	InitialWaterLevelHeight	Float	Initial water level height
huTerrain	SRindex	float	Hurricane surface roughness index (calculated)
huTerrain	Tract	char(11)	Census tract
huTerrain	SurfaceRoughness	real	Hurricane surface roughness value (meters)
huTerrainB	SRindex	float	Hurricane surface roughness index (calculated)
huTerrainB	CensusBlock	char(15)	Census block
huTerrainB	SurfaceRoughness	real	Hurricane surface roughness value (meters)
huTract	WindGridIndex	smallint	Wind grid index
huTract	huOccMapSchemeName	varchar(20)	Hurricane general building stock occupancy mapping list ID
huTract	huBldgSchemeName	varchar(20)	Wind building mapping scheme name
huTract	Tract	char(11)	Census block
huTract	DistToCoast	real	Distance between the census tract centroid and the coast line
huTract	SurfaceRoughness	real	Hurricane surface roughness value (meters)
huTreeParameters	StemsPerAcre	int	Count of stems per acre
huTreeParameters	PreDomTreeType	varchar(20)	Predominate tree type
huTreeParameters	Tract	char(11)	Census tract
huTreeParameters	TreeHeightGreater60	real	Count greater than 60 ft
huTreeParameters	TreeHeightLess40	real	Count less than 40 ft
huTreeParameters	TreeHeight40To60	real	Count 40 to 60 ft
huTreeParametersB	TreeHeightGreater60	real	Count greater than 60 ft
huTreeParametersB	TreeHeightLess40	real	Count less than 40 ft
huTreeParametersB	TreeHeight40To60	real	Count 40 to 60 ft
huTreeParametersB	CensusBlock	char(15)	Census block
huTreeParametersB	StemsPerAcre	int	Count of stems per acre
huTreeParametersB	PreDomTreeType	varchar(20)	Predominant tree type
huUserDefinedFlty	UserDefinedFltyId	char(8)	Facility ID

Table	Name	Data Type	Description
huUserDefinedFlty	huBldgSchemeName	varchar(20)	Wind building mapping scheme
huUserDefinedFlty	sbtName	varchar(10)	Hurricane specific building type name
hzSurgeFRCombByBldgTypeB	StudyCaseID	int	Study case ID
hzSurgeFRCombByBldgTypeB	ReturnPeriodId	char(6)	Return period ID
hzSurgeFRCombByBldgTypeB	AnalysisOptId	int	Analysis option ID
hzSurgeFRCombByBldgTypeB	CensusBlock	char(15)	Census block
hzSurgeFRCombByBldgTypeB	BldgTypeID	int	Building type ID
hzSurgeFRCombByBldgTypeB	Firm	int	NFIP FIRM
hzSurgeFRCombByBldgTypeB	PrePostPct	real	Pre-post percent
hzSurgeFRCombByBldgTypeB	H_BuildingLoss	real	Hurricane building loss
hzSurgeFRCombByBldgTypeB	H_ContentsLoss	real	Hurricane content loss
hzSurgeFRCombByBldgTypeB	H_InventoryLoss	real	Hurricane inventory loss
hzSurgeFRCombByBldgTypeB	F_BuildingLoss	real	Flood building loss
hzSurgeFRCombByBldgTypeB	F_ContentsLoss	real	Flood content loss
hzSurgeFRCombByBldgTypeB	F_InventoryLoss	real	Flood inventory loss
hzSurgeFRCombByBldgTypeB	ExpBldg	int	Building exposure
hzSurgeFRCombByBldgTypeB	ExpCont	int	Building content
hzSurgeFRCombByBldgTypeB	ExpInventory	int	Inventory exposure
hzSurgeFRCombByBldgTypeB	H_BldgPct	real	Hurricane building percent
hzSurgeFRCombByBldgTypeB	H_ContPct	real	Hurricane content percent
hzSurgeFRCombByBldgTypeB	H_InvPct	real	Hurricane inventory percent
hzSurgeFRCombByBldgTypeB	F_BldgPct	real	Flood building percent
hzSurgeFRCombByBldgTypeB	F_ContPct	real	Flood content percent
hzSurgeFRCombByBldgTypeB	F_InvPct	real	Flood inventory percent
hzSurgeFRCombByBldgTypeB	FH_BldgPct	real	Flood-hurricane building percent
hzSurgeFRCombByBldgTypeB	FH_ContPct	real	Flood-hurricane content percent
hzSurgeFRCombByBldgTypeB	FH_InvPct	real	Flood-hurricane inventory percent
hzSurgeFRCombByBldgTypeB	BldgFloodLoss	real	Building flood loss
hzSurgeFRCombByBldgTypeB	BldgWindLoss	real	Building wind loss
hzSurgeFRCombByBldgTypeB	BldgCombLoss	real	Building combined loss
hzSurgeFRCombByBldgTypeB	ContFloodLoss	real	Content flood loss
hzSurgeFRCombByBldgTypeB	ContWindLoss	real	Content wind loss
hzSurgeFRCombByBldgTypeB	ContCombLoss	real	Content combined loss
hzSurgeFRCombByBldgTypeB	InvFloodLoss	real	Inventory flood loss
hzSurgeFRCombByBldgTypeB	InvWindLoss	real	Inventory wind loss
hzSurgeFRCombByBldgTypeB	InvCombLoss	real	Inventory combined loss
hzSurgeFRCombSOccupB	StudyCaseID	int	Study case ID
hzSurgeFRCombSOccupB	ReturnPeriodId	char(6)	Return period ID
hzSurgeFRCombSOccupB	AnalysisOptId	int	Analysis option ID
hzSurgeFRCombSOccupB	CensusBlock	char(15)	Census block

Table	Name	Data Type	Description
hzSurgeFRCombSOccupB	SOccup	varchar(5)	Specific occupancy
hzSurgeFRCombSOccupB	Pre_PostFirm	bit	Pre-post FIRM
hzSurgeFRCombSOccupB	PrePostPCT	float	Pre-post FIRM percent
hzSurgeFRCombSOccupB	PrePostExp	float	Pre-post exposure
hzSurgeFRCombSOccupB	Exposure	int	Exposure
hzSurgeFRCombSOccupB	BldgFloodLoss	float	Building flood loss
hzSurgeFRCombSOccupB	BldgWindLoss	float	Building wind loss
hzSurgeFRCombSOccupB	BldgCombLoss	float	Building combined loss
hzSurgeFRCombSOccupB	ContFloodLoss	float	Content flood loss
hzSurgeFRCombSOccupB	ContWindLoss	float	Content wind loss
hzSurgeFRCombSOccupB	ContCombLoss	float	Content combined loss
hzSurgeFRCombSOccupB	InvFloodLoss	float	Inventory flood loss
hzSurgeFRCombSOccupB	InvWindLoss	float	Inventory wind loss
hzSurgeFRCombSOccupB	InvCombLoss	float	Inventory combined loss
huEfBldgCharWt	WtPercent	real	Hurricane wind building type characteristic total distribution value
huEfBldgCharWt	wbID	smallint	wbID should be one to one relationship with the huWindBldgChar table in the system database
huEfBldgEconRTBusInterruptio n	HuEfSbt	varchar(10)	Essential facility building type
huEfBldgEconRTBusInterruptio n	None	Real	Building economic no damage state
huEfBldgEconRTBusInterruptio n	MinorDS	real	Building economic minor damage state
huEfBldgEconRTBusInterruptio n	ModerateDS	real	Building economic moderate damage state
huEfBldgEconRTBusInterruptio n	CompleteDS	real	Building economic complete damage state
huEfBldgEconRTBusInterruptio n	SevereDS	real	Building economic severe damage state
huEfBldgMapping	HuEfSbt	varchar(10)	Hurricane specific building type name
huEfBldgMapping	huEfBldgSchemeName	varchar(20)	Wind building mapping scheme
huEfBldgMapping	PercentDist	real	Hurricane building characteristic distribution
huEfBldgMapping	BldgCharID	int	Hurricane list of wind building characteristic ID
huEfBldgMappingList	SchemeDescription	varchar(40)	Hurricane mapping scheme list description
huEfBldgMappingList	huEfBldgSchemeName	varchar(20)	Wind building mapping scheme
huEfBldgMappingList	SchemeUpdated	datetime	Hurricane mapping scheme list updated date
huEfBldgMappingList	Updateable	bit	Editable flag
huEfBldgMappingList	SchemeCreated	datetime	Hurricane scheme creation date
huEfBldgMappingList	CaseID	int	Location filter
huEfBldgMappingListExt	huEfBldgSchemeName	varchar(20)	Wind building mapping scheme
huEfBldgMappingListExt	huEfBldgSchemeNameExt	varchar(255)	Wind building mapping scheme displayed