

MOODY'S

Insurance Solutions

North Atlantic Hurricane Models

Version 25.0 (Build 2450)

MARCH 25, 2025

Submitted in compliance with the 2023 Standards of the Florida Commission on Hurricane Loss Projection Methodology

Moody's Corporation
7 World Trade Center
at 250 Greenwich Street
New York, NY 10007

<http://www.rms.com/>

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March 25, 2025

Chair, Florida Commission on Hurricane Loss Projection Methodology
State Board of Administration
1801 Hermitage Boulevard, Suite 100
Tallahassee, FL 32308

Re: Certification of the Moody's RMS North Atlantic Hurricane Models on the primary platform: RiskLink 25.0 (Build 2450) and equivalent platform: Risk Modeler 2.38.0 on the Moody's Intelligent Risk Platform™.

Dear Chairman Paris:

Professionals having credentials and/or experience in the areas of meteorology, statistics, structural engineering, actuarial science, and computer/information science have reviewed Moody's RMS North Atlantic Hurricane Models 25.0 (Build 2450); with model settings as specified in the FCHLPM Certified Hurricane Losses DLM profile for compliance with the Commission's 2023 standards. As shown in the enclosed Expert Certification Forms (G-1 to G-7), these persons have, in accordance with their professional standards and code of ethical conduct, certified the model meets or exceeds the 2023 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology. The model is ready to be reviewed by the Professional Team.

Moody's has continued a consulting arrangement with Merlino's, Inc actuarial consultants to review and sign off on the actuarial standards in the Moody's submission. The biographies of each consultant are found in Appendix B – Technical Staff and their CVs will be made available during the professional team on-site audit.

Enclosed with this letter please find all the required documentation.

Please do not hesitate to contact me if there are any questions. We thank you for your consideration.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Matt Pinkowski', with a long horizontal flourish extending to the right.

Matthew Pinkowski
Assist. Vice President
Government, Public, and Regulatory Affairs

Enc

HURRICANE MODEL IDENTIFICATION

Name of Hurricane Model: North Atlantic Hurricane Models

Hurricane Model Version Identification: 25.0 (Build 2450)

Hurricane Model Platform Name and Identifications with Primary Hurricane Model Platform and Identification Designated:

RiskLink® 25.0 (Build 2450) (Primary)

Risk Modeler™ 2.38.0 on Moody's Intelligent Risk Platform™

Interim Hurricane Model Update Version Identification: N/A

Interim Data Update Designation: N/A

Name of Modeling Organization: Moody's Corporation

Street Address: 7 World Trade Center at 250 Greenwich Street

City, State, ZIP Code: New York, NY 10007

Mailing Address, if different from above: Same as above

Contact Person: Matt Pinkowski

Phone Number: 813-352-4863 ***Fax Number:*** N/A

E-mail Address: matt.pinkowski@moodys.com

Date: March 25, 2025

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GENERAL HURRICANE STANDARDS

G-1 Scope of the Hurricane Model and Its Implementation

- A. *The hurricane model shall project loss costs and probable maximum loss levels for damage to insured residential property from hurricane events.***

The Moody's RMS North Atlantic Hurricane Models project loss costs and probable maximum loss levels from hurricanes for residential property for the following coverages, as appropriate to the type and composition of the policy form in question: primary structures, appurtenant structures, contents, and additional living expenses. Output from the model can explicitly and separately define expected losses for each of these coverages.

- B. *A documented process shall be maintained to assure continual agreement and correct correspondence of databases, data files, and computer source code to presentation materials, scientific literature, technical literature, and modeling organization documents.***

Moody's uses a variety of systems to track and maintain documentation, data, computer source code, scientific literature and technical literature. These systems include the use of source control software, bug tracking systems, and internal documentation standards and protocols.

- C. *All software, data, and flowcharts (1) located within the hurricane model, (2) used to validate the hurricane model, (3) used to project modeled hurricane loss costs and hurricane probable maximum loss levels, and (4) used to create forms required by the Commission in the Hurricane Standards Report of Activities shall fall within the scope of the Computer/Information Standards.***

Moody's stores all software, model, validation, and form creation data in centralized systems. These systems comply with the Computer/Information Standards included in the Report of Activities.

- D. *All meteorological forms, statistical Forms S-1, S-2, and S-6, and all actuarial forms with the exception of Form A-2 shall be produced through an automated procedure or procedures as indicated in the form instructions.***

Moody's creates and uses scripts that automate the generation of all forms for which the Report of Activities denotes a requirement for an automated procedure. These automation procedures and scripts may be reviewed on-site.

- E. *Vintage of data, code, and scientific literature, and technical literature used shall be justifiable.***

Moody's regularly reviews and updates vintages of data, code, and both scientific and technical literature as needed to inform a model that reflects a current view of the hurricane risk landscape. As a result of regular updates, vintages vary by component. This information may be reviewed on-site.

- G-1.1 *Specify the hurricane model version identification. If the hurricane model is implemented on more than one platform, specify each hurricane model platform identifying the primary platform and the distinguishing aspects of each platform.***

The model being submitted for rate filing in Florida is the:

- North Atlantic Hurricane Models Version 25.0 (Build 2450)

Available in the following platforms:

- RiskLink 25.0 (Build 2450)
- Risk Modeler 2.38.0 on the Moody's Intelligent Risk Platform™

RiskLink is the software platform that has been delivered to our clients since 2003 and is an application typically installed on hardware owned and operated by a client. This is the primary platform for the purpose of this submission.

Risk Modeler is a cloud based software application on the Moody's Intelligent Risk Platform. Risk Modeler contains an encapsulated version of RiskLink 25.0 loss analytics that includes the North Atlantic Hurricane Models. The model running within Risk Modeler is functionally equivalent to the model running on the RiskLink platform.

G-1.2 *Provide a comprehensive summary of the hurricane model. This summary shall include a technical description of the hurricane model, including each major component of the hurricane model used to project loss costs and probable maximum loss levels for damage to insured residential property from hurricane events causing damage in Florida. Describe the theoretical basis of the hurricane model and include a description of the methodology, particularly the wind components, the vulnerability components, and the insured loss components used in the hurricane model. The description shall be complete and shall not reference unpublished work.*

The North Atlantic Hurricane Models consist of four major model components, or modules:

- [Stochastic Module](#)
- [Wind Field \(or Wind Hazard\) Module](#)
- [Vulnerability or Damage Assessment Module](#)
- [Financial Loss Module](#)

Descriptions of each of the modules follow.

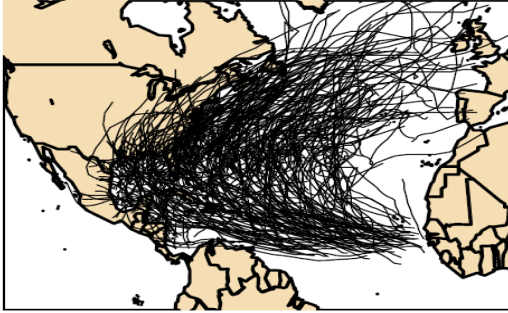
Stochastic Module

The stochastic module is made of a set of thousands of stochastic events that represents more than 100,000 years of hurricane activity. Moody's scientists have used state-of-the-art modeling technologies to develop a stochastic event set made of events that are physically realistic and span the range of all possible storms that could occur in the coming years.

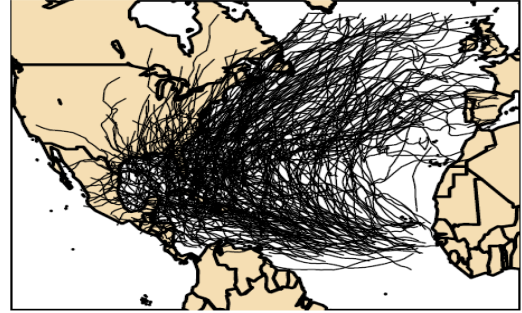
At the heart of the stochastic module is a statistical track model that relies on advanced statistical techniques (Hall and Jewson 2007a, 2007b) to extrapolate the HURDAT catalog (Jarvinen et al., 1984) and generate a set of stochastic tracks having similar statistical characteristics to the HURDAT historical tracks (see example in [Figure 1](#)). Stochastic tracks are simulated from genesis (starting point) to lysis (last point) using a semi-parametric statistical track model that is based upon historical data. Simulated hurricane tracks provide the key drivers of risk, including landfall intensity, landfall frequency, and landfall correlation.

Figure 1: Comparison of observations from 58 years of HURDAT tracks (1950–2007), to one "58-year" model realization of the Moody's statistical track model

(a) Observed



(b) Modeled



Track genesis location is sampled from a spatial Poisson process. The intensity field is derived from historical genesis locations, weighed according to their distance from site. The length scale involved in the smoothing process is optimized through cross validation to avoid both over fitting and unrealistic genesis points. Once the location of the first track point has been simulated, the central pressure (used as a measure of storm intensity) is sampled from the observed distribution of genesis central pressure. Then the track is simulated forward in time with a 6-hour increment, Δt , using the following equations (Hall and Jewson 2007a, 2007b):

Equation 1

$$\begin{aligned}x(t + \Delta t) &= x(t) + u(t)\Delta t \\y(t + \Delta t) &= y(t) + v(t)\Delta t \\p_c(t + \Delta t) &= p_c(t) + \frac{\Delta p_c}{\Delta t} \Delta t\end{aligned}$$

where u and v are the zonal and meridional components of the translational speed derived by running a weighted average of the historical records. The Δp_c variable is the 6-hourly change in central pressure. When the storm center is located over water, the model for Δp_c is a local linear regression with predictors that include the previous change in central pressure and the zonal and meridional components of the translational speed. When the storm center is located over land, Δp_c is computed using the filling rate associated with the landfall of interest (Colette et al., 2010). At each time step, central pressure is constrained to fall within the local Maximal Potential Intensity (Emanuel 1986) (when over water) and the local far field pressure.

Moody's scientists have also used the best elements of numerical modeling in an effort to complement the historical records in areas where historical data is sparse. Because historical landfall details are generally poorly known, Moody's has used a bogusing technique (Kurihara et al., 1993) to generate thousands of synthetic storms which inform the inland filling model (Colette et al., 2010), even though the model has been thoroughly tested and validated against the limited historical records.

Eventually, tracks are killed by sampling a logistic regression model at each time step. The model has various predictors including the difference between far field pressure and central pressure, making storms more likely to vanish when this difference is small.

Although central pressure is the main intensity variable in the model, Moody's also derives a maximum wind time series (V_{max}) that is similar to the HURDAT V_{max} time series when the storm is over water but different when the storm is over land as our modeled time series provides

equivalent over water Vmax. The Vmax model is a log-linear regression with pressure difference, and latitude as predictors. Note that only over water HURDAT points are used to fit the regression.

The last step is a calibration process ensuring that simulated landfall frequencies are in agreement with the historical record. Target landfall rates are computed on a set of 69 linear coastal segments by smoothing the historical landfall rates. This smoothing technique is widely used in the scientific community to reduce the local under-sampling or over-sampling issues associated with the limited historical records (123 years). The stochastic set is then adjusted toward these targets using methods such as selecting the optimum intensity time series among several candidates.

Importance sampling of the simulated tracks is performed to create the computationally efficient event set used for loss cost determinations. The hurricane model contains 20,153 stochastic events affecting Florida.

Wind Field (or Wind Hazard) Module

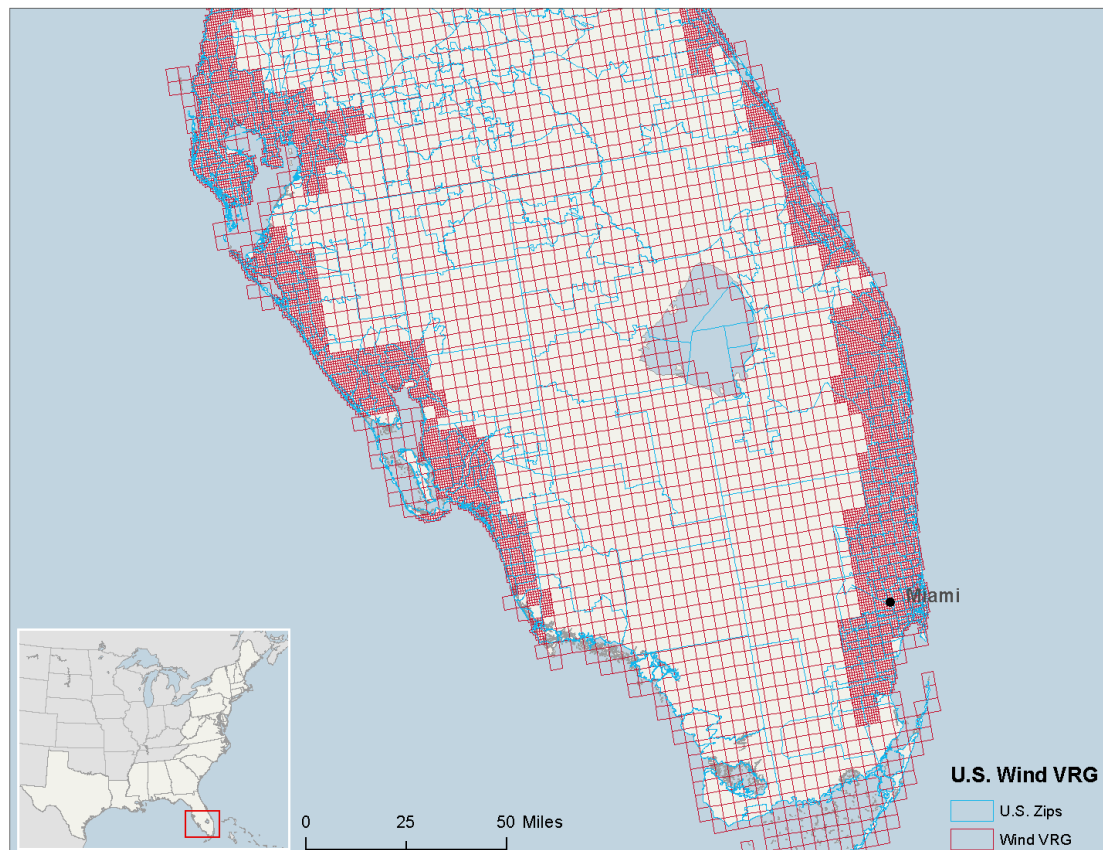
Once tracks and intensities have been simulated by the stochastic module, the wind field module simulates 10-meter 3-second gusts on a variable resolution grid (VRG) to be saved in the stochastic hazard database.

There are four parts of the wind field module:

- [Variable resolution grid](#)—Geographic framework used to store high resolution hazard information.
- [Assign wind field parameters](#)—Parameters, associated with the size and shape of the wind field, are generated for each track point along each stochastic event. For each track (and every 5 minutes) 10-meter, 1-minute mean winds equivalent over water are computed on the variable resolution grid.
- [Downscale and convert wind speeds](#)—Downscale and apply directional roughness and gust coefficients to generate 10-meter, 3-second gust wind speeds over local terrain.
- [Maximum peak gust](#)—Determine final hazard footprint from maximum gusts simulated at each site over the entire lifecycle of the storm.

Variable resolution grid: Terrain, coastline, and hurricane hazard can often vary dramatically across an individual ZIP Code. To capture this detail, Moody's stores hazard data in a patented standard high-resolution grid, called a variable resolution grid (Carttar 2012). VRG grid cell sizes are established such that the smallest cells occur where the hazard gradient is highest and/or high densities of exposure exist. Like U.S. ZIP Codes and counties, the VRG constitutes a set of geographic boundaries that can be used to store hazard information. [Figure 2](#) compares the VRG for stochastic data in the North Atlantic Hurricane Models (shown in red) with ZIP Codes (in blue). While relative size of both is similar – with ZIP Codes also varying in size with population density – the VRG resolution is always finer than the ZIP Code.

Figure 2: Examples of stochastic VRG (red boundaries) and ZIP Codes (blue boundaries) in South Florida



Wind field parameters: Size and shape of the time stepping wind fields are generated using an analytical wind profile derived from Willoughby et al. (2006), with parameters fitted from the extended best track dataset (Demuth et al., 2006) and Moody's HWind (Powell et al., 2010).

At any given point in time and space, the 1-minute mean wind (equivalent over water) is entirely prescribed by the position from the storm center and the following set of parameters: maximum wind (V_{max}), radius to maximum wind (R_{max}), two shape parameters giving the radial profile inside and outside the eyewall, the angle between the location of the maximum winds and the track, and four additional parameters (empirical orthogonal functions, or EOFs) that reduce the variance between observed and modeled wind fields.

R_{max} time series are given by a regression model with central pressure and latitude as predictors. The R_{max} model is fitted on observations available in the extended best track dataset. Moody's has filtered out years with missing R_{max} values set to climatology.

All other wind field parameters have been fitted to the HWind dataset, and additional validation has been performed using the extended best track dataset, especially for the radius of hurricane force winds. The HWind database has been filtered to keep only snapshots with damaging winds. For each of the remaining 629 snapshots, the best values of the wind field parameters have been fitted, applying a high weight around the location of the maximum wind. These best fit values are then used as a training dataset to build linear regression models.

Downscale and convert wind speed: The simulated 1-minute mean wind (equivalent over water) at a site is then downscaled to account for local and upstream roughness conditions. This captures

the transition from sea to land or any change in upstream roughness. The model formulation is based on a peer reviewed wind engineering model (Cook 1985, 1997) and roughness lengths are derived from the 15–30 m resolution ASTER satellite imagery (Advanced Spaceborne Thermal Emission and Reflection Radiometer, <https://asterweb.jpl.nasa.gov/>) with a 2007–2014 vintage. The ASTER imagery has been validated against the National Land Cover Database (NLCD) 2016 and Google Earth, and updated where necessary to ensure consistency between the Moody's and NLCD 2016 databases. An additional component of the roughness model converts mean winds over local terrain to 3-second gusts over local terrain (Deaves and Harris 1978; Harris and Deaves 1980; Deaves 1981; Cook 1985; Cook 1997; Wieringa 1993 and 2001; Vickery and Skerlj 2005).

The wind field model has been validated through the reconstruction of all damaging storms in the HURDAT database. The model is able to reproduce accurately hourly gust observations for a large range of wind stations (including coastal and inland stations). When considering Hurricane Andrew 1992 and all the major post 2004 U.S. landfalling hurricanes, the root mean squared error between observed and modeled hourly gusts is approximately 10 mph which is acceptable given the uncertainty associated with hurricane force wind observations.

Maximum peak gust footprints: The output from the wind field module is the hazard database that is made of the stochastic footprints. Each footprint contains the maximum damaging 3-second gust wind speed to affect each of the variable resolution grid cells. This information is pre-compiled for efficient access at run-time for loss calculation in the subsequent modules.

Vulnerability or Damage Assessment Module

Based on the geographic extent of the exposure data provided, events and event hazard data are retrieved from the event and hazard databases, respectively. Given an event, the model estimates the wind and surge (optional) hazards present at a user-specified site. Local wind and surge hazards are measured in terms of peak-gust wind speed and flood depth, respectively. These parameters are then used to derive the estimate of damage to a specific location. Estimated damage is measured in terms of a mean damage ratio (MDR) and a deviation around the mean represented by the coefficient of variation (CV). The MDR is defined as the ratio of the repair cost divided by replacement cost of the asset. The curve that relates the MDR to the peak gust wind speed is called a vulnerability function. Moody's has developed vulnerability functions for hundreds of building classifications per vulnerability region. Each classification has a vulnerability function for damage to buildings due to wind and a vulnerability function for damage to building contents due to wind, as well as similar vulnerability functions for surge damage. Time element vulnerability functions (also known as additional living expenses [ALE] or business interruption [BI] vulnerability functions) are based upon the building damage function and the occupancy of the structure.

The vulnerability classes depend on a combination of:

- Construction Class
- Building Height (number of stories)
- Building Occupancy
- Year Built
- Floor Area (single-family residential and low-rise commercial only)
- Region of State (vulnerability region)

The possible classifications for each of the six primary characteristics are described in [Disclosure V-1.8](#).

The vulnerability functions consist of a matrix of wind speed levels (measured as peak 3-second gust in mph) and corresponding MDRs. To calculate a MDR for a given location, the model first determines an expected wind speed, and then looks up the corresponding MDRs for building and contents based on the building classification. Moody's has also developed CVs associated with

each MDR. The CV is used to develop a probability distribution for the damage at each wind speed and for each classification. A beta distribution is used for this purpose.

The vulnerability relationships are developed using structural and wind engineering principles underlying the Moody's component vulnerability model (CVM) (Khanduri 2003) coupled with analysis of historical storm loss data, building codes, published studies, and Moody's internal engineering developments in consultation with wind engineering experts including the late Dr. Dale Perry and Dr. Norris Stubbs of Texas A&M University. The CVM allows objective modeling of the vulnerability functions, especially at higher wind speed ranges where little historical loss data is available. The CVM is also used to obtain the vulnerability relativities by building class and gain insight into the effects of hurricane mitigation. These approaches also build on the earlier input received from Dr. Peter Sparks of Clemson University, and the late Dr. Alan Davenport of the University of Western Ontario.

The engineering model based on the CVM is calibrated using historical claims data at ZIP Code resolution for building, contents, and time element coverages. The calibration process involves a comparison of modeled MDR with that obtained from observed losses. Since the vulnerability model is a function of the wind speed, the calibration involves varying both wind speed and vulnerability within the bounds established by i) the science and historical observations governing the hazard at a given location and ii) the engineering and historical observations governing the damageability of property at that location. Thus, one primary goal of calibration is to ensure that the vulnerability function is confined within the high and low vulnerability bounds as established by the CVM.

Moody's also uses published documents, expert opinion, and conventional structural engineering analysis. Moody's has reviewed research and data contained in numerous technical reports, special publications, and books related to wind engineering and damage to structures due to wind. References are provided in [Disclosure G-1.6](#).

The Moody's engineering staff includes several engineers with PhD qualifications in civil and structural engineering. These engineers have significant experience and expertise in the understanding of building performance and structural vulnerability, and are dedicated to the development of vulnerability relationships for risk models worldwide. Moody's engineers have participated in several reconnaissance missions as described in [Disclosure V-1.7](#).

The knowledge and data gathered during these site visits has been used in the calibration and validation of vulnerability functions. The final calibration of the vulnerability functions has been made using over \$15.0 billion of loss data, with corresponding exposure information.

The vulnerability of buildings modeled by each of the building classes represents the "average" vulnerability of a portfolio of buildings in that class. The vulnerability will vary depending upon specific characteristics of buildings in that portfolio. This variation can be addressed in the model through the use of secondary modifiers that can consider secondary building characteristics or mitigation measures to improve a building's wind resistance. The secondary modifiers could be building-characteristic specific (e.g., improved roof sheathing or anchors) or external (e.g., storm shutters). These secondary modifiers modify the base, "average" vulnerability functions according to specific building characteristics or mitigation measures. The secondary modifiers are discussed in [Standard V-4](#).

Financial Loss Module

To calculate losses, the damage ratio for each stochastic event derived in the vulnerability module is translated into dollar loss by multiplying the damage ratio (including loss amplification as appropriate) by the value of the property. This is done for each coverage at each location. Using the mean and coefficient of variation, a beta distribution is fit to represent the loss distribution.

From the loss distribution one can find the expected loss and the loss corresponding to a selected quantile.

The model uses the loss distribution to estimate the portion of loss carried by each participant within a financial structure (insured, insurer, (re)insurer). This distribution is used to calculate the loss net of any deductibles and limits.

Demand surge impacts on estimated losses are incorporated in the post-event loss amplification (PLA) component of the North Atlantic Hurricane Models. This component estimates the degree to which losses are escalated by a combination of economic, social and operational conditions that follow after a given event. The PLA component accounts for three separate mechanisms of escalation arising from:

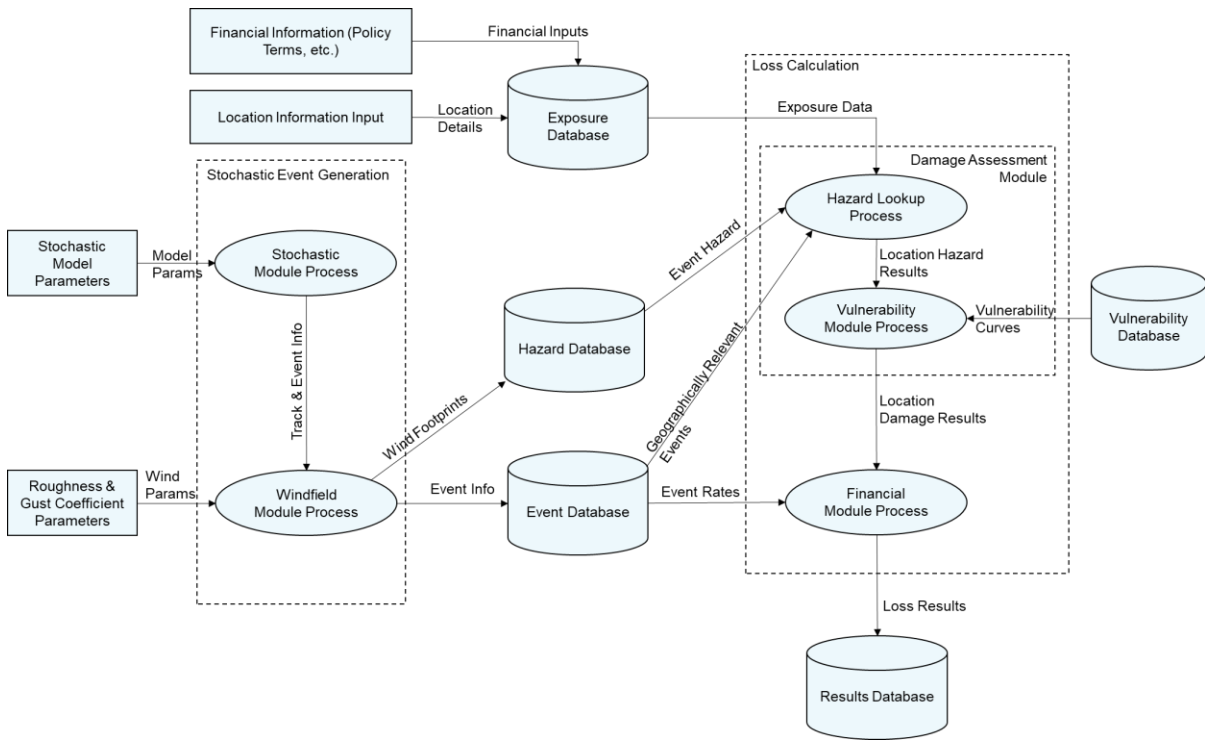
- Economic Demand Surge (EDS)—increase in the costs of building materials and labor costs as demand exceeds supply
- Claims Inflation (CI)—cost inflation due to the difficulties in fully adjusting claims following a catastrophic event
- Super Catastrophe Scenarios—coverage and loss expansion due to a complex collection of factors such as containment failures, evacuation effects, and systemic economic downturns in selected urban areas

These loss amplification factors are developed for each stochastic event in the model by coverage and applied to the damage ratio on a ground up basis.

G-1.3 Provide a flowchart that illustrates interactions among major hurricane model components.

The high-level flow chart is shown in Figure 3.

Figure 3: Flow diagram of major model components



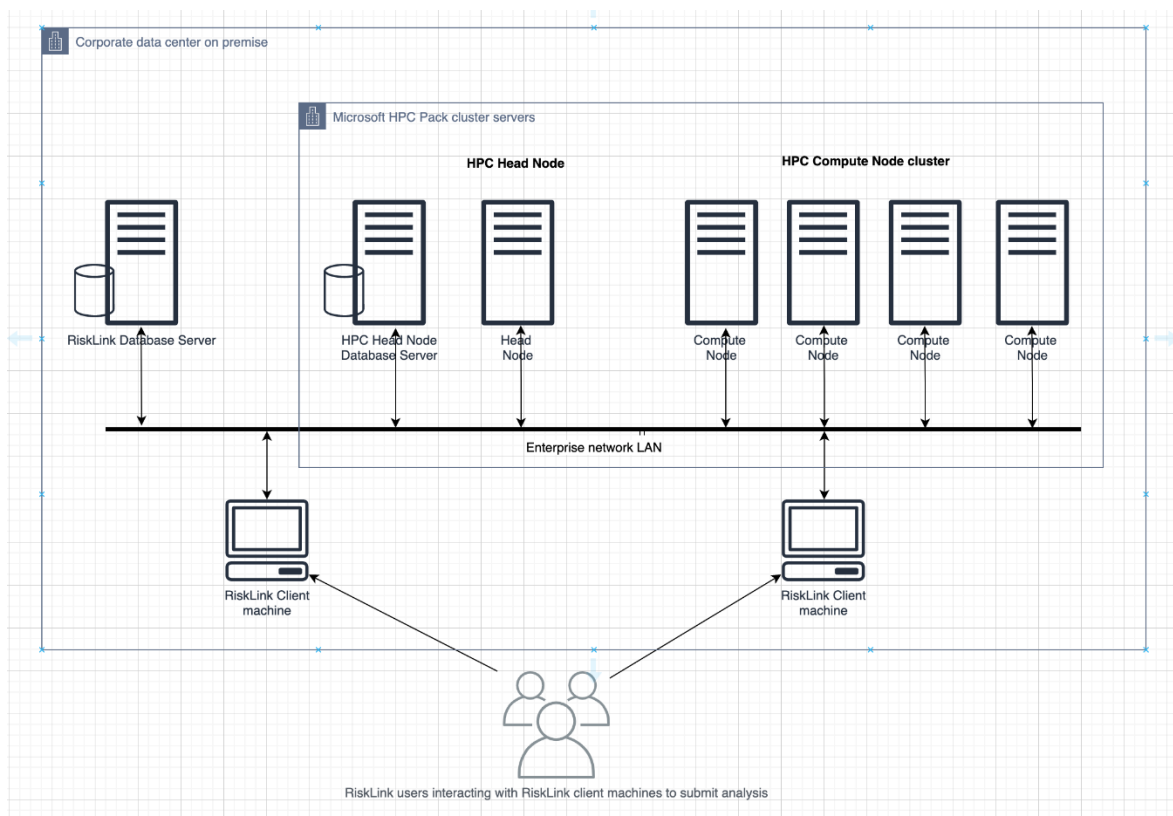
G-1.4 Provide a diagram defining the network organization in which the hurricane model is designed and operates.

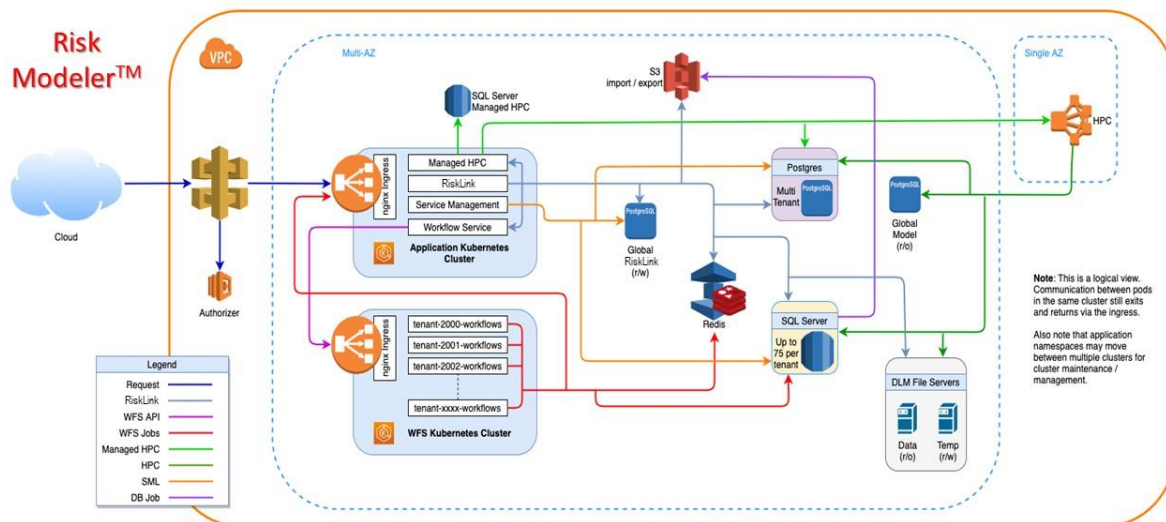
The high-level diagram defining the RiskLink and Risk Modeler networks organization which the North Atlantic Hurricane Models are designed and operate is shown in [Figure 4](#).

RiskLink is deployed on premise within a group of dedicated servers called as a cluster, over an Enterprise network, which allows high bandwidth data exchange between the RiskLink Database Server, HPC Head and Compute Nodes. RiskLink Client computers are used to submit jobs to the RiskLink clusters.

Risk Modeler application is deployed on a public cloud provider like AWS and utilizes a virtual private cloud (VPC) network isolation technology to create a secured network for all the servers to communicate with each other, without external interference. All servers are connected to a network with bandwidth exceeding 10 GBps.

Figure 4: Diagram defining the RiskLink network organization (top) and Risk Modeler network organization (bottom)





G-1.5 Provide detailed information on the hurricane model implementation on more than one platform, if applicable. In particular, submit Forms S-5, A-1, A-4, and A-8 from each platform including additional calculations showing no differences.

The North Atlantic Hurricane Models Version 25.0 (Build 2450) are implemented on two platforms: RiskLink 25.0 and Risk Modeler 2.38.0.

RiskLink is the software platform that has been delivered to our clients since 2003 and is an application typically installed on hardware owned and operated by a client. This is the primary platform for the purpose of this submission.

Risk Modeler is a cloud based software application on the Intelligent Risk Platform. Risk Modeler contains an encapsulated version of RiskLink 25.0 (Build 2450) loss analytics which includes the North Atlantic Hurricane Models. The model running within Risk Modeler is functionally equivalent to the model running on the RiskLink platform.

G-1.6 Provide a comprehensive list of complete references pertinent to the hurricane model under review by standards group using professional citation standards.

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G-1.7 Provide the following information related to changes in the hurricane model from the current accepted hurricane model to the initial submission this year.

G-1.7.A Hurricane model changes:

1. **A summary description of changes that affect the personal or commercial residential hurricane loss costs or hurricane probable maximum loss levels,**
2. **A list of all other changes, and**
3. **The rationale for each change.**

The following significant changes have been revised in the model relative to the previously submitted version:

Geocoding Module Changes: Updates to the geocoding module have been incorporated. There are three components to the update.

- December 2023 postal code vintage data has been incorporated as per our policy to update geocoding data at least every 24 months. All four databases described in [Disclosure G-3.2](#) have been updated accordingly to reflect the new data vintage.
- Updates to the number of parcels, building centroids, address points, points of interest (landmarks and business names), streets and cities

Hazard Module Changes: There are three changes related to the hazard component.

- Stochastic Module—The landfall and bypass rates associated with the stochastic event set have been revised based on updated data from the official NHC HURDAT2 database (as available in May 2023).
- Historical Footprint Recreations—Moody's has added historical footprint recreations from recent events, including Hurricane Elsa (2021), Hurricane Ian (2022), and Hurricane Nicole (2022). Additionally, the version of the HURDAT2 database published as of May 2023 includes reanalysis of years 1966-1970. Moody's has revised the historical footprint recreations of three events: Alma (1966), Inez (1966), and Gladys (1968).
- Reaggregation of postal code and county-level wind hazard for all events against updated postal code vintage data and boundaries (December 2023).

Vulnerability Module Changes: Updates to the vulnerability module have been incorporated.

- Updated vulnerability mappings for ISO FIRE 3 (Non-Combustible) construction class from RMS 4B (Light Metal) to RMS 2 (Masonry) construction class

Additionally, annual deductible factors have been revised to reflect updated model and model output. Post analysis, users must apply annual deductible factors to model output to convert average annual loss and return period loss using occurrence-deductibles to average annual and return period loss using annual-deductibles, as required by Florida Statute 627.701.

Other changes made to benefit users of Moody's software that do not affect personal and commercial residential losses in Florida include:

- In the North Atlantic Hurricane Models
 - Geocoding updates in the U.S. outside of Florida, Canada, Caribbean, Mexico, and Central America
 - Updates to the Moody's U.S. Hurricane Industry Exposure Database (IED), and the Moody's industry loss curves (ILCs) in the United States and the Caribbean
 - Updates to the Moody's RMS® Simulation Platform

G-1.7.B *Percentage difference in average annual zero deductible statewide hurricane loss costs based on the 2017 FHCF exposure data for:*

1. All changes combined, and

Moody's has compiled the percentage difference in average annual zero deductible statewide loss costs relative to the Version 23.0 (Build 2250) model using the 2017 FHCF data. Overall, Version 25.0 (Build 2450) is 1.2 percent higher than the previous submission.

2. Each individual hurricane model component change.

The contribution of significant model components is shown in [Table 1](#). The changes are calculated progressively so that the changes to the hazard module are calculated after incorporating the updated geocoding. The percentage differences are calculated in an additive format, such that the total change is equal to the sum of the changes for each significant component change.

Table 1: Percentage difference by module

Statewide Percentage Difference	Component Module			
	Geocoding	Hazard	Event Rates	Vulnerability
+1.2%	0.0%	-0.0%	+1.2%	0.0%

G-1.7.C *Color-coded maps by county reflecting the percentage difference in average annual zero deductible statewide hurricane loss costs based on the 2017 FHCF exposure data for each hurricane model component change.*

Maps of the changes by significant component at a county resolution are shown in [Figure 5](#) to [Figure 8](#). Note that the scale in each map has been held constant to facilitate comparisons between components.

Figure 5: Percentage change in average annual loss with zero deductible by county due to geocoding changes

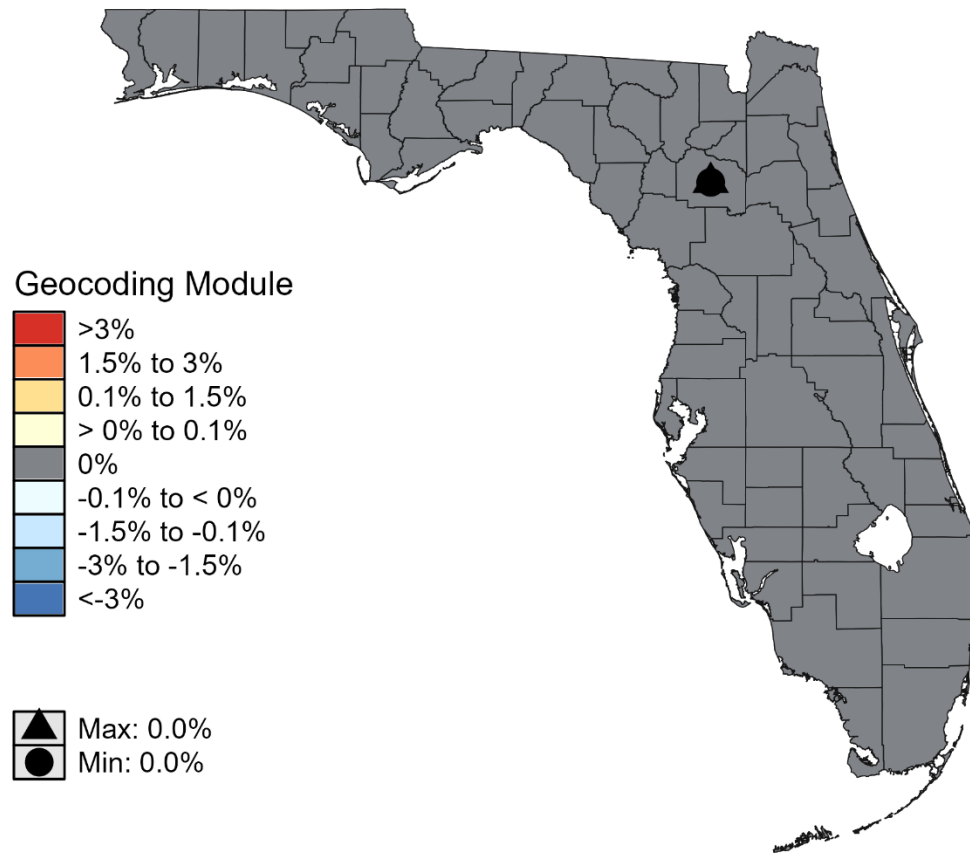


Figure 6: Percentage change in average annual loss with zero deductible by county due to hazard module changes

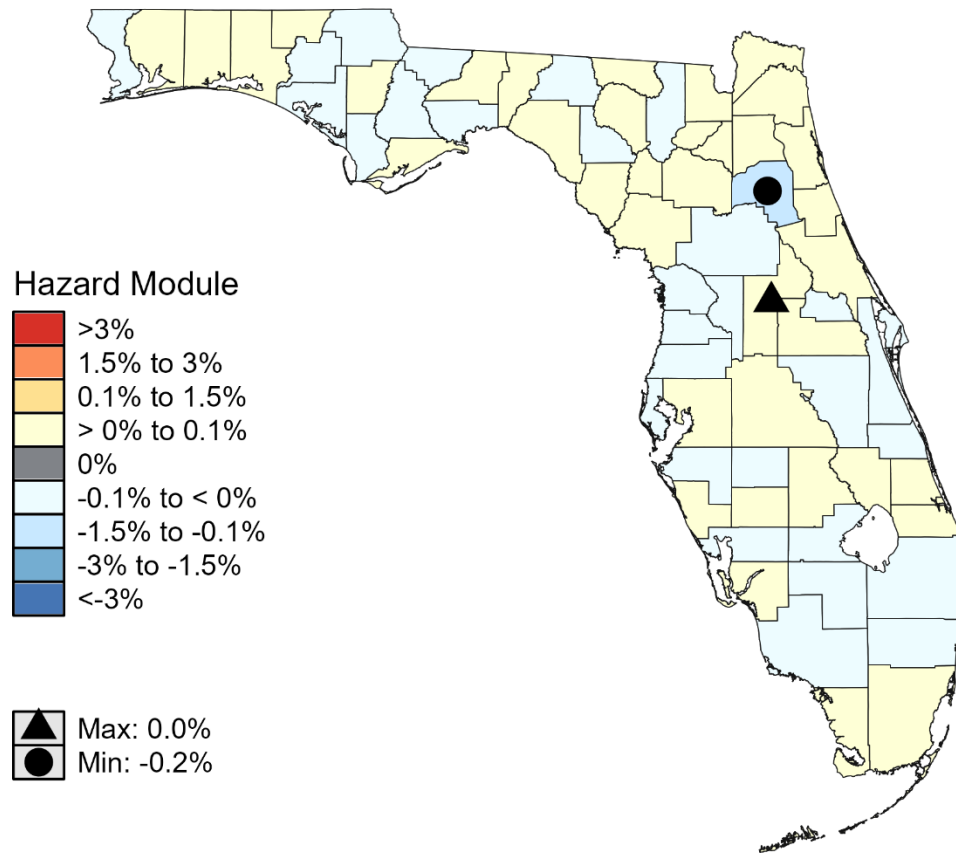


Figure 7: Percentage change in average annual loss with zero deductible by county due to event rates module changes

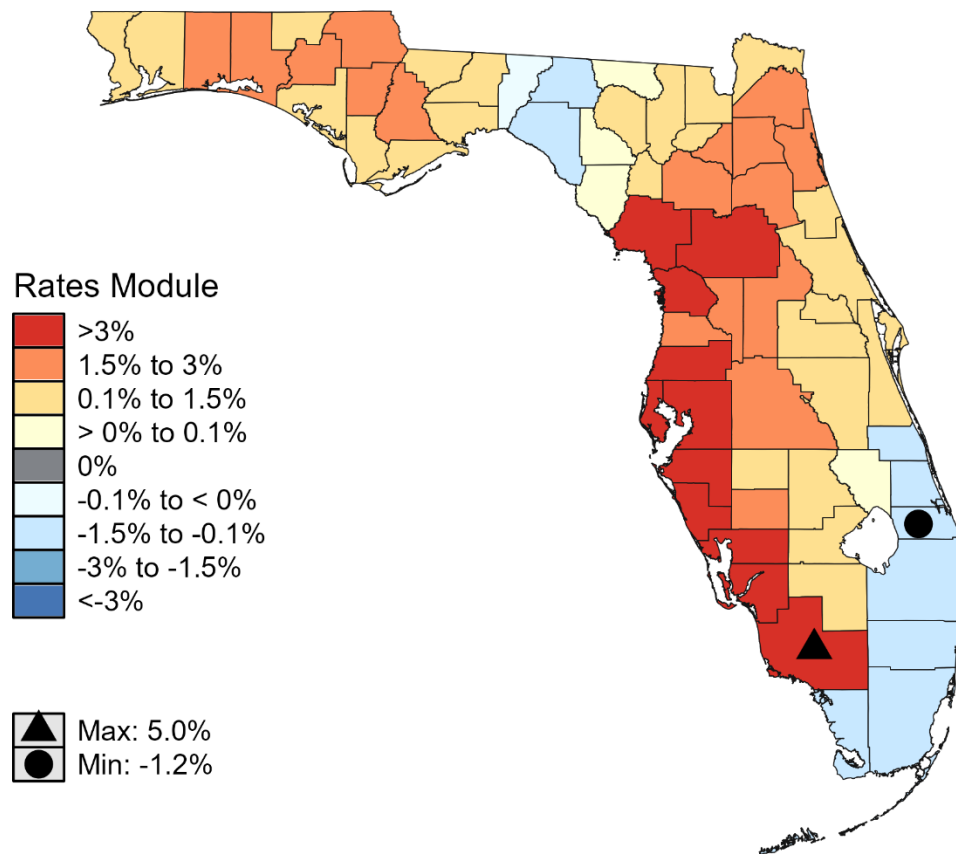
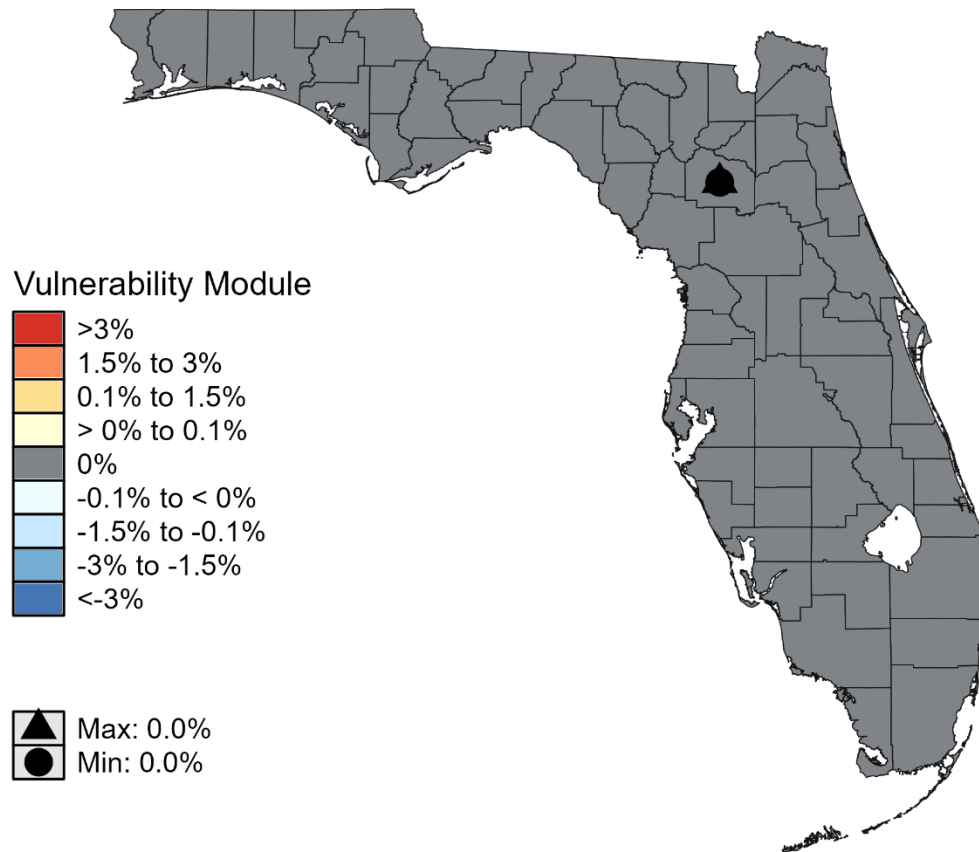


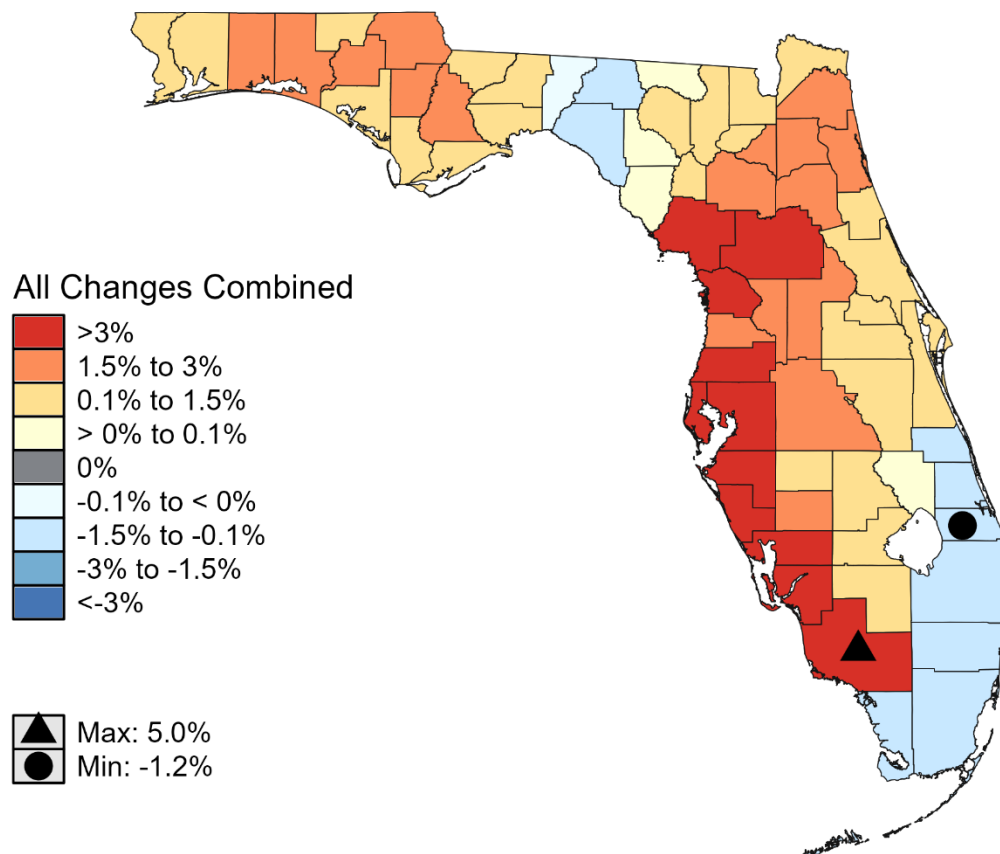
Figure 8: Percentage change in average annual loss with zero deductible by county due to vulnerability module changes



G-1.7.D *Color-coded map by county reflecting the percentage difference in average annual zero deductible statewide hurricane loss costs based on the 2017 FHFC exposure data for all hurricane model component changes combined.*

A map of the changes for all components combined is shown in Figure 9. Note that the scale of the map is the same as Figure 5 to Figure 9 to facilitate comparisons between components.

Figure 9: Percentage change in average annual loss with zero deductible by county due to all changes combined



G-1.8. *Provide a list and description of any potential interim updates to underlying data relied upon by the hurricane model. State whether the time interval for the update has a possibility of occurring during the period of time the hurricane model could be found acceptable by the Commission under the review cycle in this Hurricane Standards Report of Activities.*

Moody's may, in the near future, decide to update the following data:

- Vintage of geocoding data to new version, plus any associated geocoding software updates to support new geocoding data.

Moody's will not be making any updates to this component while the current submission is being reviewed.

G-2 Qualifications of Modeling Organization Personnel and Consultants Engaged in Development and Implementation of the Hurricane Model

- A. Hurricane model construction, testing, and evaluation shall be performed by modeling organization personnel or consultants who possess the necessary skills, formal education, and experience to develop the relevant components for hurricane loss projection methodologies.**

Over 300 of Moody's total staff is focused solely on research, development, and innovation. The team possesses a wide range of multi-disciplinary skills in engineering, the physical sciences, actuarial science, statistics data development, data analysis and numerical modeling, computer science/engineering, and quality assurance engineering. Of the model development staff, about 95 percent hold advanced degrees and over 100 possess PhD level qualifications in their fields of expertise. One-third of Moody's total staff is focused solely on research, development, and innovation. These individuals possess the necessary skills, formal education, and experience, in all required disciplines, to develop hurricane loss projection methodologies.

- B. The hurricane model and hurricane model submission documentation shall be reviewed by modeling organization personnel or consultants in the following professional disciplines with requisite experience: structural/wind engineering (current licensed Professional Engineer), statistics (advanced degree or equivalent experience), actuarial science (Associate or Fellow of Casualty Actuarial Society or Society of Actuaries), meteorology (advanced degree), and computer/information science (advanced degree or equivalent experience and certifications). These individuals shall certify Expert Certification Forms G-1 through G-6 as applicable.**

The education and experience of Moody's staff and consultants reflect all of the professional disciplines listed above and are outlined in [Disclosure G-2.2.A](#). Qualified modeling personnel and/or independent experts review all model modifications. These individuals abide by the standards of professional conduct adopted by their profession.

G-2.1 Modeling Organization Background

- G-2.1.A Describe the ownership structure of the modeling organization engaged in the development of the hurricane model. Describe affiliations with other companies and the nature of the relationship, if any. Indicate if the modeling organization has changed its name and explain the circumstances.**

Risk Management Solutions, Inc. ("Moody's RMS") is an affiliate of Moody's Analytics, Inc. RMS was acquired by Moody's Corporation in August 2021 from DMG Information, Inc.

- G-2.1.B If the hurricane model is developed by an entity other than the modeling organization, describe its organizational structure and indicate how proprietary rights and control over the hurricane model and its components are exercised. If more than one entity is involved in the development of the hurricane model, describe all involved.**

The North Atlantic Hurricane Models were developed only by employees of Moody's and its consultants.

G-2.1.C *If the hurricane model is developed by an entity other than the modeling organization, describe the funding source for the development of the hurricane model.*

The North Atlantic Hurricane Models were developed only by employees of Moody's and its consultants.

G-2.1.D *Describe any services other than hurricane modeling provided by the modeling organization.*

The catastrophe modeling unit of Moody's provides products and services for the quantification and management of catastrophe risks. The company's natural hazard risk modeling solutions are used by over 400 insurers, reinsurers, trading companies, and other financial institutions worldwide. Moody's receives revenues from software licenses, analytical reports, consulting services, and miscellaneous other services.

G-2.1.E *Indicate if the modeling organization has ever been involved directly in litigation or challenged by a governmental authority where the credibility of one of its U.S. hurricane model versions for projection of hurricane loss costs or hurricane probable maximum loss levels was disputed. Describe the nature of each case and its conclusion.*

Moody's has interacted with several departments of insurance (DOIs such as Florida, Hawaii, Louisiana, and South Carolina) in the context of hurricane rate making. None of these relationships have been adversarial.

In 2005 and 2007, the Massachusetts Department of Insurance initiated reviews of rate filings for the Massachusetts Property Insurance Underwriting Association (MPIUA). Hearings on the MPIUA's proposed rates covered a variety of issues related to rate setting, including the catastrophe models used to estimate potential insured losses from hurricanes impacting Massachusetts. The MPIUA was asked to demonstrate that the general U.S. Hurricane Model (Version 6.0) was appropriate for developing rates in Massachusetts. The decision on the 2005 filing concluded that it was reasonable for the MPIUA to use the Moody's model. The decision on the 2007 filing concluded that the MPIUA did not demonstrate that the Moody's model was appropriately calibrated to Massachusetts.

G-2.2 Professional Credentials

G-2.2.A *Provide in a tabular format (a) the highest degree obtained (discipline and university), (b) employment or consultant status and tenure in years, and (c) relevant experience and responsibilities of individuals currently involved in the acceptability process or in any of the following aspects of the hurricane model:*

1. *Meteorology*
2. *Statistics*
3. *Vulnerability*
4. *Actuarial Science*
5. *Computer/Information Science*

The highest degree obtained, employment or consultant status, and tenure is provided in the following tables. The relevant experience of these individuals is contained in the brief biographies provided in [Appendix B](#).

Table 2: Individuals involved in meteorological aspects of the model

Name	Credentials	Staff (S)/ Consultant (C)	Tenure (Years)
Dr. Florian Arfeuille	PhD, Atmospheric Science ETH Zurich	S	7
Dr. Ed Bannister	PhD, Meteorology University of Birmingham	S	3
Dr. Enrica Bellone	PhD, Statistics University of Washington	S	19
Dr. Auguste Boissonnade	PhD, Civil Engineering Stanford University	S	31
Dr. Alison Dobbin	PhD, Atmospheric Physics University College London	S	13
Dr. Michael Drayton	PhD, Applied Mathematics Cambridge University	S/C	8/21
Mr. Philip Feiner	MS, Meteorology Pennsylvania State University	S	9
Dr. David Gatey	PhD, Wind Engineering and Environmental Fluid Mechanics University of Western Ontario	S	13
Dr. Jara Imbers Quintana	PhD, Theoretical Physics University of Nottingham, UK	S	12
Ms. Sarah Hartley	MSc, Applied Meteorology University of Reading	S	11
Dr. Jo Kaczmarek	PhD, Statistical Science, University College London	S	11
Ms. Chana Keating	MSc, Meteorology Florida State University	S	9
Dr. Shree Khare	PhD, Program in Atmospheric and Oceanic Sciences Princeton University	S	18
Dr. Nicolas Joss Matthewman	PhD, Applied Mathematics University College London (UCL)	S	13
Dr. Christos Mitas	PhD, Atmospheric Sciences University of Illinois at Urbana-Champaign	S	18
Dr. Robert Muir-Wood	PhD, Earth Sciences Cambridge University	S	28
Mr. Ian Mutschler	BS, Meteorology Florida State University	C	0.8
Mr. Edida Rajesh	MS, Technology (Geophysics) Andhra University	S	28
Dr. Emilie Scherer	PhD, Atmospheric Science Paris VI University, France	S/C/S	8/5/1
Dr Ankita Singh	PhD, Applied Statistics Utkal University Bhubaneswar, India	S	6
Mr. Jeffrey Waters	MS, Meteorology Pennsylvania State University	S	13
Dr Xiaoning Wu	PhD, Marine and Atmospheric Science State University of New York at Stony Brook	S	3

Table 3: Individuals involved in statistical aspects of the model

Name	Credentials	Staff (S)/ Consultant (C)	Tenure (Years)
Dr. Florian Arfeuille	PhD, Atmospheric Science ETH Zurich	S	7
Dr. Enrica Bellone	PhD, Statistics University of Washington	S	19
Dr. Auguste Boissonnade	PhD, Civil Engineering Stanford University	S	29
Mr. Scott Brydon	BS, Economics California Polytechnic State University, San Luis Obispo	S	1
Mr. Abhijeet Chhatry	M.Tech, Remote Sensing and GIS National Institute of Technology Surathkal, India	S	3
Dr. Alison Dobbin	PhD, Atmospheric Physics University College London	S	13
Mr. Philip Feiner	MS, Meteorology Pennsylvania State University	S	9
Dr. David Gatey	PhD, Wind Engineering and Environmental Fluid Mechanics University of Western Ontario	S	13
Ms. Kian Greene	BS, Environmental Studies and Biological Anthropology University of California Santa Barbara	S	5
Dr. Jo Kaczmarek	PhD, Statistical Science, University College London	S	11
Ms. Chana Keating	MSc, Meteorology Florida State University	S	9
Dr. Charles Menun	PhD, Structural Engineering University of California, Berkeley	S/C/S	4/14/2
Dr. Robert Muir-Wood	PhD, Earth Sciences Cambridge University	S	28
Mr. Edida Rajesh	MS, Technology (Geophysics) Andhra University	S	28
Dr. Emilie Scherer	PhD, Atmospheric Science Paris VI University, France	S/C/S	8/5/1
Dr. Nilesh Shome	PhD, Structural Engineering Stanford University	S	15
Ms. Carlin Starrs	MF, Master of Forestry University of California, Berkeley	S	6
Ms. Lindsay Stone	MS, Geography Wilfrid Laurier University	S	6
Dr. Anudeep Sure	PhD, Remote Sensing Indian Institute of Technology Kanpur, India	S	1.5
Mr. Joel Taylor	BS, Mathematics Bradley University	S	17
Mr. Barrett Travis	MS, Civil and Environmental Engineering Stanford University	S	6
Mr. Rajkiran Vojjala	MS, Civil Engineering Stanford University, CA	S	20
Mr. Jeffrey Waters	MS, Meteorology Pennsylvania State University	S	13
Mr. Hugo Winter	PhD Statistics and Operational Research Lancaster University	S	4

Name	Credentials	Staff (S)/ Consultant (C)	Tenure (Years)
Dr Xiaoning Wu	PhD, Marine and Atmospheric Science State University of New York at Stony Brook	S	3
Mr. Michael Young	MS, Engineering Science University of Western Ontario, Canada	S	21

Table 4: Individuals involved in vulnerability aspects of the model

Name	Credentials	Staff (S)/ Consultant (C)	Tenure (Years)
Dr. Yasuyuki Akita	PhD, Environmental Science University of North Carolina, Chapel Hill	S	10
Dr. Enrica Bellone	PhD, Statistics University of Washington	S	19
Dr. Auguste Boissonnade	PhD, Civil Engineering Stanford University	S	29
Mr. Scott Brydon	BS, Economics California Polytechnic State University, San Luis Obispo	S	1
Dr. Peter Datin	PhD, Civil Engineering University of Florida, Gainesville, FL	S	13
Dr. Laura Eads	PhD, Civil & Environmental Engineering Stanford University, CA	S	10
Mr. Philip Feiner	MS, Meteorology Pennsylvania State University	S	9
Ms. Kian Greene	BS, Environmental Studies and Biological Anthropology University of California Santa Barbara	S	5
Mr. Manabu Masuda	MS, Civil Engineering, Stanford University	S	21
Mr. Rohit Mehta	MS, Statistics, California State University, Hayward	S	24
Dr. Akwasi Mensah	PhD, Civil Engineering Rice University, Houston	S	10
Dr. Charles Menun	PhD, Structural Engineering University of California, Berkeley	S/C/S	4/14/2
Dr. Mohsen Rahnama	PhD, Structural Engineering, Stanford University	S	26
Dr. Nilesh Shome	PhD, Structural Engineering Stanford University	S	15
Ms. Carlin Starrs	MF, Master of Forestry University of California, Berkeley	S	6
Mr. Derek Stedman	MS, Civil & Environmental Engineering University of Western Ontario, Canada	S	11
Ms. Lindsay Stone	MS, Geography Wilfrid Laurier University	S	6
Mr. Barrett Travis	MS, Civil and Environmental Engineering Stanford University	S	6
Dr. Vahid Valamanesh	PhD, Civil and Environmental Engineering Northeastern University	S	9
Mr. Rajkiran Vojjala	MS, Civil Engineering Stanford University, CA	S	20
Mr. Jeffrey Waters	MS, Meteorology Pennsylvania State University	S	13
Mr. Michael Young	MS, Engineering Science University of Western Ontario, Canada	S	21

Table 5: Individuals involved in actuarial aspects of the model

Name	Credentials	Staff (S)/ Consultant (C)	Tenure (Years)
Ms. Karen Argonza	BS, Journalism San Francisco State University	S	5
Dr. Auguste Boissonnade	PhD, Civil Engineering Stanford University	S	29
Mr. Scott Brydon	BS, Economics California Polytechnic State University, San Luis Obispo	S	1
Dr. Peter Datin	PhD, Civil Engineering University of Florida, Gainesville, FL	S	13
Dr. Laura Eads	PhD, Civil & Environmental Engineering Stanford University, CA	S	10
Mr. Greg Fanoie	FCAS, MAAA, and BS, Mathematics and Computer Sciences University of Richmond	C	N/A
Mr. Philip Feiner	MS, Meteorology Pennsylvania State University	S	9
Mr. Zachary Gellis	BS, Meteorology Pennsylvania State University	S	8
Ms. Kian Greene	BS, Environmental Studies and Biological Anthropology University of California Santa Barbara	S	5
Ms. Nathalie Grima	MS, Mathematics San Jose State University	S	18
Dr. Mahmoud Kamalzare	PhD, Civil and Environmental Engineering University of Southern California	S	7
Mr. Matthew Nielsen	MS, Atmospheric Science Colorado State University	S	19
Dr. Bronislava Sigal	PhD, Statistics Stanford University	S	16
Dr. Ajay Singhal	PhD, Civil Engineering Stanford University	S	23
Ms. Beth Stamann	Certificate of General Insurance Insurance Institute of America	S	29
Ms. Carlin Starrs	MF, Master of Forestry University of California, Berkeley	S	6
Ms. Lindsay Stone	MS, Geography Wilfrid Laurier University	S	6
Mr. Joel Taylor	BS Mathematics Bradley University	S	17
Mr. Barrett Travis	MS, Civil and Environmental Engineering Stanford University	S	6
Mr. Jeffrey Waters	MS, Meteorology Pennsylvania State University	S	13
Mr. Michael Young	MS, Engineering Science University of Western Ontario, Canada	S	21

Table 6: Individuals involved in computer/information science aspects of the model

Name	Credentials	Staff (S)/ Consultant I	Tenure (Years)
Mr. Suman Bhattacharya	Diploma in Electrical Engineering RK Mission Shilpamandira, Kolkata, India	S	15
Ms. Masha Bilyak	BS, Economics and Management Polytechnic University in Lvov, Ukraine	S	22
Mr. Jason Bryngelson	MS, Structural Engineering San Jose State University	C/S	2/25
Mr. Jordan Byk	MBA, Marketing and Finance Rutgers – The State University of New Jersey	S	16
Mr. David Carttar	MS, City Planning University of California, Berkeley	S	28
Mr. Umesh Chander	MS, Computer Science – Northwestern Polytechnic University, Fremont, CA	S	16
Mr. Tommy Chou	BA, Developmental Studies of Industrial Societies University of California, Berkeley	S	18
Mr. Sushil Dhyani	MCA, Master of Computer Application University of Rohtak (India)	S	18
Mr. David Glaubman	BS, Mathematics Northeastern University, Boston	S	18
Ms. Olga Goldin	BS, Power Engineering, Azerbaijan University of Oil and Chemistry	S	27
Mr. Atin Jain	MS, Physics (Specialization Electronics) Rewa University, India	S	13
Mrs. Vidya Karthigeyan	MS, Computer Information Systems California State University, East Bay	S	15
Ms. Veena Krishnamoorthy	MS, Physics Madurai Kamaraj University	S	15
Ms. Jenny Lu	MS Computer Science Wuhan University, Wuhan, China	S	9
Mr. Rohit Mehta	MS, Statistics, California State University, Hayward	S	22
Dr. Rakesh Mohindra	PhD, Earth Sciences Indian Institute of Technology, Roorkee, India	S	22
Dr. Gilbert Molas	PhD, Civil Engineering University of Tokyo	S	27
Mr. Geoffrey Overton	BS, Geography University of Nebraska at Omaha	S	16
Mr. Narvadeshwar Pandey	MS, Future Studies and Planning, Dev Ahilya University, Indore, India MS, Mathematics Gorakhpur University, India	S	19
Mr. Ghanshyam Parasram	BA, Mechanical Engineering Jawahar Lal Nehru Technological University, India	S	23
Mr. Viraj Patil	MS, Computer Science California State University, Long Beach	S	6
Ms. Richa Sharma	BTech, Information Technology UPTU, Lucknow	S	12
Ms. Kim Shuss	BS, Computer Science, California State University, Hayward	S	9
Dr. Ajay Singhal	PhD, Civil Engineering Stanford University	S	21

Name	Credentials	Staff (S)/ Consultant I	Tenure (Years)
Mr. Jayant Srivastava	MS, Computer Science, Institute of Management and Technology, India	S	22
Mr. Avinash Takale	MS, Computer Application Shivaji University, Maharashtra, India	S	14
Mr. Srinivas Thupakula	BS Civil Engineering Indian Institute of Technology Kanpur, India	S	11
Ms. Monika Tomar	MS, Computer Applications (MCA) Bundelkhand University, Jhansi, India	S	20
Mr. Yogesh Vani	MS, Computing Technologies, Telecommunication Systems California State University, Hayward	S	17

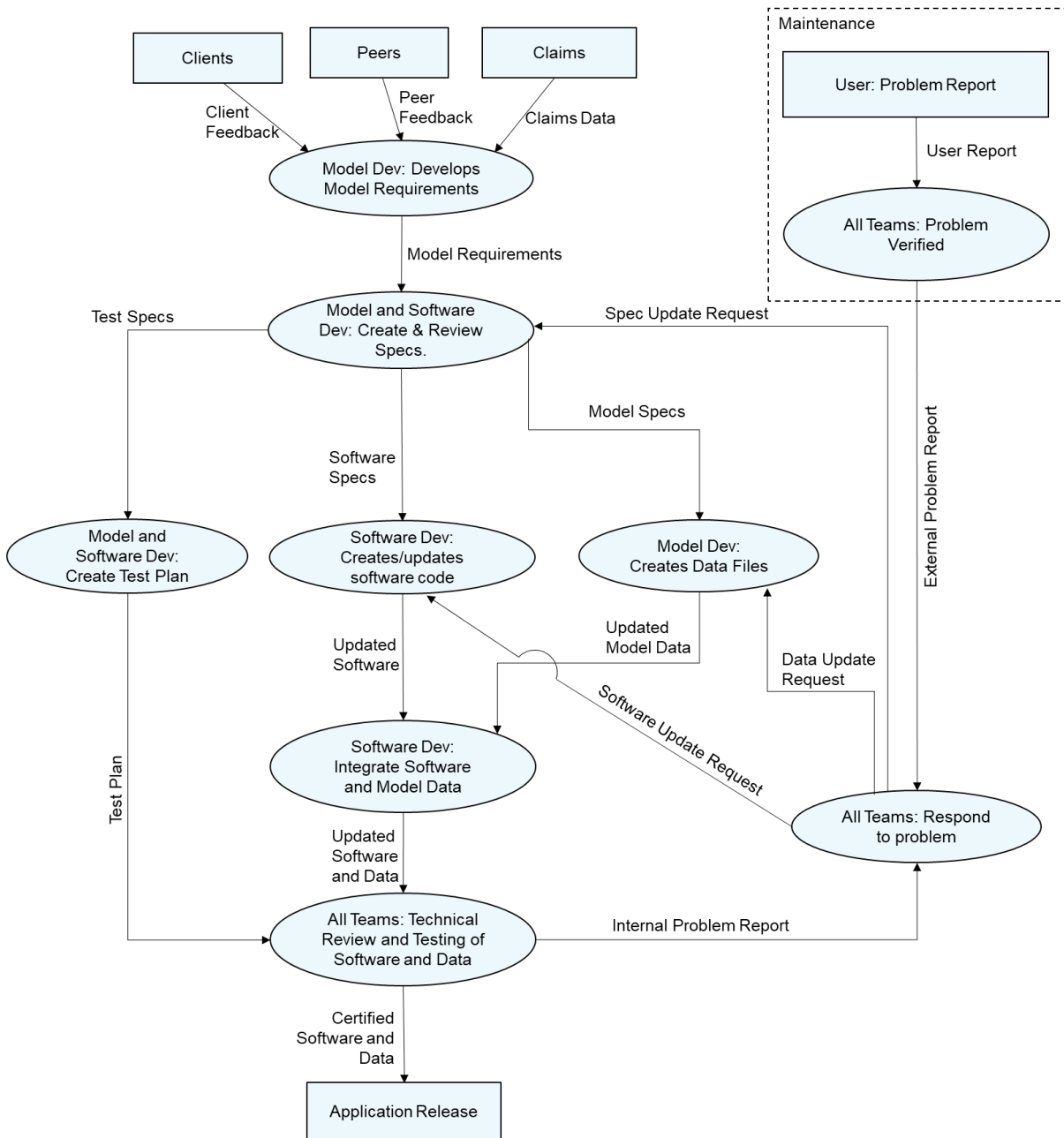
G-2.2.B *Identify any new employees or consultants (since the previous submission) engaged in the development or implementation of the hurricane model or the acceptability process.*

This submission introduces 3 new individuals: Scott Brydon, Ian Mutschler, and Ankita Singh.

Their education, employment status, tenure, and relevant experience are included in [Disclosure G-2.2.A](#) and [Appendix B](#).

G-2.2.C *Provide visual business workflow documentation connecting all personnel related to hurricane model design, testing, execution, maintenance, and decision-making.*

[Figure 10](#) illustrates a typical workflow used at Moody's.

Figure 10: Moody's model development, testing, and maintenance business workflow diagram

In [Figure 10](#), model development includes all individuals listed in [Table 2](#) to [Table 5](#). Software development and QA includes the individuals listed in

Table 6. Users are Moody's clients (internal and external).

G-2.3 Independent Peer Review

G-2.3.A *Provide reviewer names and dates of external independent peer reviews that have been performed on the following components as currently functioning in the hurricane model:*

- 1. Meteorology**
- 2. Statistics**
- 3. Vulnerability**
- 4. Actuarial Science**
- 5. Computer/Information Science**

The methodology used in the current hurricane model has evolved over time. In addition to the extensive testing that Moody's has itself performed on its North Atlantic Hurricane Models, contributions and model reviews performed by external experts whose names and reputations rest upon the quality of their work, have contributed to model improvements.

When significant changes to a model component are made, Moody's may retain the services of an external expert to review the methodology, techniques, and other relevant changes to the model. The submission for RiskLink 11.0 involved significant changes to the hazard and vulnerability modules and therefore Moody's engaged with experts for two external reviews. Moody's considers these reviews relevant for the current model version because the core framework and methodology underlying both the hazard and vulnerability modules remains consistent with RiskLink 11.0.

Dr. Robert Hart is an Associate Professor of Meteorology at the Florida State University. Dr. Hart received his PhD in Meteorology in 2001 from Pennsylvania State University. Dr. Hart's career has focused on hurricane modeling and track forecasting, and has been doing periodic consulting with Moody's since 2007. Moody's has retained Dr. Hart's services to conduct a peer review of changes to the meteorological aspects of the North Atlantic Hurricane Models in RiskLink 11.0. His review was completed on October 29, 2010.

Mr. Thomas Smith is president of TLSmith Consulting, Inc. and is an internationally recognized expert on wind performance of buildings. Mr. Smith has performed building investigations after several tornados and 15 hurricanes – for eight of the hurricane investigations he was a member of the FEMA research teams. Mr. Smith contributed to several FEMA guides and documents including, FEMA's residential *Coastal Construction Manual* (FEMA 55), *Home Builder's Guide to Coastal Construction* (FEMA 499), and *Design Guide for Improving Critical Facility Safety from Flooding and High Winds* (FEMA 543). He is also a contributing author of AIA's *Buildings at Risk: Wind Design Basics for Practicing Architects* (1997), and he authored *Low Slope Roofing II* (NCARB, 2003). Mr. Smith was retained by Moody's to conduct an external review of the vulnerability model changes being made in RiskLink 11.0 in September 2010.

G-2.3.B *Provide documentation of independent peer reviews directly relevant to the modeling organization responses to the current hurricane standards, disclosures, or forms. Identify any unresolved or outstanding issues as a result of these reviews.*

Moody's engages with external consultants, researchers, or experts using one of two methods; publication in a peer reviewed journal, or external expert reviews conducted under the condition of non-disclosure agreements. The following peer reviews relevant to this version of the model in each of these two categories are:

External Expert Reviews

Copies of Dr. Robert Hart's and Mr. Tom Smith's assessment reports as described under [Disclosure G-2.3.A](#) are attached in [Appendix C](#) and [Appendix D](#). There are no unresolved or outstanding issues related to these reviews. Both of these views are directly applicable to this model, Version 25.0, pursuant to the Report of Activities (ROA) 2023 standards.

Dr. Hart's review of the hazard module as it was incorporated in Version 11.0 is shown in [Appendix C](#). The aspects he reviewed and commented on have not changed and meet the current ROA standards.

Mr. Smith reviewed the vulnerability module in Version 11.0. Although there have been changes made in the vulnerability module since then, the basic methodology and application remain as they were. His review is therefore still applicable to the vulnerability module, and has not been nullified by either model or standard changes.

Peer Reviewed Journals

Moody's has published details about the development of its statistical track module and wind field module in the following papers listed below. Upon publication, no unresolved or outstanding issues were identified.

- Hall, T. M. and S. Jewson. 2007a "Statistical Modeling of North Atlantic Tropical Cyclone Tracks." *Tellus* 59A: 486–498.
- Colette, A., N. Leith, V. Daniel, E. Bellone, D. S. Nolan. 2010. "Using Mesoscale Simulations to Train Statistical Models of Tropical Cyclone Intensity over Land." *Monthly Weather Review* 138: 2058–2073.
- Hall, T. and S. Jewson. 2007 b. "Comparison of Local and Basin-Wide Methods for Risk Assessment of Tropical Cyclone Landfall." *Journal of Applied Meteorology and Climatology* 47: 361–367.

G-2.3.C *Describe the nature of any on-going or functional relationship the modeling organization has with any of the persons performing the independent peer reviews.*

There currently is no on-going or functional relationship with the reviewers.

G-2.4 *Provide a completed Form G-1. Provide a link to the location of the form in the submission appendix [\[Form G-1\]](#).*

G-2.5 *Provide a completed Form G-2. Provide a link to the location of the form in the submission appendix [\[Form G-2\]](#).*

G-2.6 *Provide a completed Form G-3. Provide a link to the location of the form in the submission appendix [\[Form G-3\]](#).*

- G-2.7** *Provide a completed Form G-4. Provide a link to the location of the form in the submission appendix [\[Form G-4\]](#).*
- G-2.8** *Provide a completed Form G-5. Provide a link to the location of the form in the submission appendix [\[Form G-5\]](#).*
- G-2.9** *Provide a completed Form G-6. Provide a link to the location of the form in the submission appendix [\[Form G-6\]](#).*

G-3 Insured Exposure Location

- A. ZIP Codes used in the hurricane model shall not differ from the United States Postal Service publication date by more than 24 months at the date of submission of the hurricane model. ZIP Code information shall originate from the United States Postal Service.**

Moody's acquires its ZIP Code data primarily from a third-party developer, which bases its information on the ZIP Code definitions issued by the United States Postal Service (USPS). It is Moody's policy to update these ZIP Codes at least every 24 months.

- B. ZIP Code centroids, when used in the hurricane model, shall be based on population data.**

The Moody's model does not use ZIP Code centroids as proxies for exposure. If a building location is entered as a ZIP Code, then the model uses wind speeds that are exposure weighted averages of wind speeds across the ZIP Code extent. These exposure weighted averages are derived from residential population data.

- C. ZIP Code information purchased by the modeling organization shall be verified by the modeling organization for accuracy and appropriateness.**

ZIP Code information is examined by Moody's for consistency and is subject to standardized quality control testing and checking by experts employed by Moody's for that purpose.

- D. If any hurricane model components are dependent on ZIP Code databases, a logical process shall be maintained for ensuring these components are consistent with the recent ZIP Code database updates.**

RiskLink uses ZIP Code tables in the geocoding, vulnerability, and hazard modules. Moody's has a methodology for making consistent updates to relevant ZIP Code data when the vintage is updated.

- E. Geocoding methodology shall be justified.**

The Moody's geocoder uses industry proven methods and data, thorough testing for consistency, validation processes that justify and support change, and benchmarking against alternative industry suppliers to ensure accuracy and performance. The methods are consistent and justifiable.

- G-3.1 Provide a description of the geographic information system (GIS) software and tools used for geocoding.**

The Moody's geocoder is a proprietary product, designed and built by in-house developers, relying on more than 30 years of GIS and software-engineering expertise. The underlying data is developed using GIS software and database tools from ArcGIS (Esri) and QGIS (open-source).

- G-3.2 List the current ZIP Code databases used by the hurricane model and the hurricane model components to which they relate. Provide the effective (official United States Postal Service) dates corresponding to the ZIP Code databases.**

A set of four internal databases use postal code data (see below). The USPS vintage of the ZIP Code data used in the submitted model is December 2023.

ZIP Code Assignment (GDMPOST)

This database is used for assigning a geographical coordinate returned from the geocoding module to a corresponding ZIP Codes.

ZIP Resolution Wind Hazard for Historic Storms (histfpZIPWlindex)

Data table used to identify the historical events that impact specific ZIP Codes.

ZIP Resolution Wind Hazard for Stochastic Storms (stocfpZIPWlindex)

Data table used to identify the stochastic events that impact specific ZIP Codes.

Vulnerability and Building Inventory Regions (HUVGEOUS)

This database is used to determine vulnerability and inventory regions associated with a geocoded location.

G-3.3 *Describe in detail how invalid ZIP Codes are handled.*

There are two reasons for a ZIP Code to be considered invalid by the model. First, the ZIP Code in question may not exist, either because of a typographical error or because of an expired ZIP Code. Second, the ZIP Code may be more current than the ZIP Codes in the reference database in the product.

In cases when a building cannot be geocoded, its vulnerability and financial characteristics are excluded from consideration in the analysis. Locations that are not included in the analysis are easily identified.

G-3.4 *Describe the data, methods, and process used in the hurricane model to convert among street addresses, geocode locations (latitude and longitude), and ZIP Codes.*

Geocoding is the process of converting user supplied address information into locations that can be used by the model. There are generally four steps in the geocoding process.

- Address standardization: User supplied address information is parsed into address elements, such as building number, street name, pre/post directional, etc., and converted into standardized nomenclature and/or format (i.e., "N." becomes North).
- Address matching: The geocoding engine searches for a match between address element inputs and valid reference data for address elements contained in an internal geographic database. In the U.S., the model uses reference data from a variety of third-party sources/vendors to provide the most accurate geocoding resolution possible.
- Geographic interpolation (if necessary): Once a valid address is found, the coordinates (latitude/longitude) are assigned to the record. Interpolation along street elements may be necessary for street-level geocoding. Building or parcel level geocoding does not require interpolation because pre-compiled coordinates of the building footprints may be contained in the geographic database to allow for a precise location placement.
- Ancillary data retrieval: Additional information not supplied by the user, such as county, enclosing ZIP Codes, or state codes are added to the record to allow the model to reference model components stored by postal code or county.

ZIP aggregate records (such as FHCF data) do not go through address matching or geographic interpolation, but the ZIP Codes are checked for validity prior to ancillary data retrieval.

Table 7: List of supported geocoding resolutions

Name	Description
Coordinate	User-specified latitude/longitude coordinate pairs used directly in modeling process. Only ancillary data retrieval is applied to location supplied with coordinate level geocoding data. Requires prior knowledge of the latitude/longitude coordinate pair.
Building	Geocodes to the exact center of the building footprint.
Parcel	Geocodes to the exact center of the parcel boundaries for street-address match.
Street Address	The geocoder matches street segment resolution reference data that contains address ranges and side of street parity. Includes interpolation along street centerline and an offset from the centerline.
Point of Interest	Geocodes to the estimated center of the business, building, or other feature that matches the user-entered name.
Blockface	The geocoder matches street segment resolution reference data that contains address ranges but not side of street parity. Includes interpolation along street centerline.
Street Name	The geocoder matches the street name only, either because the address number is invalid or missing. Uses a centroid for the street (length) factoring coarser address input (such as postcode).
Postcode	The geocoder places the location on the exposure weighted centroid of the postal code (e.g., U.S. ZIP Code) in which it falls. In the U.S., postal code centroids are population weighted to provide a better representation of exposure. Populated-weighted centroids and geographic centroids are not usually the same place.
City	The geocoder validates the name of the city and returns coordinates, and sets both latitude and longitude to zero.
County	The geocoder validates the name of the county/state and sets both latitude and longitude to zero.

G-3.5 List and provide a brief description of each hurricane model ZIP Code-based database (e.g., ZIP Code centroids).

See response in [Disclosure G-3.2](#).

G-3.6 Describe the process for updating hurricane model ZIP Code-based databases.

Moody's receives quarterly updates of geocoding data, including ZIP Codes and associated boundaries, from its third party sources, which are run through a series of quality and consistency checks. When preparing data and software for release, Moody's selects the most recent geocoding update, performs quality and consistency testing that includes verifying boundary alignments, and centroid alignments. Where appropriate, additional data development is performed. A quality confirmed postcode database is then provided to the development teams for inclusion in the other three databases described in [Disclosure G-3.2](#) – two exposure-weighted wind-speed averages for individual events databases, and the database to determine vulnerability region and inventory region. The development teams make updates that ensure consistency between the latest vintage of ZIP Codes, treatment of missing/incomplete data, and various vintages of exposure datasets that could be used by clients.

G-4 *Independence of Hurricane Model Components*

The meteorology, vulnerability, and actuarial components of the hurricane model shall each be theoretically sound without compensation for potential bias from other components.

In the North Atlantic Hurricane Models, vulnerability, meteorological, and actuarial functions are theoretically sound and are developed independently without compensation for potential bias from the other two components. For example, vulnerability functions relating damage ratios to wind speeds are fixed within the model and are not dependent on other aspects of the loss model. Relationships within the model among the meteorological, vulnerability, and actuarial components are reasonable.

G-5 Editorial Compliance

The submission and any revisions provided to the Commission throughout the review process shall be reviewed and edited by a person or persons with experience in reviewing technical documents who shall certify on Form G-7 that the submission has been personally reviewed and is editorially correct.

The preparation of the submission follows a development and editorial review process that involves multiple personnel who review and edit appropriate sections depending on areas of expertise. For this submission to the FCHLPM, Karen Argonza has coordinated the editorial process as described in the disclosure below. Karen has reviewed and edited where necessary all documents for accuracy and completeness.

Karen has led the development of catastrophe risk model documentation for the past 20 years. From 2004 to 2009, she was hired as a consultant to establish and manage the documentation effort for the Moody's peril models and support the editorial effort for the FCHLPM 2005 and 2006 model submissions.

Karen rejoined RMS as a full-time employee in February 2020 as Senior Science Writer and Editor for the model knowledge management team, and was the editorial signatory for the Moody's submission for the hurricane model accepted by the Commission on June 1, 2023. She plans, writes, and edits methodology, scope, and change management documents for cyber, terrorism, wildfire, and life risks models, and oversees content development and procedures for updating and delivering submissions to U.S. regulators.

Karen's experience spans all aspects of technical publication including staff management, planning, scheduling, design and layout, writing, editing, formatting, review of grammar, verification of accuracy and completeness, localization, and distribution. Publications have also included environment impact reports, and scientific grant proposals and research papers.

G-5.1 Describe the process used for document control of the submission. Describe the process used to ensure that the paper and electronic versions of specific files are identical in content.

Moody's uses source control software to control the document creation and editing process for the submission document, form development, and related information. For the main submission document, Moody's maintains and tracks edits to the document using edit tracking features in Microsoft Word and the source control system. Subject matter experts make edits on "sub-documents" that are submitted to the submission editor for inclusion into the main document, in accordance to a set of standard operating procedures maintained by the submission editor. Incremental changes to the document are checked-in by the submission editor, Karen Argonza. Form development is also tracked and edited within our source control system.

Moody's follows a review process with multiple reviewers to ensure that final subject matter content reflects edits suggested by each subject matter expert. The submission editor maintains a list of review responsibilities and review tasks. This review process also includes specific checks to ensure that the paper and electronic version of specific files are identical in content.

G-5.2 Describe the process used by the signatories on Expert Certification Forms G-1 through G-6 to ensure that the information contained under each group of hurricane standards is accurate and complete.

Each signatory is responsible for the content of their respective standards. Signatories, subject matter experts, and forms analysts submit information to be included in the submission to the submission editor. Once incorporated, signatories must verify that all changes have been incorporated and approve the final version of the document.

Moody's also uses a two-person review process whereby the content of each section/form is reviewed by someone other than the content provider. When appropriate, signatories may also review other standard sections to ensure consistency between results and submission language.

G-5.3 *Provide a completed Form G-7. Provide a link to the location of the form in the submission appendix [\[Form G-7\]](#).*

METEOROLOGICAL HURRICANE STANDARDS

M-1 Model Base Hurricane Set

- A. The Model Base Hurricane Set shall be one of the following: (1) Reference Hurricane Set, (2) Model Adjusted Hurricane Set, or (3) Model Climate-Adjusted Hurricane Set, and shall be justifiable.**

The Moody's Model Base Hurricane Set is the Reference Hurricane Set.

- B. A Climate-adjusted hurricane model shall use one of the hurricane sets listed in A as its Model Base Hurricane Set and shall be justifiable.**

The Moody's hurricane model is not climate-adjusted.

- C. Annual frequencies used in the hurricane model validation shall be based upon the Model Base Hurricane Set.**

The Moody's hurricane model validation is based upon the annual frequencies of the Model Base Hurricane Set, namely the Reference Hurricane Set.

M-1.1 Identify the basis for the Model Base Hurricane Set as listed in Hurricane Standard M-1.A.

The Moody's Model Base Hurricane Set is the Reference Hurricane Set. The base hurricane storm set is made of all hurricanes contained in the official HURDAT2 database (as available in May 2023) spanning the time frame from 1900 to 2022 inclusive. The HURDAT database is referenced in Jarvinen et al. (1984) and the new format data HURDAT2 in Landsea and Franklin (2013). NOAA's reanalysis of hurricane seasons included in the May 2023 vintage is described in Landsea et al. (2004), Landsea et al. (2008), Landsea et al. (2012), Landsea et al. (2014), Hagen et al. (2012), Delgado et al. (2018), and Delgado and Landsea (2020a, 2020b). There has not been any modification to the official HURDAT2 track set.

M-1.2 Describe the process used to develop the Model Base Hurricane Set. Specify:

M-1.2.A. The HURDAT2 release date used,

The release date used for HURDAT2 is May 4, 2023.

M-1.2.B. Additional data, databases, and modifications, excluding climate change, used, if relevant, and

Not relevant.

M-1.2.C. Additional data, databases, and modifications related to climate change used, if relevant.

Not relevant.

M-1.3 Justify the Model Base Hurricane Set based upon current scientific literature and current technical literature.

The Model Base Hurricane Set is chosen to be the Reference Hurricane Set, i.e HURDAT2 as of May 2023. This dataset provides a long and reliable record of hurricane activity in Florida, spanning the 1900-2022 period. We view this dataset as a viable representation of hurricane activity, given its wide use within the scientific communities and corresponding literature. While we continue to use this set to inform the resulting model as a stable view of risk for the purpose of this submission and use within Florida residential rate filings, in parallel we also continue to research, develop, and make available alternative views.

We do not modify the HURDAT2 record and rely on the thorough reanalysis provided by NOAA (Landsea and Franklin (2013)).

M-1.4 *Provide completed Form M-1(s). Provide a link to the location of the forms in the submission appendix [\[Form M-1\]](#).*

M-1.5. *Describe the process for incorporating the Model Base Hurricane Set consistently into Forms M-1, S-1, and A-2.*

Frequencies in Form M-1 are checked by counting landfall and bypass codes by intensity and region in Form A-2. To check Form S-1, we count the landfall codes in A-2 by year. We ensure that the total frequency is consistent in the three forms by comparing the total in Form S-1 with the number of entries in Form A-2 with FL landfalling codes, and the total of the Entire State column in Form M-1.

M-2 Hurricane Parameters (Inputs)

Methods for depicting all modeled hurricane parameters shall be based on information documented in current scientific literature and current technical literature.

Each component of the hazard model is based on information documented in currently accepted scientific literature:

- The track path model is based on Hall and Jewson (2007)
- The over water intensity model is similar in concept to the track path model
- The inland filling model (modeling the central pressure time series when the storm moves over land) is described in Colette et al. (2010)
- The Vmax and Rmax models are regression models (e.g., Weisberg 1985) with autocorrelated errors
- The analytical wind profile is a modified version of the profile proposed in Willoughby et al. (2006)
- The wind profile parameters are modeled as generalized linear models (e.g., McCullagh and Nelder, 1989)
- The roughness and gust models are based on the methodologies proposed by Cook (1985) and Cook (1997)

M-2.1 Provide details of modifications to the meteorological component of the hurricane model since the current accepted hurricane model.

There has been no modification to the meteorological component of the hurricane model since the current accepted hurricane model.

M-2.2 Identify the hurricane parameters (e.g., central pressure, radius of maximum winds, rainfall) that are used in the hurricane model.

The hurricane parameters used in the hazard model are:

- Translation speed and storm heading (also known as bearing)
- Central pressure
- Inland filling rate
- "Equivalent over water" maximum wind
- Radius of maximum winds
- Wind profile parameters
- Far field pressure

M-2.3 Describe the dependencies among parameters in the windfield component and how they are represented in the hurricane model, including the mathematical dependence of modeled windfield as a function of distance and direction from the center position.

The variables defining the wind speed at a site are:

- Radial distance from the storm center to the site (dependent on site location)
- Angle between the translational speed and the site radial vector (dependent on site location)
- Translational speed of the storm (dependent on the storm center location)
- Equivalent over water 1-minute mean wind (dependent on central pressure and far field pressure)

- Radius of maximum winds (dependent on central pressure and latitude)
- Wind profile parameters (dependent on the radius of maximum wind and central pressure)
- Roughness and gust coefficients (dependent on site location)

M-2.4 Identify whether hurricane parameters are modeled as random variables, functions, or fixed values for the stochastic storm set. Provide rationale for the choice of parameter representations.

The hurricane parameters are modeled as described below:

Translational speed and heading

The track translational speed and heading are derived from the zonal and meridional track speeds. The mean of the zonal and meridional components varies in space and are distance weighted functions of zonal and meridional steps from HURDAT. Deviations from the zonal and meridional means are modeled as Gaussian random variables that are both autocorrelated and cross-correlated. Variance and correlation coefficients also vary in space and are estimated from HURDAT tracks using weights that depend on the distance between site and HURDAT track points.

Central pressure

Central pressure is the main intensity variable in the model. Central pressure time series are obtained through the change in central pressure (Δp_c). The model for Δp_c is a linear regression with predictors that include the previous change in pressure, the total pressure drop from genesis, and the zonal and meridional track steps. The coefficients of the model are estimated locally using HURDAT data weighted according to the distance from site to HURDAT track point.

Inland filling rate

The inland filling rate is drawn from a normal distribution with a mean that depends on pressure difference ($FFP - p_c$), translational speed and R_{max} at the time of landfall, as well as two predictors that describe the proportion of the storm over different terrain at and just after the time of landfall: the proportion of the storm to the right of the track that is over water, and the proportion of the storm that is over terrain classified as urban or forest.

"Equivalent over water" maximum wind

V_{max} is modeled as a lognormal random variable, with a mean that depends on latitude and pressure difference. Deviation from the mean exhibits 1st order autocorrelation. Central pressure, V_{max} , and latitude data from HURDAT are used to estimate the coefficients of the model.

Radius of maximum winds

R_{max} is modeled as a lognormal random variable, with a mean that depends on latitude and central pressure. Deviation from the mean exhibits 1st order autocorrelation. Simulated R_{max} values are truncated on the right according to their category by pressure. The coefficients for the model are estimated using the extended best track dataset as discussed in Demuth et al. (2006).

Wind profile parameters

The shape parameters $X1$ and N are modeled as Gamma random variables that depend on R_{max} and translational speed, as well as a lagged version of $X1$ and N respectively (lag 1). The position of V_{max} with respect to the track is described by the wind field parameter A_{max} , which is assumed to follow a truncated Gaussian distribution. The mean depends on translational speed, R_{max} , and previous values of A_{max} . EOF coefficients are modeled as Gaussian random variables.

Far field pressure

Far field pressure is not modeled as a random variable, but it varies according to spatial position and time of the year. The monthly climatology of sea level pressure over a grid covering the model domain is used as a proxy for far field pressure.

M-2.5 Describe if and how any hurricane parameters are treated differently in the Model Base Hurricane Set and the stochastic storm set and provide rationale.

For historical storms, hurricane parameters are treated as in the stochastic set except that the longitude, latitude, central pressure (when available), and over water Vmax are fixed and set to the corresponding HURDAT2 values. In addition, simulated parameters may be constrained by relevant meteorological data that are available for the historical storm, including estimates for observed Rmax, and wind speeds observed at recording stations over the storm's lifetime.

M-2.6 Describe any evolution of the functional representation of hurricane parameters during an individual storm life cycle.

Hurricane parameters in the Moody's model evolve with the changes that each storm experiences. As a storm travels over water, the central pressure is simulated using the Moody's over water intensity model and as it moves over land it is modeled using the Moody's inland filling model. For hurricanes that are transitioning to extratropical storms, the calculations for the Vmax and Rmax time series gradually evolve to represent the extratropical nature of the storm. The methodology used to calculate the roughness factors, however, remains the same everywhere, even as the storm moves over water.

M-2.7 If the modeling organization has accounted for climate change in the hurricane model development (other than a change to the Model Base Hurricane Set), justify its use in modeling Florida hurricane rates from current scientific literature and current technical literature. Describe the analysis and its impacts on Florida hurricane rates.

Not applicable.

M-2.8 Provide plots of distance along the coast of Florida and adjacent states (x-axis) versus modeled annual landfall occurrence rates (y-axis) in two intensity bands (Saffir-Simpson categories 1-2 and 3-5). Any set of coastal segments may be used for this purpose, as long as they are not greater than 100 miles in length. If the modeling organization has a current accepted hurricane model, provide the current accepted hurricane model's rates on the same axes. Also provide on the same axes the modeled annual landfall occurrence rates computed directly from the Model Base Hurricane Set. For a climate-adjusted hurricane model that uses either the Reference Hurricane Set or a Model Adjusted Hurricane Set for the Model Base Hurricane Set, a modeling organization shall provide two plots, one completed with climate-adjusted modeled rates and one completed without climate-adjusted modeled rates.

We use the Moody's landfall gates to validate landfall frequencies. These landfall gates are coastal segments of varying sizes, all less than 100 miles in length, as shown in [Figure 11](#). Historical (Model Base Hurricane Set), modeled, and previously-modeled hurricane annual landfall occurrence rates along the Moody's landfall gates are given on [Figure 12](#) and [Figure 13](#) for Category 1–2 and Category 3–5 hurricanes. Saffir-Simpson category is based on 1-minute wind speed at time of landfall.

Figure 11: Moody's landfall gates

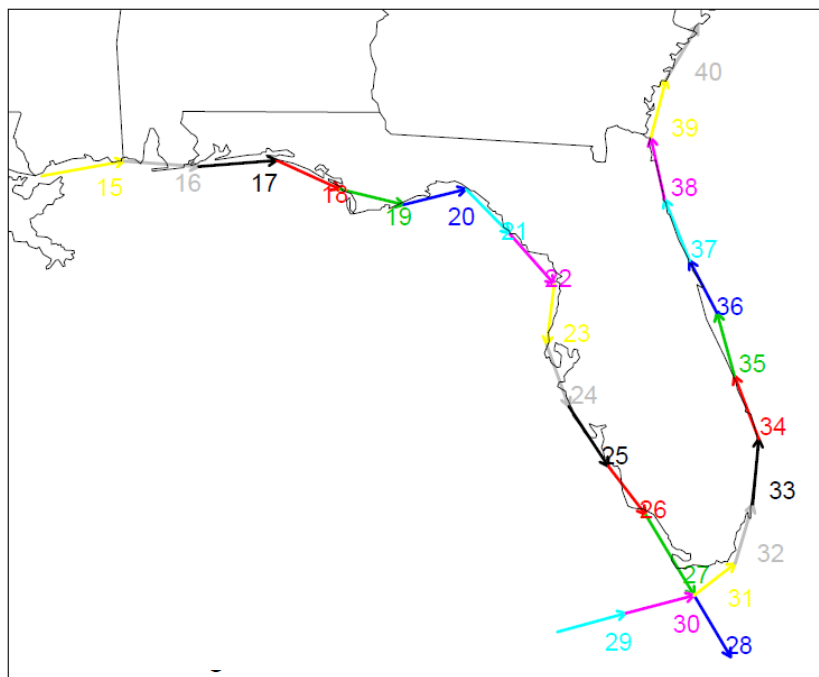


Figure 12: Historical (Model Base Hurricane Set), modeled (North Atlantic Hurricane Models 25.0 (Build 2450)), and previously-modeled (North Atlantic Hurricane Models 23.0 (Build 2250)) annual landfall occurrence rates (1900–2022) by landfall gate for Category 1–2 storms

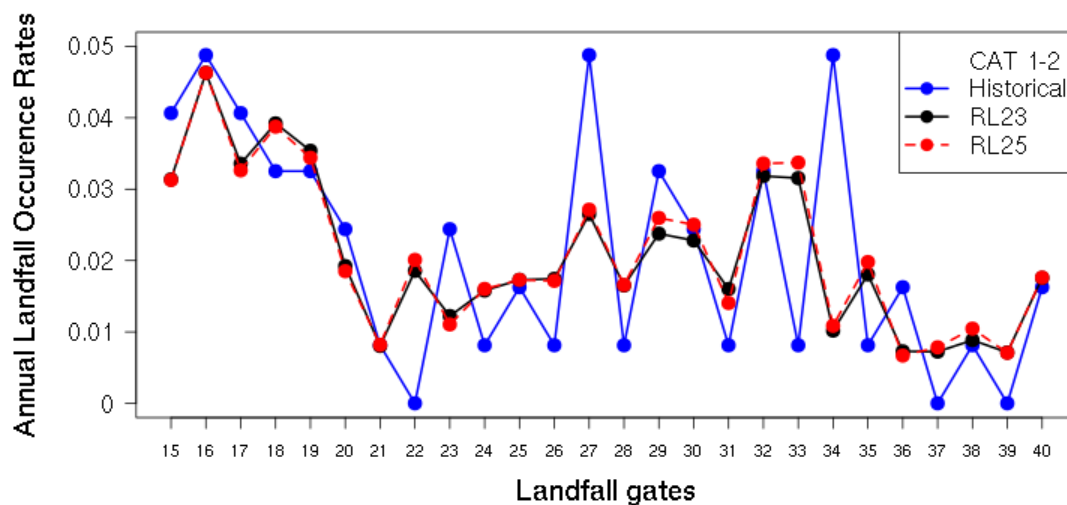
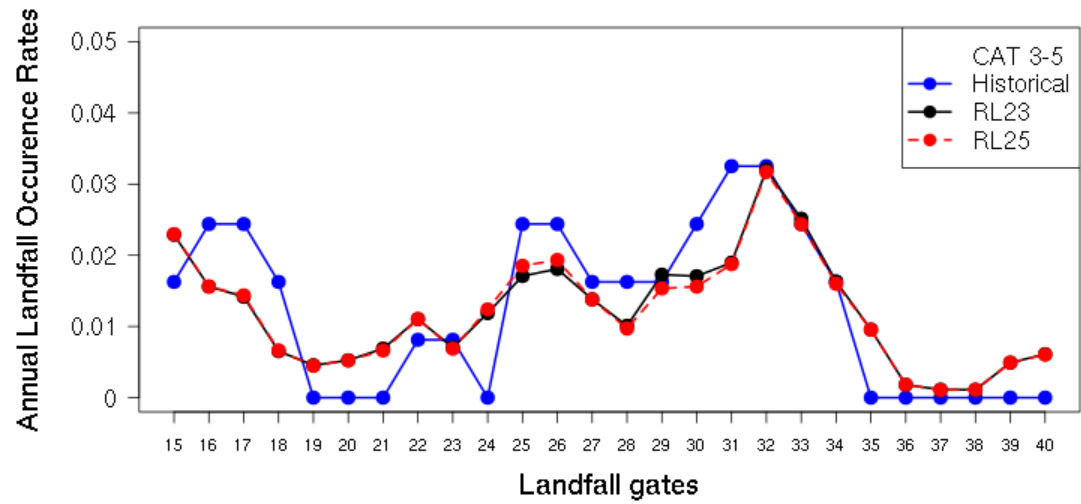


Figure 13: Historical (Model Base Hurricane Set), modeled (North Atlantic Hurricane Models 25.0 (Build 2450)), and previously-modeled (North Atlantic Hurricane Models 23.0 (Build 2250)) annual landfall occurrence rates (1900–2022) by landfall gate for Category 3–5 storms



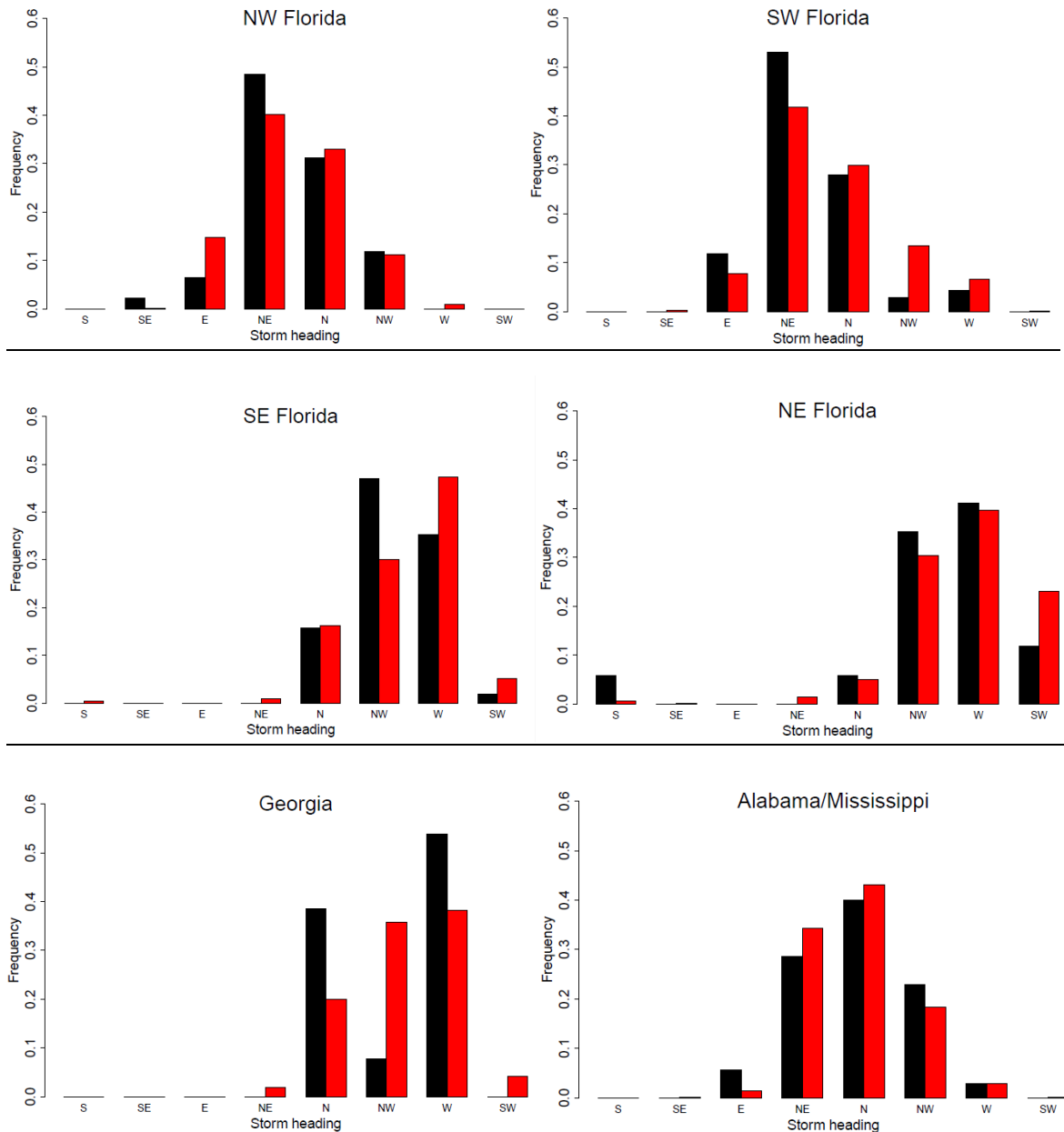
M-3 Hurricane Probability Distributions

A. Modeled probability distributions of hurricane parameters shall be consistent with the Model Base Hurricane Set. Any differences shall be justifiable.

Moody's modeled distributions of hurricane parameters and characteristics are consistent with historical hurricanes in the Atlantic Basin:

- **Forward speed**—Modeled and historical distributions are compared in [Disclosure S-1.5](#) for Florida and adjacent states.
- **Storm heading**—[Figure 14](#) shows the comparison between observed and modeled storm heading distribution for the each of the four Florida regions and adjacent regions. There is generally a good agreement between both distributions.
- **Central pressure**—Modeled and historical distributions are compared in [Disclosure S-1.5](#).
- **Inland filling rate**—The range of modeled filling rates is compared against historical central pressure time series in [Disclosure M-5.3](#).
- **"Equivalent over water" maximum wind (Vmax)**—Modeled and historical landfall frequencies (by intensity and by region) are compared in [Form M-1](#). Modeled and historical Vmax distributions at landfall are compared in [Disclosure S-1.5](#).
- **Radius of maximum winds**—Modeled and historical distributions are compared in [Disclosure S-1.5](#).
- **Wind profile parameters**—As described in [Disclosure M-4.1](#), the wind parameters have been fitted using HWind snapshots. The quartiles of modeled radii (>110mph, >73mph, and >40mph) are presented in [Form M-3](#) and the distribution of the radius to hurricane force winds is compared to historical observations available in HURDAT2 and the extended best track dataset (Demuth et al., 2006) in [Disclosure M-6.3](#).

Figure 14: Observed (black) and modeled (red) histograms of storm heading for landfalls in each Florida region and adjacent regions – storm heading "N" stands for a storm heading north



B. Modeled hurricane landfall frequency distributions shall reflect the Model Base Hurricane Set used for category 1 to 5 hurricanes and shall be consistent with those observed for each coastal segment of Florida and neighboring states (Alabama, Georgia, and Mississippi). Any differences shall be justifiable.

Modeled landfall frequencies are consistent with what has been observed historically for each geographical area of Florida and neighboring states, as demonstrated in [Form M-1](#). The model is consistent both in terms of the total rate of hurricanes making landfall by region, and the rate of hurricanes of various intensities by region.

- C. *The hurricane model shall use maximum one-minute sustained 10-meter windspeed when defining hurricane landfall intensity. This applies both to the Model Base Hurricane Set used to develop landfall frequency distributions as a function of coastal location and to the modeled winds in each hurricane which causes damage. The associated maximum one-minute sustained 10-meter windspeed shall be within the range of windspeeds (in statute miles per hour) categorized by the Saffir-Simpson Hurricane Wind Scale.***

Hurricane intensities are defined using the maximum 1-minute sustained 10-meter wind speed. This applies both to modeled hurricanes from the Moody's stochastic set and historical hurricanes from the base hurricane storm set.

- M-3.1 *Provide a brief rationale for the probability distributions used for assigning all hurricane parameters, including any assumptions that go into the use or interpretation of the distributions.***

A description of the probability distributions used for all hurricane parameters is given in [Form S-3](#).

- M-3.2 *Describe and justify any changes made to the Model Base Hurricane Set in the hurricane model under review that are not reflected in changes to the distributions in Form S-3. Describe the methodology used to make such changes.***

Storm frequencies and Vmax distributions are updated using 1900–2022 HURDAT2 data, as mentioned in Form S-3. The update relies on changes to the Poisson rate associated to each storm in the stochastic event set. The distributions of other parameters change implicitly as a result. These changes are reflected in the validation provided throughout the submission.

M-4 Hurricane Windfield Structure

A. *Windfields generated by the hurricane model shall be consistent with observed historical storms affecting Florida.*

Wind fields generated by the Moody's model are consistent with observed historical hurricanes in the Atlantic Basin. The basis for developing the wind field structure is the record of historical hurricanes. The functions used to model the wind fields have been tested thoroughly against various historical storms.

B. *The land use and land cover (LULC) database shall be consistent with National Land Cover Database (NLCD) 2016 or later. Use of alternate datasets shall be justified.*

The Moody's database that describes the land use and land cover is derived from the 15–30 m resolution ASTER satellite imagery (Advanced Spaceborne Thermal Emission and Reflection Radiometer). To ensure consistency the Moody's database was compared to the NLCD 2016 database to identify regions where land use land cover changed, for which the existing ASTER imagery was validated against NLCD 2016 and Google Earth, and updated where necessary.

C. *The translation of land use and land cover or other source information into a surface roughness distribution shall be consistent with current state-of-the-science and shall be implemented with appropriate geographic-information-system data.*

The raw land-use and land-cover classes derived from the 15–30 m resolution ASTER satellite imagery are merged into 10 typical land-use classes grouped by similar roughness characteristics. Each class is assigned a representative roughness length which is within the range of published mapping schemes from scientific literature (e.g., Cook 1985; Wieringa 1992, 1993; ASCE 7-98).

D. *With respect to multi-story buildings, the hurricane model shall account for the effects of the vertical variation of winds.*

The effects of the vertical variation of winds are accounted for in the vulnerability curves.

M-4.1 *Provide a tangential windspeed (y-axis) versus radius (x-axis) plot of the average or default symmetric wind profile used in the hurricane mode. Justify the choice of this wind profile. If the windfield represents a modification from the current accepted hurricane model, plot the previous and modified wind profiles on the same figure using consistent axes. Describe variations between the previous and modified wind profiles with references to historical storms.*

The Moody's model is based on an optimized version of the Willoughby profile (Willoughby et al., 2006). [Figure 15](#) shows the radially averaged profile for typical Florida values:

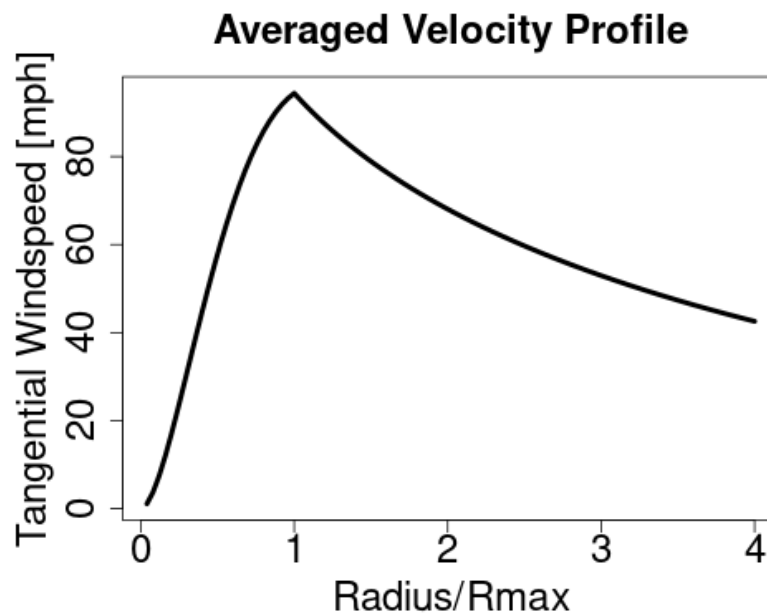
- Translational velocity – 5 m/s (11.2 mph)
- Latitude – 27.5 N
- Pressure difference – 58.5 hPa

Given these parameters, the stochastic model yields the following mean values for the remaining wind parameters used to generate the average wind profile:

- Rmax – 36 km (22 miles)
- Vmax – 49 m/s (110 mph)
- X1 (decay length parameter) – 107 km (66.5 miles)
- N (power law parameter) – 1.85

The wind profile models the 10 m winds directly and has been derived using more than 600 over-water HWind snapshots (e.g., Powell et al., 2010).

Figure 15: Radially averaged velocity profile based on the parameters given in the text



Past modeling approaches at Moody's have relied on the Holland profile (Holland 1980). [Figure 16](https://www.rms.com/event-response/hwind/legacy-archive) and [Figure 17](https://www.rms.com/event-response/hwind/legacy-archive) show the comparison between HWind wind fields (<https://www.rms.com/event-response/hwind/legacy-archive>) and modeled wind fields for Hurricane Charley (August 13, 2004 – 16:30 UTC) and Hurricane Andrew (August 24, 1992 – 04:00 UTC) based on the Holland and Willoughby models. To better assess the model skills across different snapshots, Moody's presents "composite wind fields" where both the size and the orientation have been normalized. From the plots it is clearly seen that the optimized Willoughby model outperforms the Georgiou/Holland model.

Figure 16: Hurricane Charley on August 13, 2004–16:30 UTC. a) HWind snapshot b) HWind composite, c) Best fit for the Georgiou/Holland Model, d) Best fit for the Moody's wind field model – all wind speeds are 1-minute mean 10 m winds in mph

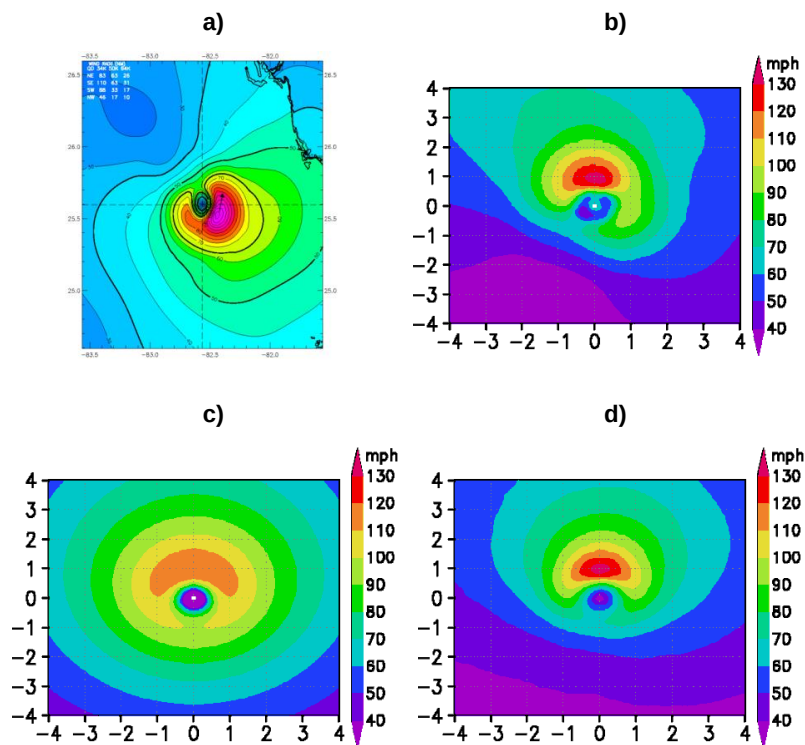
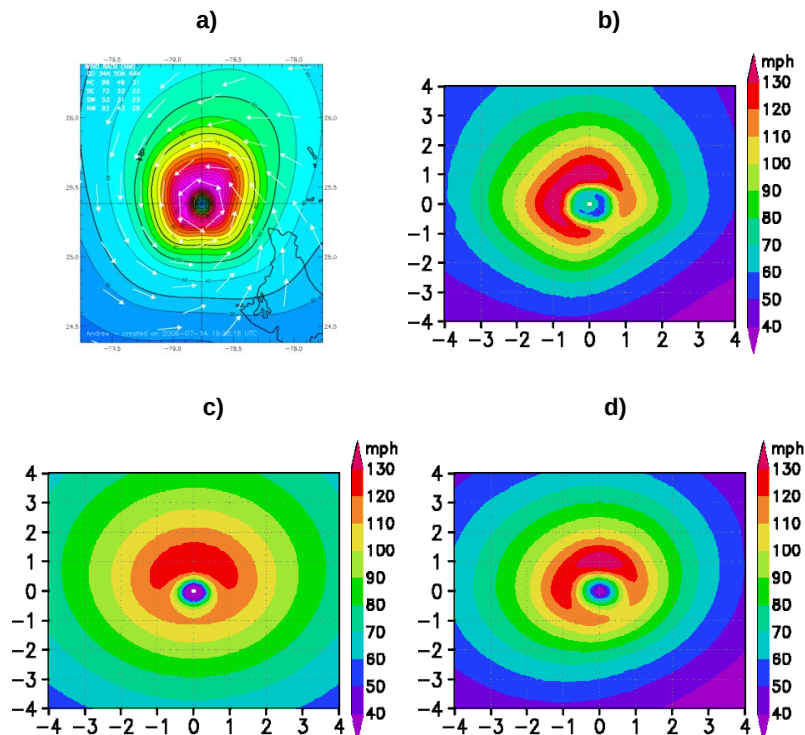


Figure 17: As Figure 16, but for Hurricane Andrew on August 24, 1992–04:00 UTC



The wind profile has not changed since the previous submission.

The model wind field has not changed in any way since the previous submission.

M-4.2 Describe the general process for calculating hurricane surface winds.

Moody's calculates hurricane surface winds by downscaling the output of the wind field model (a 1-minute open-water sustained wind) to a 3-second gust at a given location. This downscaling process captures the transition from sea to land and changes in upstream directional roughness. The downscaling comprises two main stages. First, a 'roughness coefficient' is applied to the wind-field output to account for the effect of surface friction on the mean wind, generating a real-terrain mean wind. Second, a 'gust coefficient' (i.e., a site-specific gust factor) is applied to the real-terrain mean wind to generate a 3-second real-terrain gust.

Moody's calculates the roughness and gust coefficients (together, the site coefficients) from high-resolution land-use land-cover data. The site coefficients are location-specific, accounting for the local land use and the upstream directional surface conditions. The Moody's site-coefficient model formulation is based on a peer-reviewed wind engineering model (Cook 1985, 1997; Wieringa 1993, and references in [Disclosure M-4.4](#) to [Disclosure M-4.8](#)).

M-4.3 Describe how the vertical variation of winds is accounted for in the hurricane model where applicable.

The vertical variation of winds is accounted for in the vulnerability curves, where the curves depend on the height of the building. Historical and stochastic storms are treated in the same way.

M-4.4 Describe the relevance of the formulation of gust factor(s) used in the hurricane model.

The model calculates the over land gust wind speeds by location via modeling the local surface roughness as well as the change in the local roughness conditions upstream of a particular location. The Moody's gust model incorporates these roughness conditions into the computation of the peak gust wind speed at the 10 m elevation. The gust factor methodology follows peer-reviewed wind engineering literature (Deaves and Harris 1978; Harris and Deaves 1980; Deaves 1981; Cook 1985; Cook 1997; Wieringa 1993 and 2001; Vickery and Skerlj 2005).

M-4.5 Identify all non-meteorological variables (e.g., surface roughness, topography) that affect windspeed estimation.

Variables that affect the modeled wind speed are the surface roughness conditions, both at the site and upstream to the site by direction. The effect of topography on wind speeds in Florida is negligible.

M-4.6 Provide the collection and publication dates of the land use and land cover data used in the hurricane model and justify their timeliness for Florida.

The land-use land-cover data for Florida was developed from ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer, <https://asterweb.jpl.nasa.gov/>) satellite imagery collected between 2001 and 2014. As discussed in [Standard M-4.8](#) the land-use and land-cover data was compared to the NLCD 2016 data set to ensure consistency and identify regions where land use land cover has changed. Consistency checks between the Moody's and NLCD 2016 databases ensured that land use and land cover derived from satellite imagery collected from earlier years maintain consistency with the land cover described by NLCD 2016.

M-4.7 Describe the methodology used to convert land use and land cover information into a spatial distribution of roughness coefficients in Florida and neighboring states.

The land use is available at 15–30 m resolution. The raw land-use classes are merged into 10 typical land-use classes grouping classes of similar roughness together. Each class is assigned a representative roughness length which is within the range of published mapping schemes from scientific literature (e.g., Cook 1985; Wieringa 1992, 1993; ASCE 7-98). Aggregate roughness maps are generated on a 200 m resolution grid, and are used by the roughness model to calculate roughness coefficients (roughness and gust factors) on the same grid. The roughness and gust factors are based on Cook (1985, 1997) modified by a local correction factor. The correction factor was derived from station data of actual hurricanes. The 200 m roughness factors on the 200 m grid are aggregated to the Moody's variable resolution grid (1–10 km) using weights that depend on insured exposure.

M-4.8 *Demonstrate the consistency of the spatial distribution of model-generated winds with observed windfields for hurricanes affecting Florida. Describe and justify the appropriateness of the databases used in the windfield validations.*

For the generation of historical footprints, the HURDAT and extended best track dataset are insufficient, since the wind model requires additional parameters. For this reason, the stochastic model is used to generate various versions of the historical storms all having a different time series of the wind model parameters. The chosen realization (i.e., time series of track parameters) yields the best agreement with the station observations. Therefore, the historical reconstructions agree well with the observed spatial patterns as can be seen when comparing to wind station data. The sources of station observations are:

- HURDAT reanalysis data (NOAA); Landsea and Franklin 2013; Landsea et al., 2014; Hagen et al., 2012; Delgado et al., 2018, Delgado and Landsea 2020a, 2020b
- National Hurricane Center reports (NOAA) <https://www.nhc.noaa.gov/data/publications.php>, <https://www.nhc.noaa.gov/data/tcr/>
- ISD from National Climatic Data Center (NCDC, National Oceanic and Atmospheric Administration, NOAA); Lott et al., 2001; Smith et al., 2011
- Florida Coastal Monitoring Program (FCMP); Masters 2004; Balderrama et al., 2011
- TTUHRT from Texas Tech University, Weiss and Schroeder 2008
- Weatherflow: Proprietary data from hurricane hardened network and a professional observation network
- MDA Federal: Commercial data provider of public-domain data, including Automated Surface Observing System (ASOS), Coastal Marine Automated Network (C-MAN) and buoy data from National Data Buoy Center (NDBC, NOAA)

Figure 18 to Figure 26 show footprints and time series at two example stations for hurricanes Charley (2004), Wilma (2005), Irma (2017), and Michael (2018). The reconstruction of Hurricane Irma uses a further step, which modifies the optimized footprint using spatially smoothed differences between the modeled and observed maximum peak gusts (e.g., Barnes 1964). The figures in this section and the exhibits in [Disclosure S-1.1](#) are based on the wind field generated by the Moody's stochastic model before this final adjustment step.

Figure 18: Footprint of Hurricane Charley (2004). Shown is the maximum 3-second peak gust (in mph). The triangles are stations and are colored according to the observed maximum peak gust. Gray triangles indicate stations that failed and did not record the maximum 3-sec gust. The pink markers indicate the stations for which a time series is shown in [Figure 19](#).

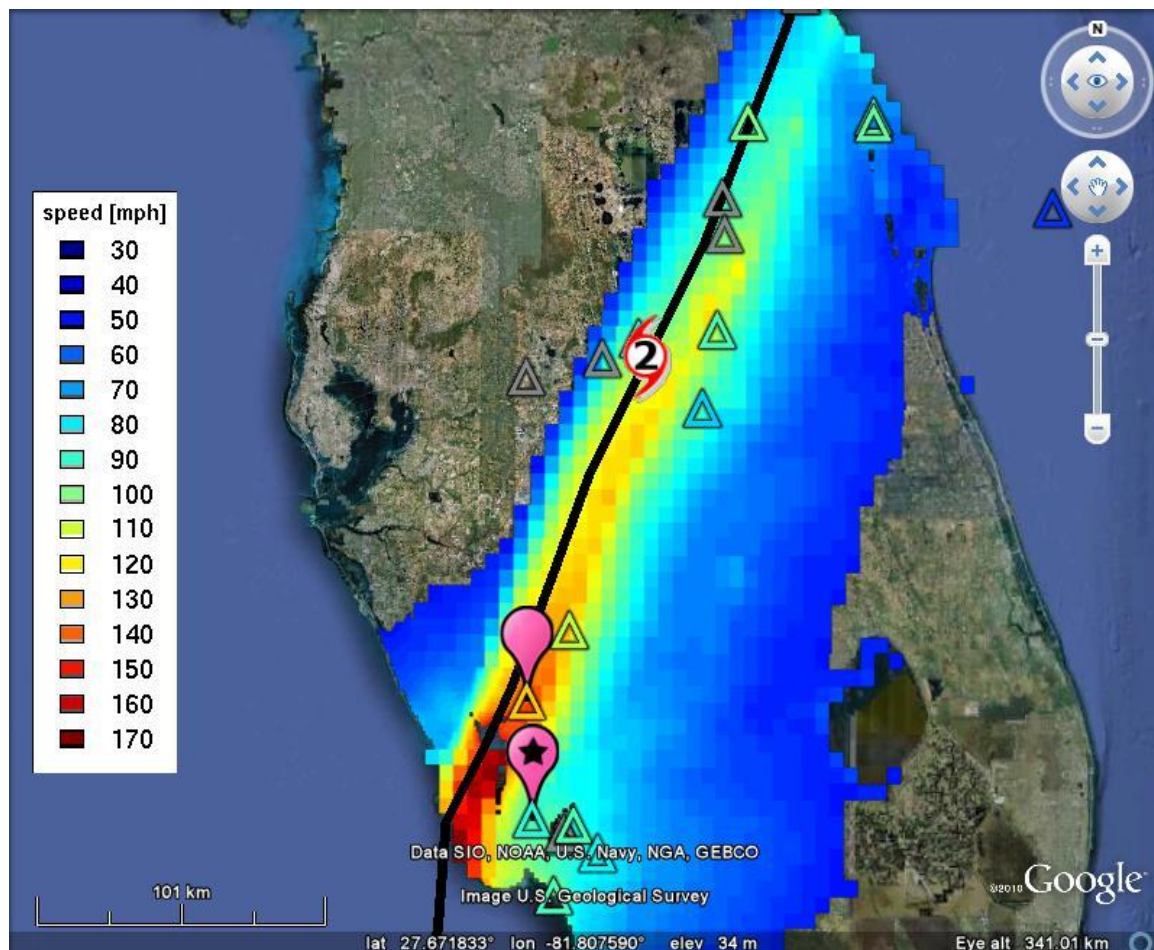


Figure 19: Two station time series of 3-second gust wind speeds comparing model with observations for Hurricane Charley (2004)

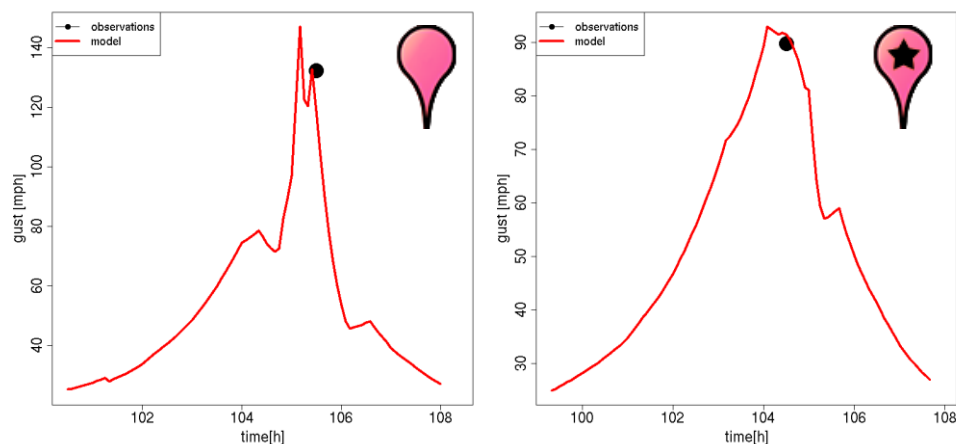


Figure 20: As Figure 18 but for Hurricane Wilma (2005)

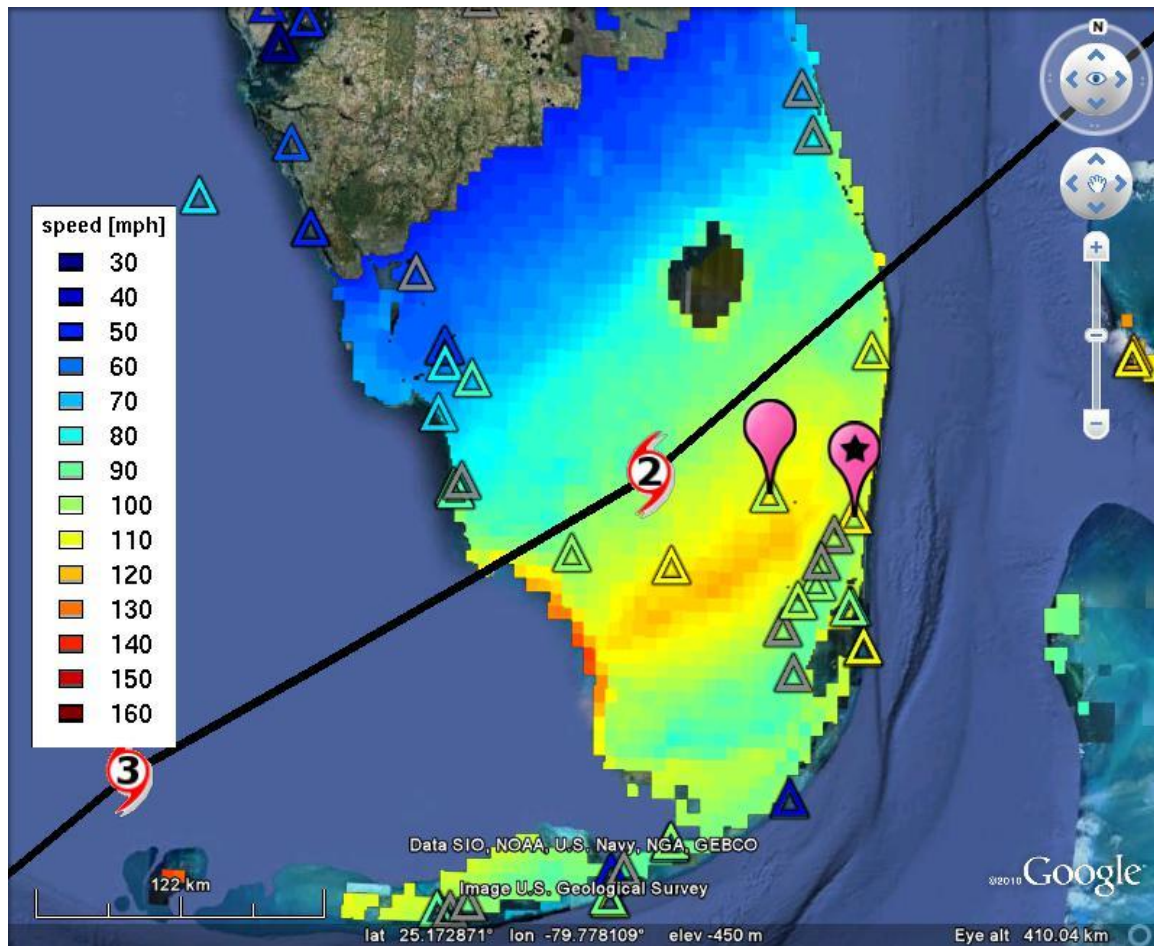


Figure 21: Two station time series of 3-second gust wind speeds comparing model with observations for Hurricane Wilma (2005)

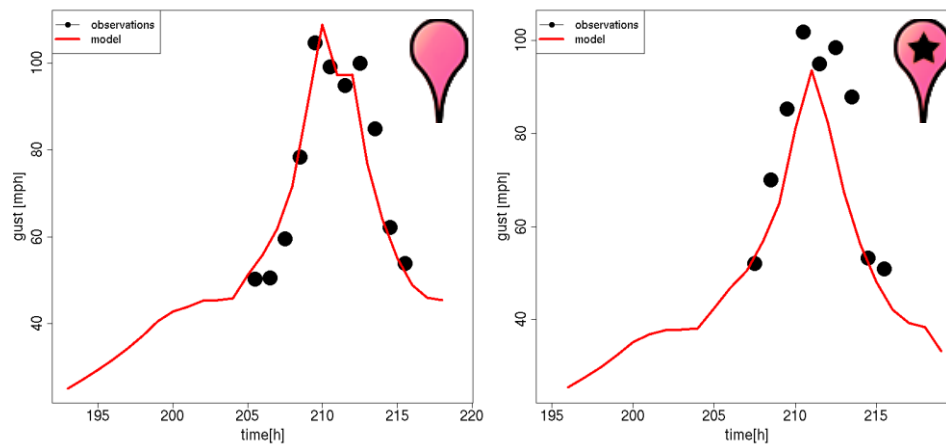


Figure 22: As Figure 18 but for Hurricane Irma (2017)

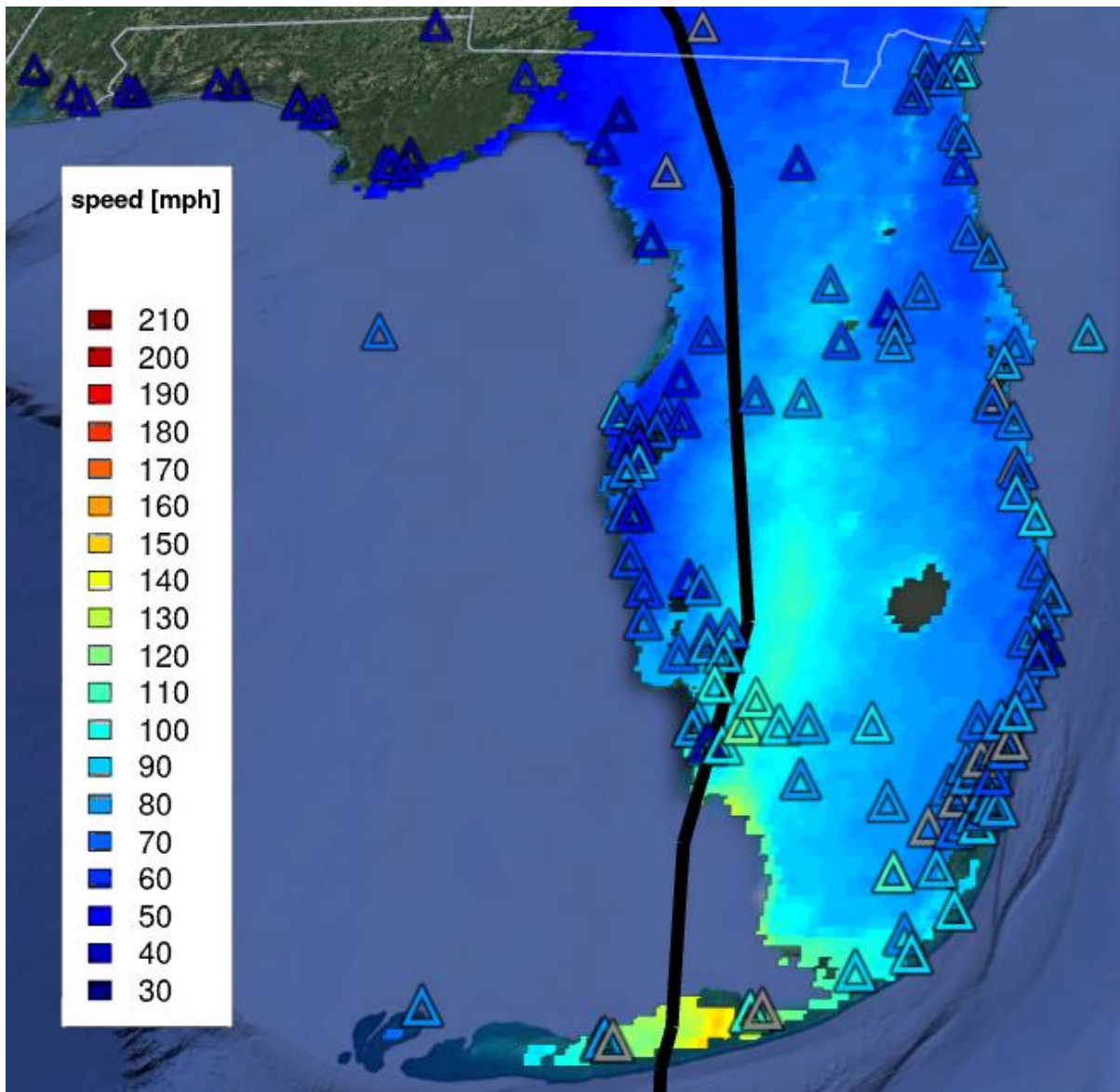


Figure 23: Zoom on Southern Florida for Hurricane Irma (2017)

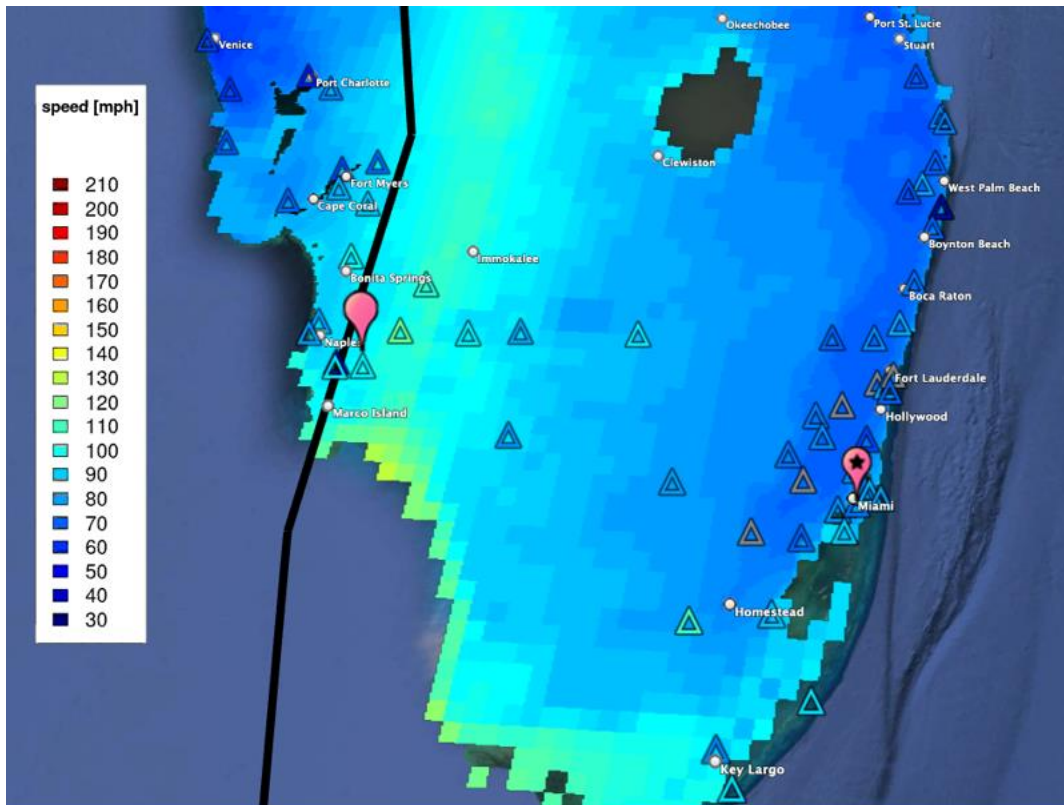


Figure 24: Two station time series of 3-second gust wind speeds comparing model with observations for Hurricane Irma (2017)

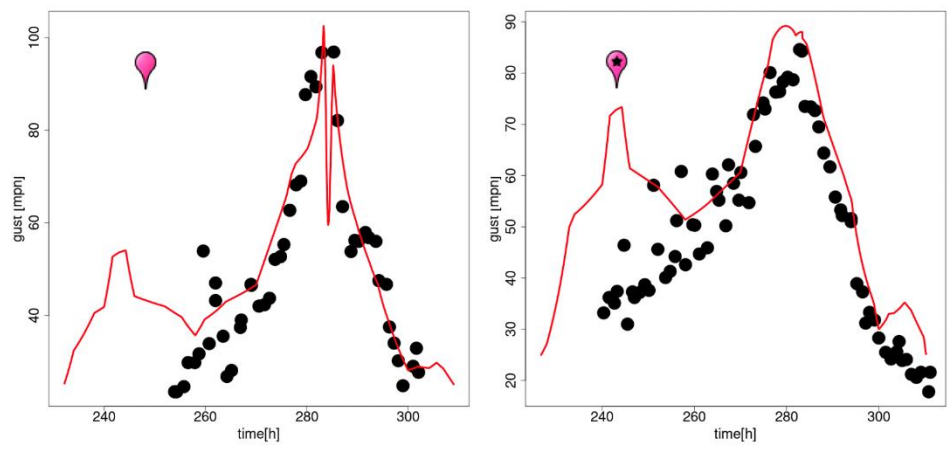


Figure 25: As Figure 18 but for Hurricane Michael (2018). Most anemometers around landfall and along the track failed, and they are shown in gray.

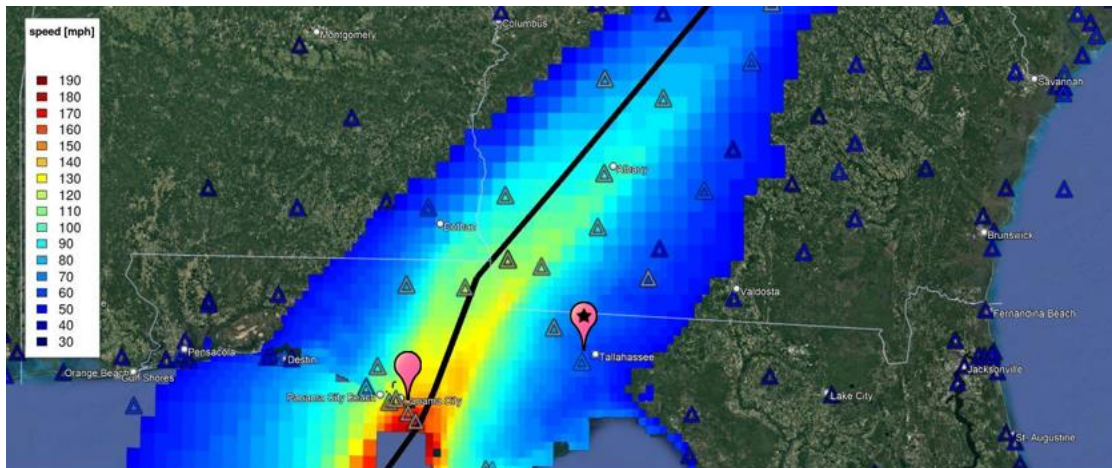
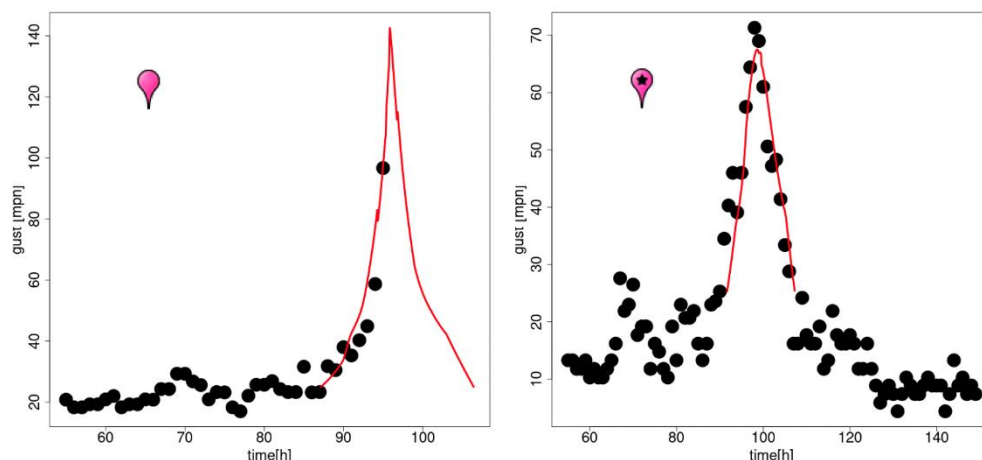


Figure 26: Two station time series of 3-second gust wind speeds comparing model with observations for Hurricane Michael (2018)



M-4.9 Describe how the hurricane model windfield is consistent with the inherent differences in windfields for such diverse hurricanes as Hurricane Charley (2004), Hurricane Wilma (2005), Hurricane Irma (2017), and Hurricane Michael (2018).

Charley (2004), Wilma (2005), Irma (2017), and Michael (2018) vary substantially from each other. Charley was an intense storm (Category 4) with a small R_{max} and a fast filling rate, while Wilma was weaker (Category 3) but affecting a larger area (large R_{max}) with a slow filling rate. Irma made two landfalls, in the Keys (Category 4) and on Marco Island (Category 3), then traveled north through Florida. Irma had a broad structure and caused strong winds over almost the entire Florida peninsula. Michael was the strongest of these storms, and the most intense on record to make landfall in the Florida panhandle (Category 5). It was still intensifying as it made landfall and went on to produce strong winds far inland in Florida and across state borders. Although more intense than Irma, Michael was a much more compact storm. The variability in storm intensity and structure is taken into consideration by assigning a set of realistic track parameters (V_{max} , R_{max} , etc.) to each of these storms. As demonstrated in [Disclosure M-4.8](#), modeled wind fields are in agreement with observations for these four hurricanes.

M-4.10 Describe any variations in the treatment of the hurricane model windfield for stochastic versus historical storms and justify this variation.

Stochastic and historical storms are modeled with the same wind field model. In the stochastic catalog the gusts over land reflect the changes in land-use land-cover data described in [Standard M-4.B](#). For historical events up to and including 2008, the gusts are calculated as in the 2013 Standards of the Florida Commission on Hurricane Loss Projection Methodology (land-use and land-cover database shall be consistent with NLCD 2006 or later), which is consistent with the urban exposures of the 2004–2005 seasons. For historical events from 2009 onwards, gusts are calculated using the land-use land-cover data as described in [Standard M-4.B](#) (in Florida, this pertains to hurricanes Hermine, Matthew, Irma, Nate, Michael, Dorian, Sally, Zeta, Elsa, Ian, and Nicole). For Hurricane Irma and Ian, the wind field is also modified as described in [Disclosure M-4.8](#) to improve the match with observations.

M-4.11 Provide a completed Form M-2. Provide a link to the location of the form [\[Form M-2\]](#).

M-4.12 State whether the hurricane model simulates surface winds directly or requires conversion between some other reference level or layer and the surface. Describe the source(s) of conversion factors and the rationale for their use. Describe the process for converting the modeled winds to surface winds, including the treatment of the inherent uncertainties in the conversion factors with respect to location of the site compared to the radius of maximum winds over time. Justify the variation in the surface winds conversion factors as a function of hurricane intensity and distance from the hurricane center.

The wind field model directly simulates 1-minute mean winds equivalent over water.

M-4.13 Describe how the windspeeds generated in the windfield model are converted from sustained to gust and identify the averaging time.

The wind field model first simulates 1-minute mean winds equivalent over water. These are converted to local 3-second gust wind speeds in two stages: first, the 1-minute mean winds equivalent over water are converted to 1-minute mean winds over local terrain by applying the local roughness coefficient. Then, these 1-minute mean winds over local terrain are converted to 3-second gusts over local terrain by applying the local gust coefficient. The Moody's gust coefficients are a function of roughness lengths and follow the ones published in the scientific literature: Deaves and Harris (1978), Harris and Deaves (1980), Deaves (1981).

The table below lists the gust factor values for four different land-use classes.

Table 8: Gust factors for typical land-use classes

Typical Land Use	1-Minute to 3-Second Gust Factor
Water	1.15
Open terrain	1.22
Suburban	1.39
City center	1.52

M-5 Hurricane Intensity Change Methodologies

A. The hurricane intensity change methodology used by the hurricane model shall be consistent with current state-of-the-science.

The Moody's inland filling model simulates central pressure decay rates that are consistent with historical records as demonstrated in [Disclosure M-5.3](#) and [Disclosure S-1.5](#). The model follows a methodology similar to the one proposed in Vickery (2005) and is described in detail in Colette et al. (2010).

B. The transition of winds from over-water to over-land within the hurricane model shall be consistent with current state-of-the-science.

The transition of winds from over water to over land is modeled using well accepted wind engineering methods following Cook (1985, 1997). Land-use land-cover data is sampled upstream of each site along eight different directional sectors. The methodology has been validated against the most recent measurements (e.g., Zhu et al., 2010, Masters 2004) from hurricanes Rita and Ike.

C. Intensity change of hurricanes that pass from over land to over water shall be consistent with current state-of-the-science.

When a storm exits land, the hurricane central pressure ceases to be determined by the inland decay model described in [Disclosure M-5.1](#), and returns to be governed by the offshore central pressure model. The use of separate inland and offshore models is common in the scientific literature (see for example Bloemendaal et al., 2020).

M-5.1 Describe and justify the functional form of hurricane decay rates for hurricanes moving onshore

Hurricane decay rates are modeled through the Moody's over land intensity model, also called "inland filling model." This filling process happens shortly after landfall as storms are removed from their primary energy source, namely the heat fluxes from the warm oceanic tropical waters. The formulation of the model follows the one proposed by Vickery (2005):

Equation 2

$$P_c(t - t_0) = FFP - (FFP - P_c(t_0))e^{-\alpha(t-t_0)}$$

where:

- P_c is the storm central pressure
- t_0 is the time of landfall
- FFP is the far field pressure
- α inland filling rate

In Florida, the inland filling rate is drawn from a normal distribution with a mean that depends on pressure difference ($FFP - P_c(t_0)$), translational speed and R_{max} at the time of landfall, as well as two predictors that describe the proportion of the storm over different terrain at and just after the time of landfall: the proportion of the storm to the right of the track that is over water, and the proportion of the storm that is over terrain classified as urban or forest.

On average, small storms fill faster than large storms, intense storms fill faster than weak storms and fast moving storms fill faster than slow moving storms. Also, storms hitting the south tip of Florida and keeping a large area of their circulation over water will fill more slowly than more generic landfalling storms.

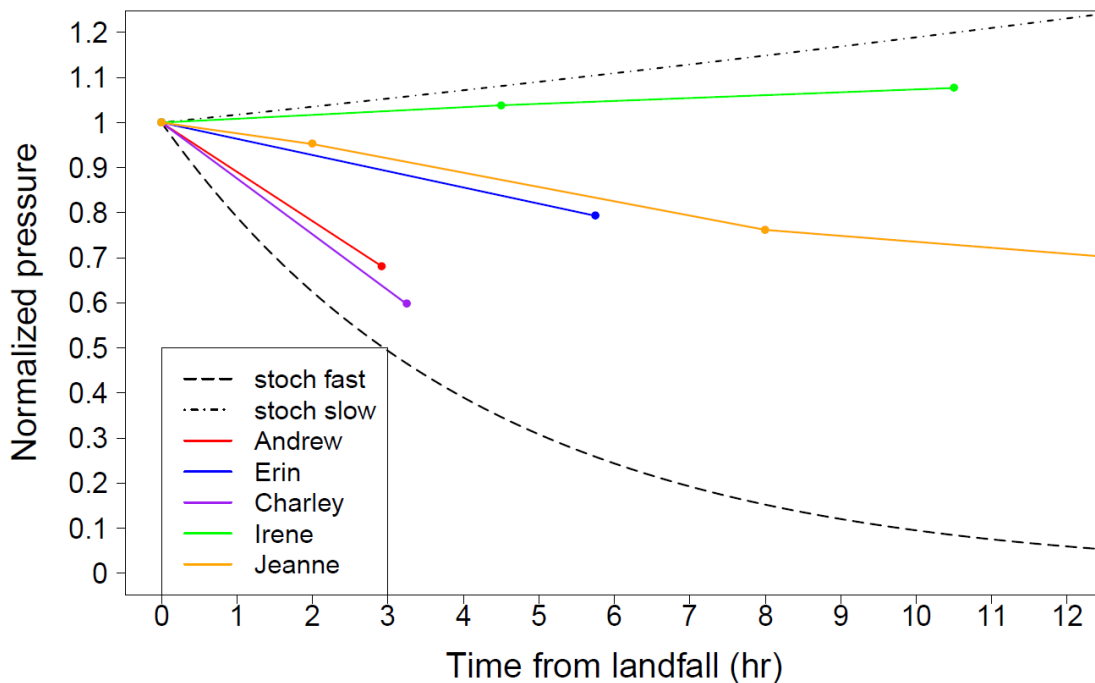
M-5.2. Describe and justify the functional form of hurricane intensity change for hurricanes moving offshore.

When a storm moves from land to over water, its central pressure evolution returns to be determined by the offshore model described in [Disclosure M-2.4](#). The model coefficients vary in space to reflect the behavior of observed storms close to any site. This setup ensures that the intensity changes as storms move from land to water are consistent with the intensity evolution of historical storms that move offshore nearby.

M-5.3 Provide a graphical representation of the modeled and observed temporal decay rates of wind or central pressure for Florida hurricanes.

[Figure 27](#) illustrates a comparison of the normalized central pressure time series for key historical Florida land-falling storms compared with the Moody's stochastic set's fastest (0.1th percentile) and slowest (99.9th percentile) filling rates. This figure demonstrates that the Moody's inland filling model is able to capture the full population of observed decay rates ranging from fast decay (Andrew 1992, Charley 2004) to slow decay (Erin 1995, Jeanne 2004) or even weak intensification for low intensity storms hitting the south tip of Florida (Irene 1999).

Figure 27: Normalized central pressure time series as a function of time from landfall. The dashed black lines give the stochastic model envelope (0.1th and 99.9th percentiles). Colored time series correspond to historical central pressure time series.



To perform a comparison between observed and modeled wind speeds, Moody's scientists have reconstructed historical events starting from the modeled central pressure time series and not the historical HURDAT central pressure time series. The modeled pressure time series has been calculated using the Moody's inland filling model (given the storm characteristics). This pressure time series is used to develop a wind footprint that is compared to station observations. [Figure 28](#) presents one of these comparisons for Hurricane Frances 2004. This figure shows the model-derived peak gust footprint (in mph) for Hurricane Frances 2004 with wind stations used for comparison. [Figure 29](#) is a scatterplot of modeled 3-second gusts compared with observed hourly

maximum 3-second gusts from the stations. Table 9 presents the maximum gusts recorded and modeled at both inland and coastal stations. There is no systematic bias between modeled and observed gusts (both for coastal and inland stations).

Figure 28: Three-second gust wind footprint (in mph) for Hurricane Frances (2004). Triangles locate a subset of stations used for the reconstruction. As mentioned in the text, the central pressure time series is given by the Moody's inland filling model and not by the HURDAT time series.

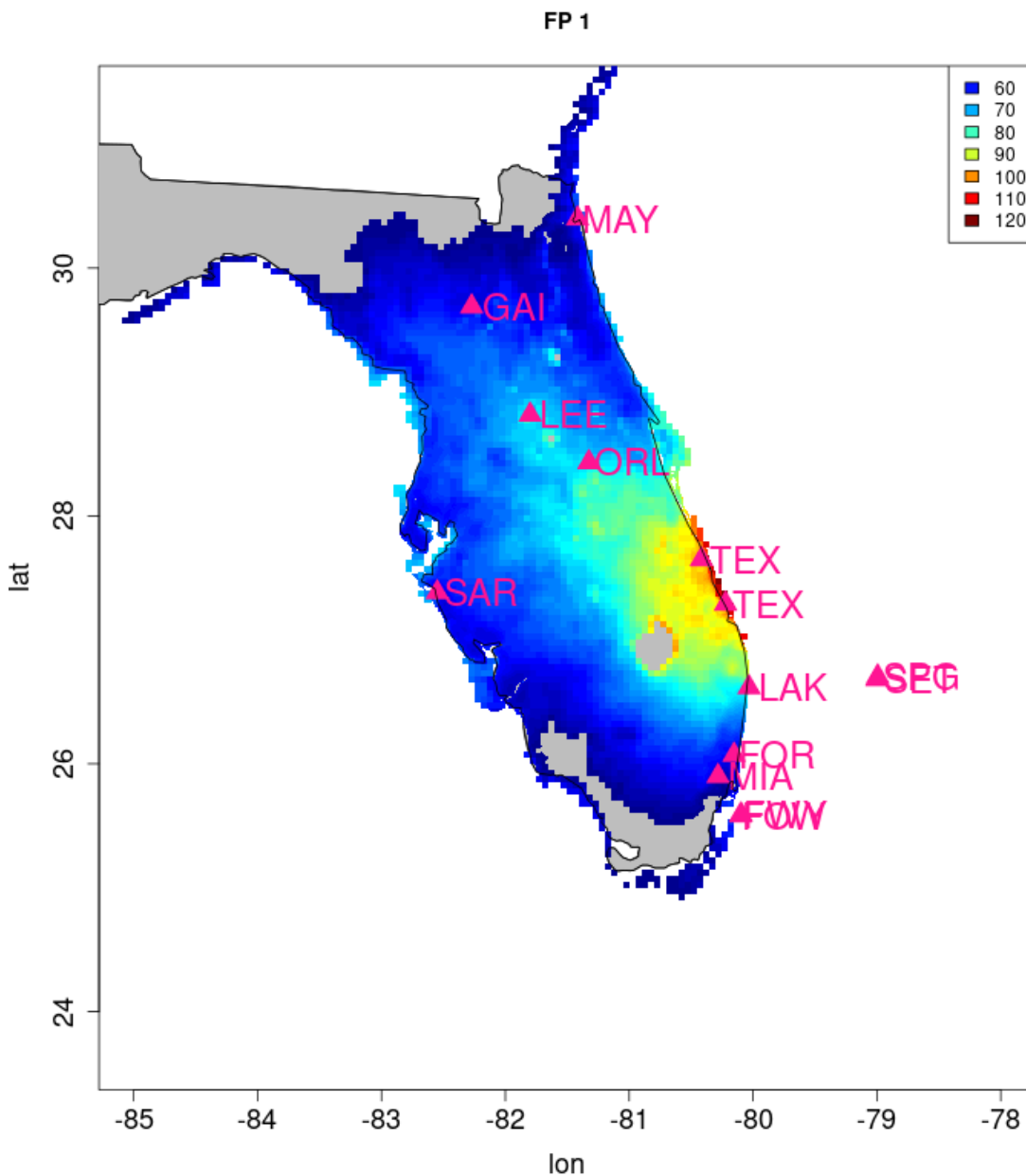


Figure 29: Scatterplot of modeled versus observed 3-second gusts (mph) for Hurricane Frances

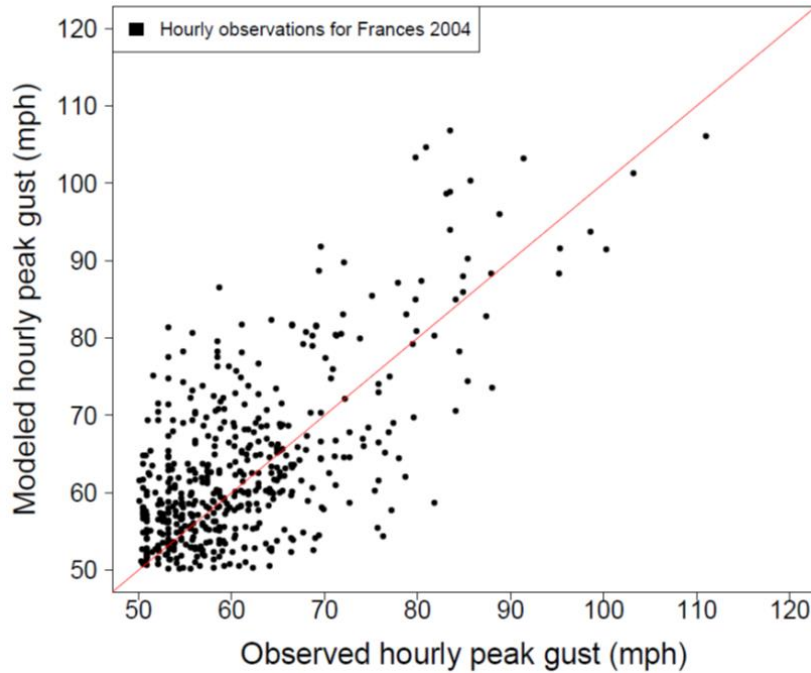


Table 9: Observed and modeled maximum peak gusts at the stations with locations given in Figure 28

Code	Station_name	Observed Peak Gust (mph)	Modeled Peak Gust (mph)
FWY	FWYF1	65.8	64.1
SET	SETTLEMENT POINT	91.4	106.8
SPG	SPGF1	111	106.0
TEX	TexasTech Frances 04 SBCCOM_CI	95.3	91.6
MIA	MIAMI/OPA LOCKA	55.8	54.3
LAK	LAKE WORTH	75.1	90.1
TEX	TexasTech Frances 04 WEMITE 1	85.7	104.7
FOW	FOWEY ROCKS	65.7	64.1
ORL	ORLANDO INTL ARPT	71.2	73.8
FOR	FORT LAUDERDALE HOLLYWOOD INT	56.9	56.7
MAY	MAYPORT NS	60.4	59.9
LEE	LEESBURG MUNI ARPT	61.8	70.3
GAI	GAINESVILLE REGIONAL AP	66.4	55.4

M-5.4 Describe any changes in hurricane parameters, other than intensity, resulting from the transition from over-water to over-land.

Except for central pressure, all other hurricane parameters have a single model that is applied both over-water and over-land. As a reminder, because the Rmax model is dependent on central pressure, storms have a tendency to increase in size after landfall.

M-5.5 *Describe the representation in the hurricane model of passage over non-continental United States (U.S.) land masses on hurricanes affecting Florida.*

Hurricanes affecting Florida are part of the Moody's North Atlantic hurricane track set. If a storm hits Cuba or Hispaniola, the inland filling model is triggered causing a weakening in storm intensity before it goes back over water. In the vicinity of Puerto Rico, storms have also a tendency to decay rather than intensify (as can be demonstrated from the HURDAT2 records).

M-5.6 *Describe any differences in the treatment of decay rates in the hurricane model for stochastic hurricanes compared to historical hurricanes affecting Florida.*

When modeling historical events, Moody's uses observed central pressure time series as available in HURDAT2. Nevertheless, [Disclosure M-5.3](#) has demonstrated that historical reconstructions using modeled central pressure time series can accurately simulate station wind observations.

M-6 Logical Relationships of Hurricane Characteristics

- A. The magnitude of asymmetry shall increase as the translation speed increases, all other factors held constant.**

The magnitude of the asymmetry increases with increasing translational speeds, all other factors being held constant, as described in [Disclosure M-6.1](#).

- B. The mean windspeed shall decrease with increasing surface roughness (friction), all other factors held constant.**

The mean wind speeds decrease with increasing surface roughness; all other factors being held constant. Increasing surface roughness acts to decrease the mean wind speed. Over a smooth surface, such as open-water, the amount of momentum required to overcome the surface shear stress is less than that for a rough surface, such as suburban or urban areas. Each surface will result in a different mean wind profile, with the mean wind speed being greater near the surface for smoother surfaces than rougher surfaces. This can be simply confirmed by evaluating the influence of surface roughness (via the aerodynamic roughness length) in the logarithmic law ("log-law") wind profile. Wind speed V at height z is given by

Equation 3

$$V(z) = \frac{u_*}{\kappa} \log\left(\frac{z}{z_0}\right)$$

where: u_* is the friction velocity, κ is von Karman's constant (≈ 0.4) and z_0 the aerodynamic roughness length. Holding all parameters constant and assessing z_0 values for open-water (0.001 m), open-country (0.03 m) and urban (1.0 m), the resulting mean wind speeds **relative** to the open-water case for open-country and urban are 0.63 and 0.25, respectively. This confirms that increasing surface roughness results in decreasing mean wind speeds.

- M-6.1 Describe how the asymmetric structure of hurricanes is represented in the hurricane model.**

At each time step, the wind field is first computed relative to the moving frame. At this stage, the wind field is symmetric and is given by the vector field: $\mathbf{v}_r(r)$. The absolute wind field $\mathbf{v}_a(r, \theta)$ is obtained by performing the following vector sum:

Equation 4

$$\mathbf{v}_a(r, \theta) = \mathbf{v}_r(r) + \beta \mathbf{v}_t$$

where: $\mathbf{v}_t$ is the translational speed of the storm and β is a scalar lower than 1.

- M-6.2 Provide a completed Form M-3. Provide a link to the location of the form in the submission appendix [Form M-3].**

- M-6.3 Explain the radii ranges for each central pressure band in Form M-3 in the context of available hurricane observations. Justify the appropriateness of the databases used in the radii validations.**

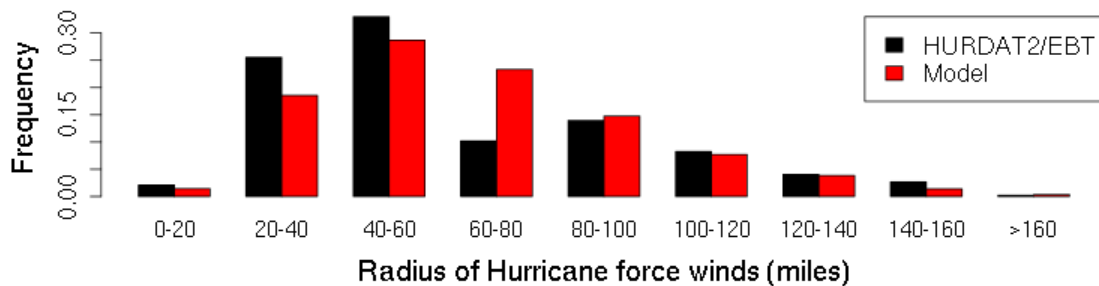
Modeled radii of maximum winds (Rmax), hurricane force winds, and gale force winds have been compared to historical values in HURDAT2, supplemented by values in the extended best track dataset (Demuth et al., 2006) for periods over which HURDAT2 is not available. The comparison has been made using all tropical hurricanes in the basin, and not only storms hitting Florida. The

comparison is generally very good, with the stochastic model spanning the range of observed values.

As an example, [Figure 30](#) shows the comparison between historical and modeled radii of hurricane force winds for hurricanes having a central pressure between 930 and 970 hPa. We can see that the two distributions are close and that the model is capturing small storms like Charley 2004 and large storms like Isabel 2003 or Ike 2008.

For the radius of gale force winds, it should be noted that the model has a tendency to simulate slightly smaller radii than the values available in the extended best track dataset, especially on the low side of the distribution.

Figure 30: Radius of hurricane force wind histograms comparing observed radii from HURDAT2 and Extended Best Track Datasets (HURDAT2/EBT) (in black) with simulated radii (in red) for hurricanes having a central pressure between 930 and 970 hPa



M-6.4 Describe the dependencies among parameters in the windfield component and how they are represented in the hurricane model.

See the response to [Disclosure M-2.3](#).

STATISTICAL HURRICANE STANDARDS

S-1 Modeled Results and Goodness-of-Fit

- A. *The use of historical data in developing the hurricane model shall be supported by rigorous methods published in current scientific literature and current technical literature.***

Moody's uses empirical methods in model development and implementation to match stochastic storm generation to historical data. These methods are supported by those described in currently accepted scientific literature and are outlined in Standards [M-2](#) and [M-3](#).

- B. *Modeled results shall reflect statistical agreement with historical data or the Model Base Hurricane Set using current scientific and statistical methods for the academic disciplines appropriate for the various hurricane model components. Any differences shall be justifiable.***

The results of the Moody's model are checked at all stages of development to ensure that the stochastic storm set includes physically realistic hurricanes and preserves the statistical characteristics of historical data. In addition, vulnerability curves have been developed based largely on actual event insured loss data.

Extensive comparisons using accepted scientific and statistical methods reflect good agreement between modeled and historical data. The checks performed by Moody's include goodness-of-fit tests for the following:

- Central pressure (CP)
- Maximum 1-minute sustained wind (Vmax)
- Translational speed (also known as forward speed)
- Radius-to-maximum winds (Rmax)
- Landfall frequency
- Track crossing frequencies over a grid covering Florida

S-1.1 *Describe the nature and results of the tests performed to validate the windspeeds generated.*

Wind speeds have been extensively validated against station data (from NOAA, Florida Coastal Monitoring Program, Texas Tech University, and Weatherflow) over land, and HWind and buoy data (from the National Data Buoy Center) over water. The modeled wind speeds are compared to observed data both at specific time steps (snapshot comparisons) and in terms of the maximum achieved at each location (footprint comparisons).

The example validations presented in this section compare model and station data for several storms, including Andrew (1992) and all the historical events from 2004 onward, at locations in Florida and a buffer surrounding it. Observed and modeled wind speeds are 3-second peak gusts.

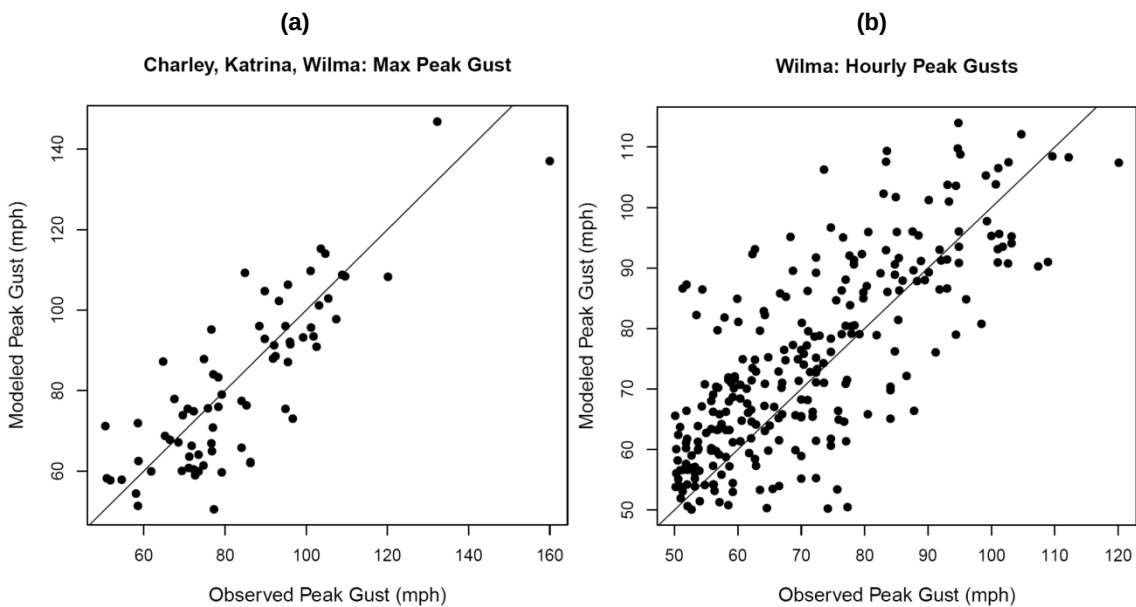
We tested for overall bias in the estimates by comparing the average modeled wind speed to the average observed wind speed. In terms of maximum at station locations, the model very slightly over-estimates the observed winds by less than 0.4 mph over all footprints. The comparison over all snapshots indicates that on average the modeled wind speeds are above the observed by approximately 3 mph. The proportion of data points for which the modeled values are within 10, 20, 30, and 40 percent of the observed wind speeds are shown in [Table 10](#) for all footprints and all snapshots.

Table 10: Portion of modeled wind speeds within 10%, 20%, 30%, and 40% of the observed value

Difference Range	Proportion of Data Points	
	Footprints	Snapshots
$\pm 10\%$	59%	55%
$\pm 20\%$	85%	83%
$\pm 30\%$	95%	94%
$\pm 40\%$	99%	98%

Several graphical validations of observed versus modeled wind speeds are shown in [Standard M-4](#), including footprints with overlaid observations, as well as example modeled and observed time series at several stations.

Additional graphical comparisons are shown in [Figure 31](#). [Figure 31\(a\)](#) is a scatterplot of modeled versus observed wind speeds for the footprints of Charley (2004), Katrina (2005), and Wilma (2005). Observed and modeled snapshot data are compared in [Figure 31\(b\)](#) for Hurricane Wilma (2005). Both scatterplots demonstrate a reasonable agreement between modeled and observed wind speeds.

Figure 31: Modeled versus observed wind speeds (3-second peak gust)

S-1.2 Provide the dates of hurricane loss of the insurance company hurricane claims data used for validation and verification of the hurricane model.

The year of the loss is given below:

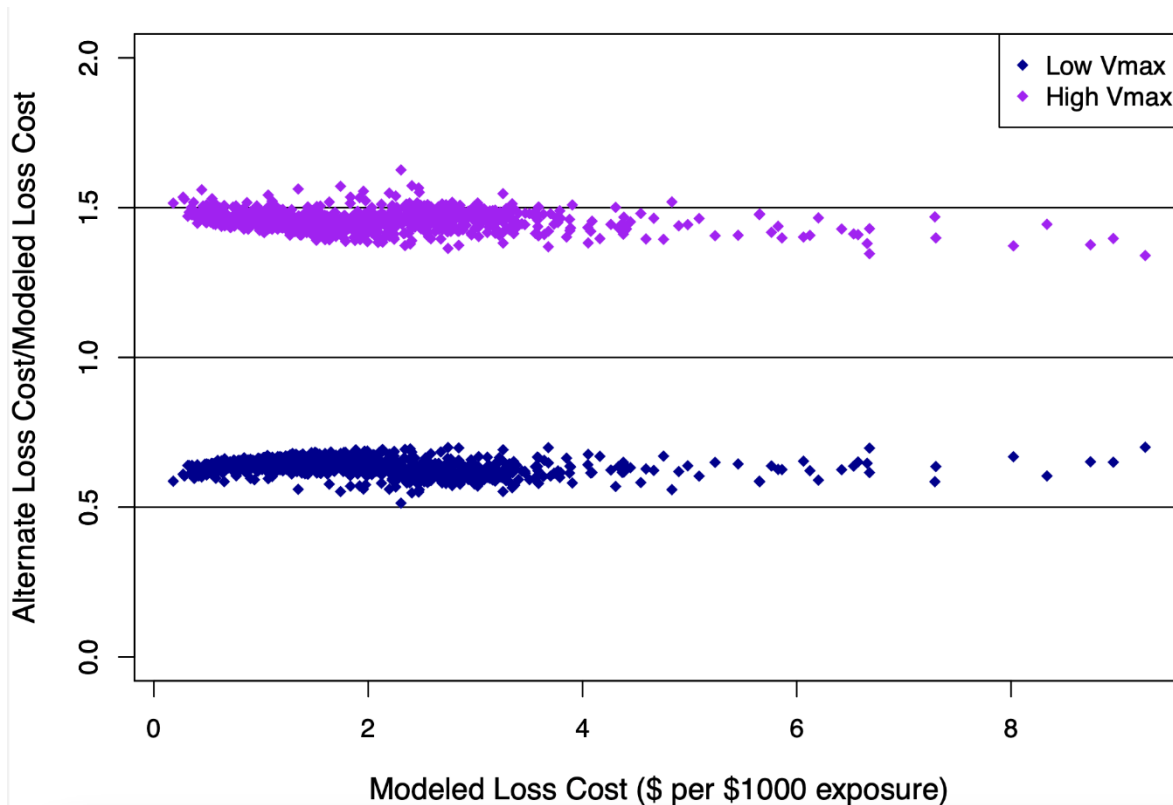
- Hugo–1989
- Bob–1991
- Andrew–1992
- Erin–1995
- Opal–1995

- Fran–1996
- Georges–1998
- Charley–2004
- Frances–2004
- Ivan–2004
- Jeanne–2004
- Dennis–2005
- Katrina–2005
- Rita–2005
- Wilma–2005
- Ike–2008
- Irene–2011
- Isaac–2012
- Sandy–2012
- Matthew–2016
- Irma–2017
- Michael–2018
- Delta–2020
- Laura–2020
- Ian–2022

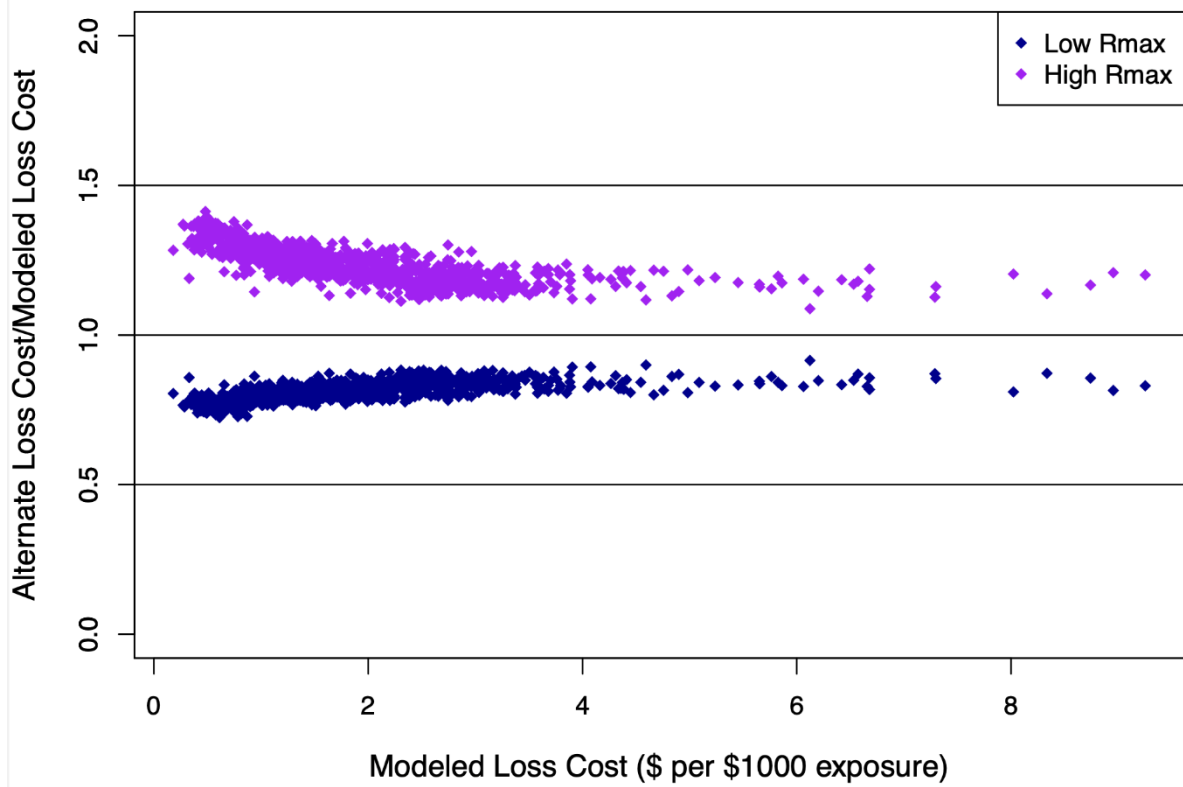
S-1.3 *Provide an assessment of uncertainty in hurricane probable maximum loss levels and hurricane loss costs for hurricane output ranges using confidence intervals or other scientific characterizations of uncertainty.*

The uncertainty analysis presented in the RiskLink 11.0.SP2c submission in Form S-6 identified far field pressure (FFP) and central pressure (CP) as the main contributors to the uncertainty in loss costs, followed by the radius to maximum winds (Rmax). Further analysis of the uncertainty in loss cost for output ranges focuses on intensity and size, as previous submissions have shown the other parameters to contribute considerably less to the total uncertainty. Since the maximum sustained wind (Vmax) depends on both FFP and CP, this one parameter is used in this disclosure to assess the uncertainty in loss cost due to uncertainty in intensity.

Figure 32 shows the uncertainty in loss costs for output ranges due to the uncertainty in Vmax. In the figure, each point represents the average annual loss per \$1,000 of exposure for a ZIP Code. Vmax is set to "low" and "high" values to obtain alternate loss costs, which are compared to the original losses. The 5 percent and 95 percent confidence bounds on the Vmax CDF are used to set the "low" and "high" limits (the 99 percent confidence bounds are shown in Figure 37). The blue (purple) points show the ratio of alternate to original loss costs when Vmax is set to "low" ("high") versus the loss cost resulting from the original modeled Vmax.

Figure 32: Uncertainty in loss costs due to Vmax

The uncertainty in the loss costs for output ranges due to the uncertainty in the Rmax cumulative distribution function is shown in [Figure 33](#). Each point represents the average annual loss per \$1,000 of exposure for a ZIP Code. Rmax is set to "low" and "high" values to obtain alternate loss costs for comparison with the original losses. The 5 percent and 95 percent confidence bounds on the Rmax CDF are used to set the "low" and "high" limits (the 99 percent confidence bounds are shown in [Figure 40](#)). The blue (purple) points show the ratio of alternate to original loss costs when Rmax is set to "low" ("high") versus the loss costs corresponding to the original modeled Rmax.

Figure 33: Uncertainty in loss costs due to Rmax

Similar analyses were performed for several return level losses at the high end of the distribution. [Figure 34](#) and [Figure 35](#) show the effect of uncertainties in Vmax and Rmax on 100-year ZIP Code losses. Comparison of [Figure 32](#) and [Figure 34](#) demonstrates that the effect of the uncertainty in Vmax is fairly similar for 100-year losses to the effect for the loss costs. The uncertainty in Rmax impacts the 100-year loss ([Figure 35](#)) less than the loss cost ([Figure 33](#)) for the majority of ZIP Codes, although with a greater variability across ZIP Codes.

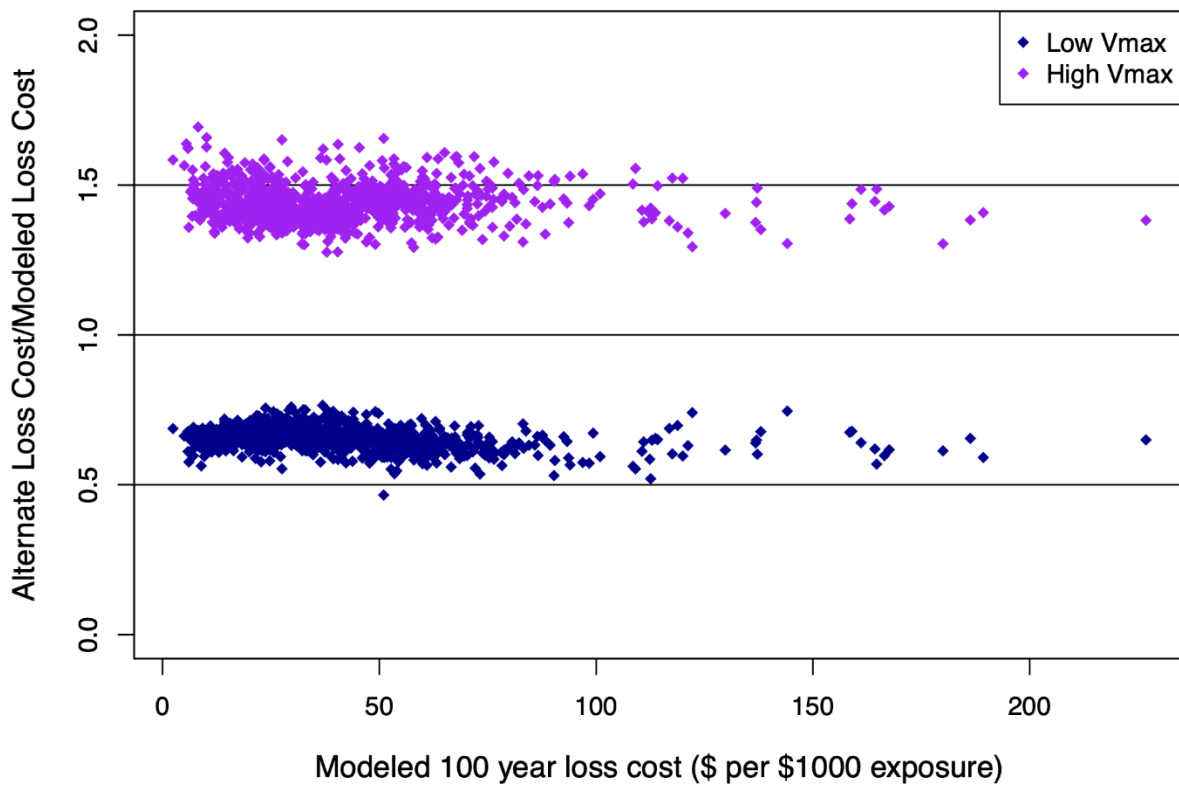
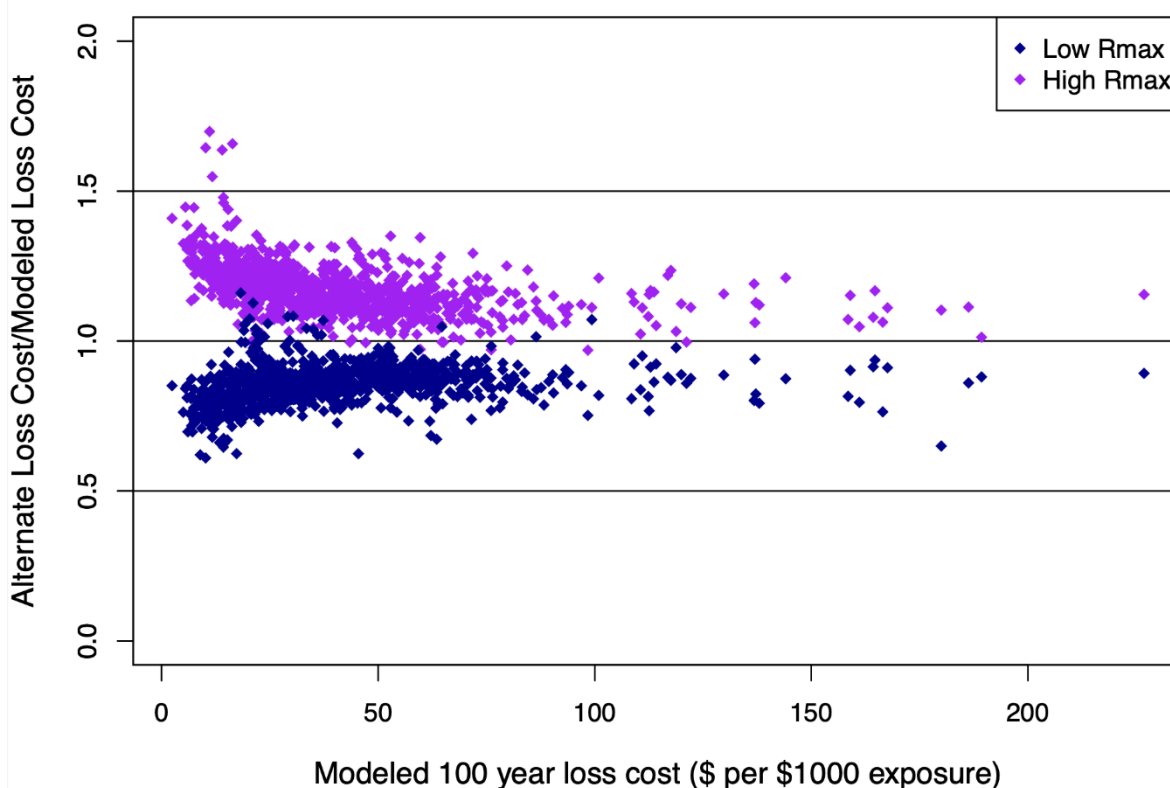
Figure 34: Uncertainty in 100-year loss due to Vmax

Figure 35: Uncertainty in 100-year loss due to Rmax

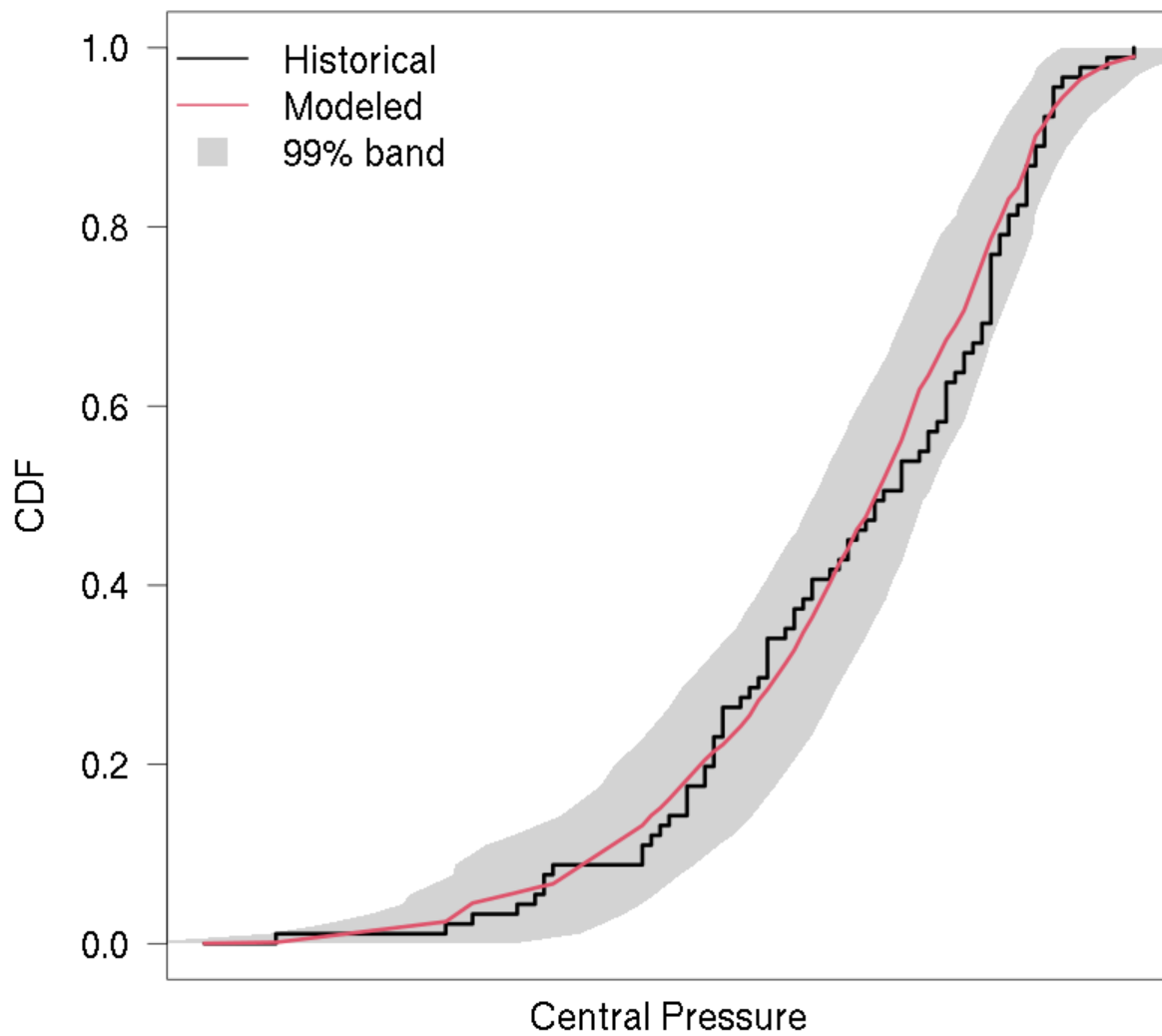
S-1.4 Justify any differences between the historical and modeled results using current scientific and statistical methods in the appropriate disciplines.

Historical and modeled results are in agreement according to currently accepted statistical methods.

S-1.5 Provide graphical comparisons of modeled and historical data and goodness-of-fit tests. Examples to include are hurricane frequencies, tracks, intensities, and physical damage.

Intensity – Central Pressure, Vmax and Inland Filling Rate

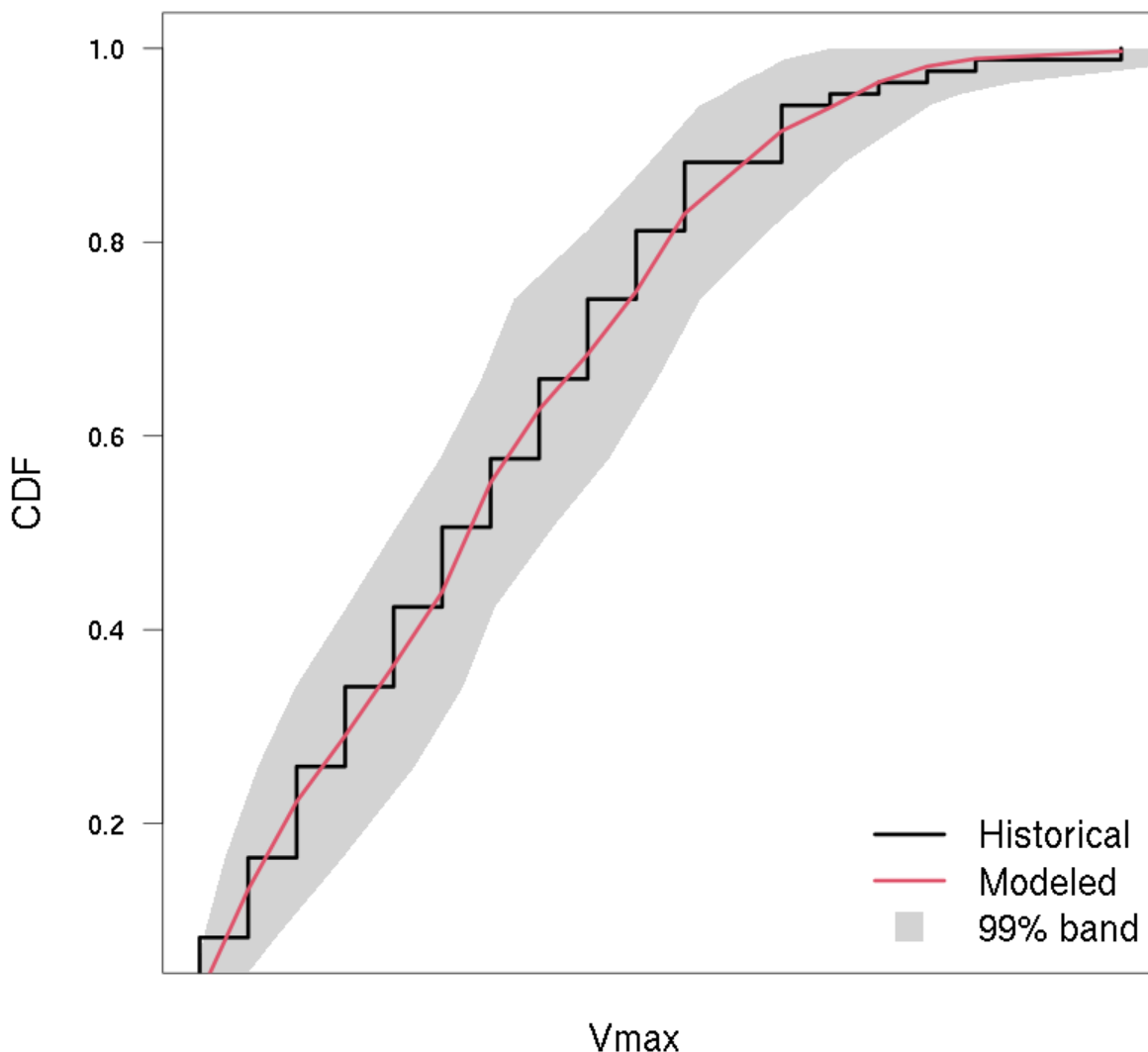
Figure 36 shows a comparison of stochastic and observed central pressure distributions in Florida and neighboring states. The observed and modeled cumulative distribution functions (CDFs) are shown in black and red respectively. The gray area represents a pointwise 99 percent band around the modeled CDF.

Figure 36: Central pressure cumulative distribution function (CDF)

The Kolmogorov-Smirnov test corresponding to the CDFs in the figure above produces a p-value of 37 percent. A chi-square test with eight cells produces a p-value of 11 percent. The historical data used for comparison is from the HURDAT2 database landfalls, for the 1900-2022 period.

Figure 37 shows a similar comparison for Vmax.

Figure 37: Vmax cumulative distribution function

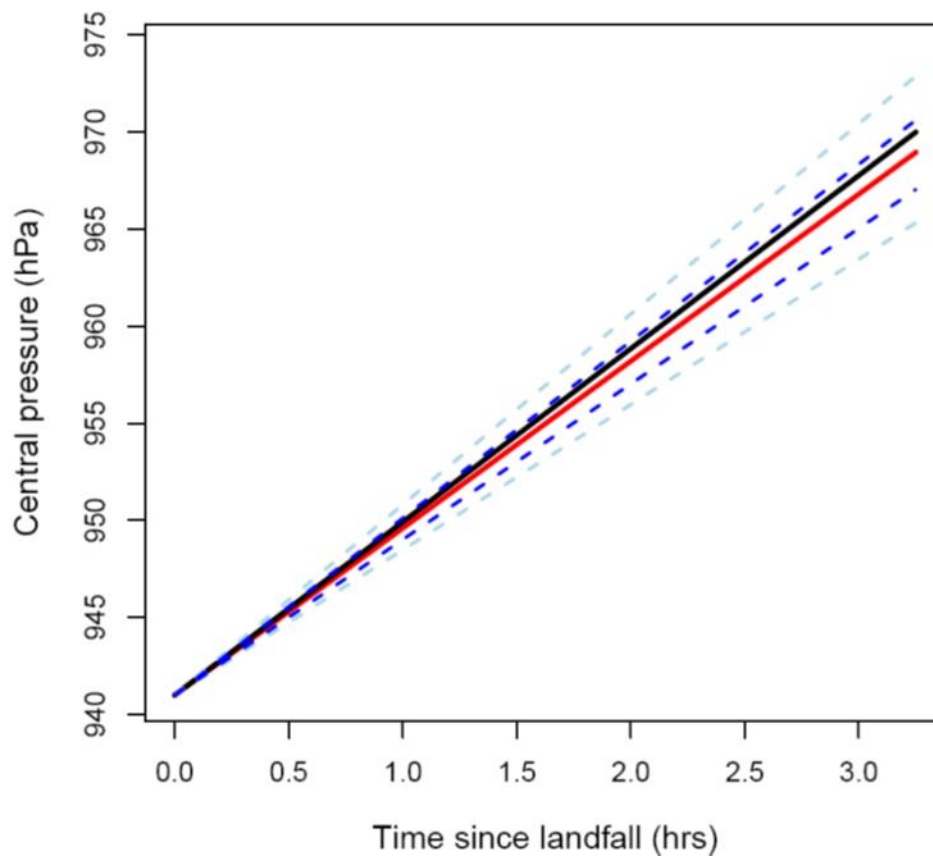


The Kolmogorov-Smirnov test corresponding to the CDFs in the figure above produces a p-value of 82 percent. A chi-square test with seven cells produces a p-value of 45 percent. The historical data used for comparison is from the HURDAT2 6-hourly database as of May 2023.

A graphical comparison for the inland filling rate is shown in [Standard M-5](#), where the central pressure series over land, normalized by the corresponding landfall pressures, are plotted for fast and slow modeled filling in Florida, together with several historical cases. In addition, [Figure 38](#) shows the historical pressure series over Florida for Charley (2004; black line), together with the pressures corresponding to the predicted filling rate (red), the middle 50 percent (dark blue), and 90 percent (light blue) simulated filling rates for this storm.

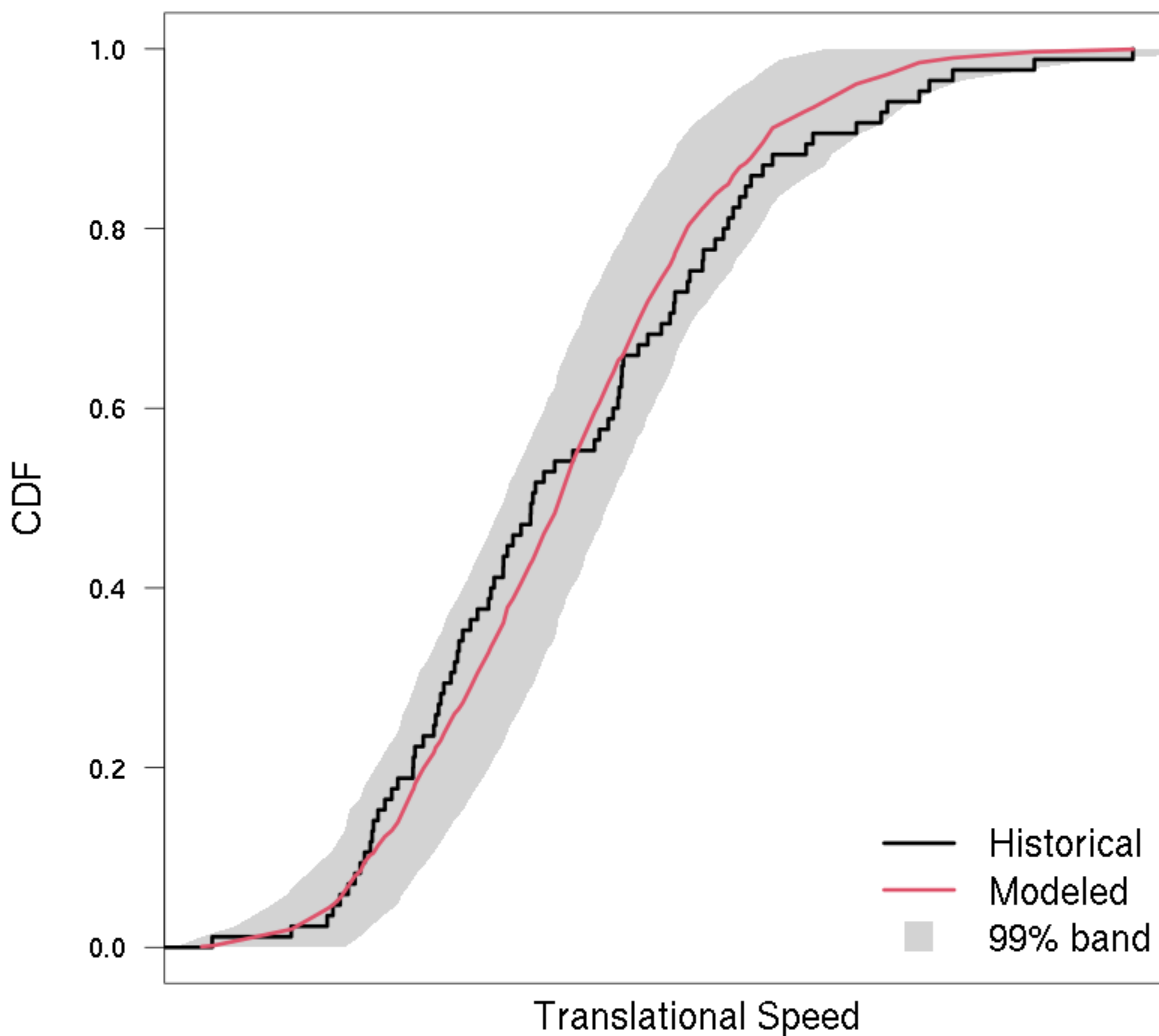
Figure 38: Pressure time series over land with observed (black), predicted (red), and simulated (dark blue for 50% and light blue for 90% bands) filling rate

Charley, 2004



Translational Speed and Heading

Figure 39 compares historical and modeled distributions of translational speed.

Figure 39: Translational speed (forward speed) cumulative distribution function

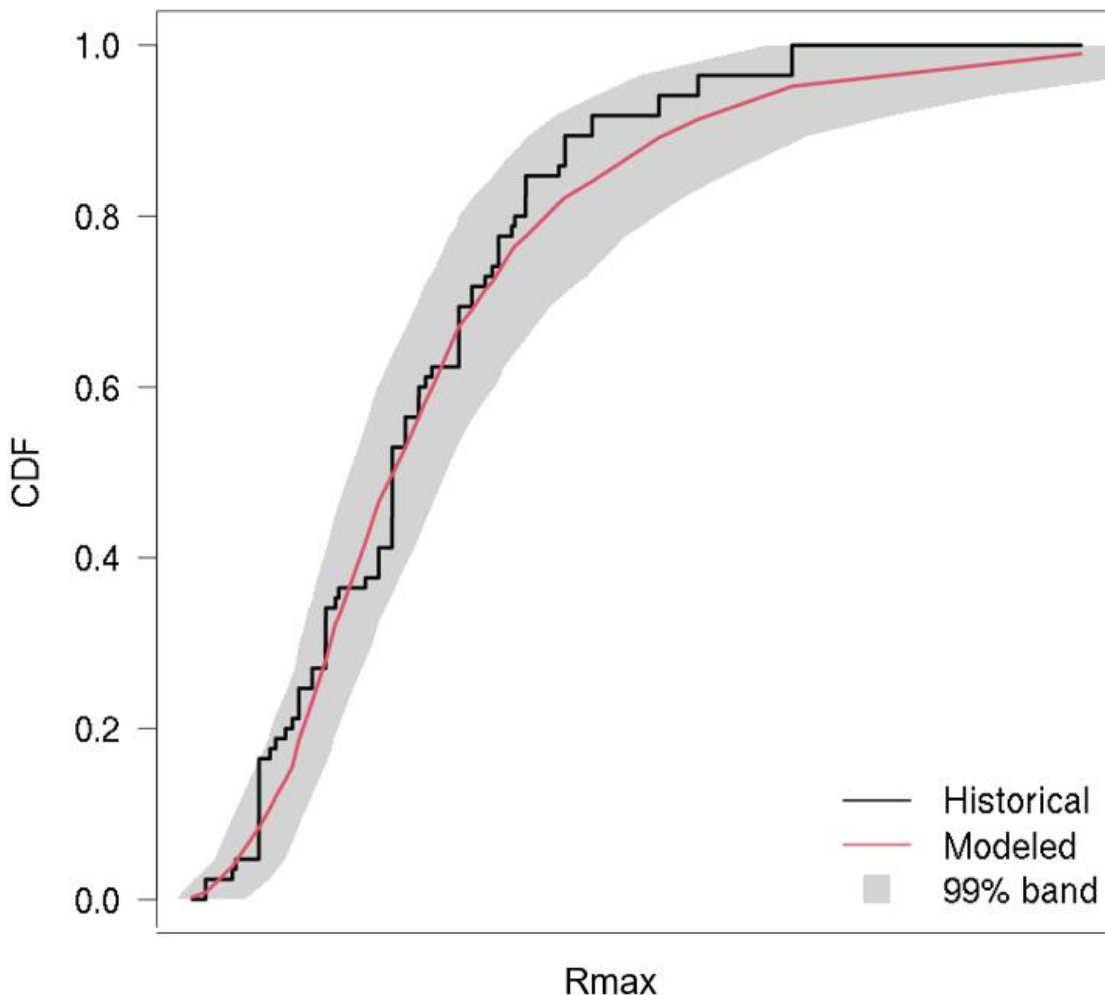
The Kolmogorov-Smirnov test on the translational speed produces a p-value of 61 percent, and a chi-square test with eight equal cells produces a p-value of 23 percent. The historical data used for comparison is from the HURDAT2 6-hourly database as of May 2023.

Histograms of historical and modeled storm heading for different coastal segments in Florida and neighboring states are shown in [Standard M-3](#).

Radius to Maximum Winds

Figure 40 shows a comparison of the observed and modeled Rmax distributions in Florida and neighboring states.

Figure 40: Rmax cumulative distribution function



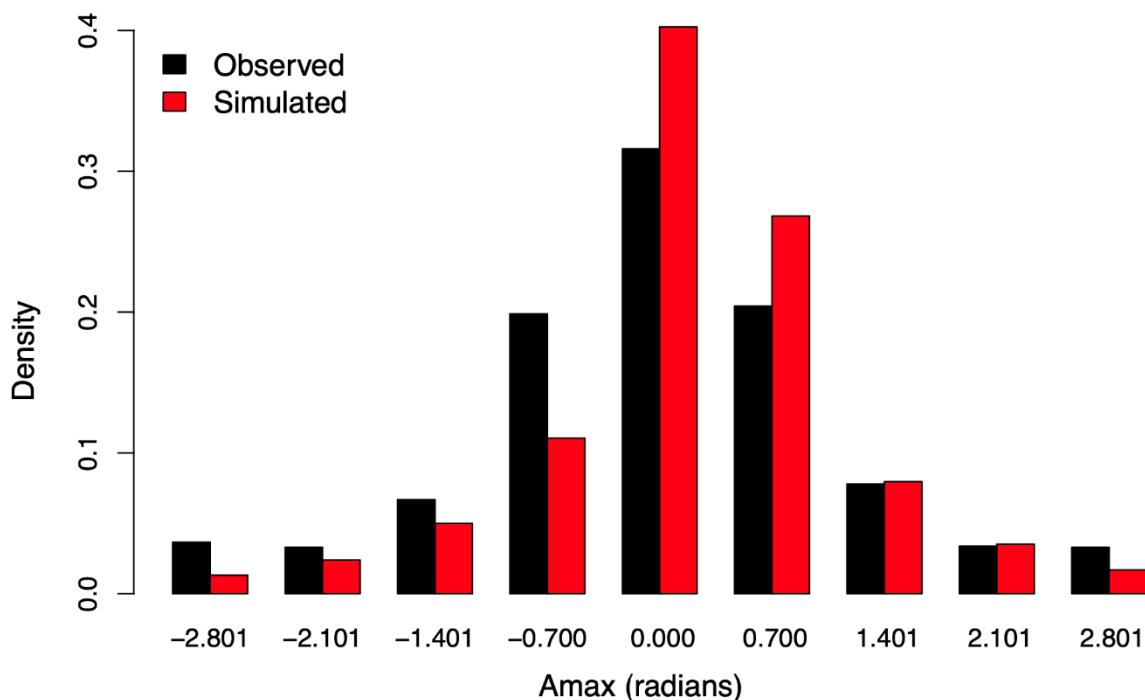
The reasonable agreement suggested by the figure above is confirmed by the goodness-of-fit test results. The Kolmogorov-Smirnov test on the radius of maximum winds produces a p-value of 49 percent, and a chi-square test with eight equal cells produces a p-value of 24 percent. The historical data used for the comparison covers the 1900 to 2022 period.

Wind Profile Parameters

The optimized Willoughby profile (see [Disclosure M-4.1](#)) prescribes the shape of the wind field outside and inside the eye of the hurricane through parameters X1 (decay length parameter) and N (power law parameter), respectively. X1 and N determine the modeled wind radii, which are validated against the historical values from the extended best track dataset. [Disclosure M-6](#) contains a graphical comparison of observed and modeled histograms for radii of hurricane force winds. [Figure 41](#) compares observed (black) and modeled (red) distributions of Amax, the wind profile parameter that describes the angle between track and location of Vmax. The comparison is

shown for the whole basin rather than Florida only, and uses HWind snapshots to derive the historical values.

Figure 41: Angle to maximum winds histogram



The figure above shows the histograms of observed (black) and modeled (red) Amax. A value of 0 radians corresponds to the location of Vmax being 90 degrees clockwise from the direction of storm movement. A chi-square test with four cells produces a p-value of 0.12. This is based on 53 storms within a restricted domain around Florida. A single observation was included for each storm, to ensure independence.

Storm Frequency

The Poisson assumption for the distribution of landfalling storm frequency was tested using a conditional chi-square test (p-value=14%) and Neyman-Scott test (p-value=14%). The chi-square goodness-of-fit test was used to compare historical and modeled annual storm frequencies over the different sub-regions and categories. The corresponding p-value is 99 percent. These tests show that the modeled storm frequency distribution is in reasonable agreement with historical data.

S-1.6 *Provide completed Form S-1(s). Provide a link to the location of the forms in the submission appendix [\[Form S-1\]](#).*

S-1.7 *Provide a completed Form S-2. Provide a link to the location of the form in the submission appendix. [\[Form S-2\]](#).*

S-1.8 *Provide a completed Form S-3. Identify the form of the probability distributions used for each function or variable, if applicable. Identify statistical techniques used for estimation and the specific goodness-of-fit tests applied along with the corresponding p-values. Describe whether the fitted distributions provide a reasonable agreement with the historical data. Provide a link to the location of the form in the submission appendix [\[Form S-3\]](#).*

S-2 Sensitivity Analysis for Hurricane Model Output

The modeling organization shall have assessed the sensitivity of temporal and spatial outputs with respect to the simultaneous variation of input variables using current scientific and statistical methods in the appropriate disciplines and shall have taken appropriate action.

Moody's has assessed the sensitivity of temporal and spatial outputs with respect to the simultaneous variation of input variables via Form S-6, which was submitted in compliance with the 2009 Standards. Disclosures [S-2.1](#) to [S-2.4](#) describe the results of the sensitivity assessment, and discuss whether any action was needed in response.

S-2.1 *Identify the most sensitive aspect of the hurricane model and the basis for making this determination.*

The most sensitive aspects of the model are the intensity and size of the hurricane at landfall, specifically the far field pressure (FFP), central pressure (CP) and radius to maximum winds (Rmax) at landfall. This determination was based on the results of the sensitivity analyses described in the RiskLink 11.0.SP2c submission, in Form S-6. The standardized regression coefficients showed that for Category 1 and 3 storms, losses are most sensitive to variations in FFP and CP. For Category 5 hurricanes, losses are mostly affected by changes in Rmax.

S-2.2 *Identify other input variables that impact the magnitude of the output when the input variables are varied simultaneously. Describe the degree to which these sensitivities affect output results and illustrate with an example.*

The filling rate (Alpha) has a significant impact on the sensitivities in output results, especially for more intense storms. Translational speed and wind profile parameters have a lesser impact on the output. This determination is based on the standardized regression coefficients presented in the RiskLink 11.0.SP2c submission.

S-2.3 *Describe how other aspects of the hurricane model may have a significant impact on the sensitivities in output results and the basis for making this determination.*

The output results are sensitive to the exact value of the maximum winds, given a central pressure and far field pressure. Variations in the land use land cover (LULC) also have an impact on the loss output. This determination is based on the changes in loss costs resulting from LULC updates in previous submissions.

S-2.4 *Describe and justify action or inaction as a result of the sensitivity analyses performed.*

The results of the sensitivity analyses confirmed previous Moody's research. Additionally, the sensitivity study highlighted the importance of the filling rate, which is a model component that has been extensively researched and revised prior to the RiskLink 11.0.SP2c submission. No action was necessary after review of the sensitivity results.

S-2.5 *For a new modeling organization only, provide a completed Form S-6. Provide a link to the location of the form in the submission appendix.*

Moody's has submitted [Form S-6](#) in the RiskLink 11.0.SP2c submission, in compliance with the 2009 Standards.

S-3 *Uncertainty Analysis for Hurricane Model Output*

The modeling organization shall have performed an uncertainty analysis on the temporal and spatial outputs of the hurricane model using current scientific and statistical methods in the appropriate disciplines and shall have taken appropriate action. The analysis shall identify and quantify the extent that input variables impact the uncertainty in hurricane model output as the input variables are simultaneously varied.

Moody's has performed an uncertainty analysis on the temporal and spatial outputs of the model via Form S-6, which was previously submitted in compliance with the 2009 Standards. [Disclosure S-1.4](#) describes additional uncertainty analysis, while Disclosures [S-3.1](#) to [S-3.3](#) discuss the results of the assessment and whether any action was necessary in response.

S-3.1 *Identify the major contributors to the uncertainty in hurricane model outputs and the basis for making this determination. Provide a full discussion of the degree to which these uncertainties affect output results and illustrate with an example.*

The major contributors to the uncertainty in model outputs are the intensity and size of the hurricane at landfall, specifically far field pressure (FFP), central pressure (CP) and radius to maximum winds (Rmax). FFP and CP are the main contributors to the uncertainty in loss costs for Category 1 and Category 3 storms. For Category 5 hurricanes, the input with the most impact on the uncertainty in the model outputs is Rmax. This determination is based on the analyses described in the RiskLink 11.0.SP2c submission, in Form S-6.

The large contributions of intensity and size of the storms at landfall on the uncertainty in the loss costs is confirmed by [Figure 32](#) and [Figure 33](#). These figures summarize the changes in the loss costs by ZIP that result from setting the maximum 1-minute sustained winds (Vmax) and Rmax to the 5 percent and 95 percent limits on the respective cumulative distribution functions.

S-3.2 *Describe how other aspects of the hurricane model may have a significant impact on the uncertainties in output results and the basis for making this determination.*

The filling rate (Alpha) has a significant impact on the uncertainties in the output results, especially for intense hurricanes. The basis for this determination is the expected percentage reductions (EPRs) presented in the RiskLink 11.0.SP2c submission. Translational speed and wind profile parameters have a much smaller impact on the uncertainties.

S-3.3 *Describe and justify action or inaction as a result of the uncertainty analyses performed.*

No action was necessary after reviewing the results of the uncertainty analyses. The results of these analyses confirmed results described in previous submissions. Additionally, the uncertainty analyses highlighted the importance of the filling rate, which is a model component that has been extensively researched and revised prior to the RiskLink 11.0.SP2c Form S-6 preparation.

S-3.4 *Form S-6, if disclosed under Hurricane Standard S-2, will be used in the verification of Hurricane Standard S-3.*

Moody's has submitted Form S-6 in the RiskLink 11.0.SP2c submission, in compliance with the 2009 Standards.

S-4 County Level Aggregation

At the county level of aggregation, the contribution to the error in hurricane loss cost estimates attributable to the sampling process shall be negligible.

The Moody's North Atlantic hurricane stochastic track set is based on approximately 100,000 years of simulated time. The track paths and associated parameters are simulated and calibrated according to the methods described in Standards M-2 and S-1. The number of storms is then reduced to a representative sub-sample through a selection process described below. Loss convergence testing verified that the county level error in loss cost estimates induced by the sampling process is negligible.

S-4.1 *Describe the sampling plan used to obtain the average annual hurricane loss costs and hurricane output ranges. For a direct Monte Carlo simulation, indicate steps taken to determine sample size. For an importance sampling design or other sampling scheme, describe the underpinnings of the design and how it achieves the required performance.*

The target for the storm selection process is the county level average annual loss, with additional constraints to ensure that other loss criteria are met and the landfall distributions of the main physical parameters are preserved. The procedure is iterative and can be described by the following steps:

1. Group storms according to their loss in different regions and their landfall parameters
2. Eliminate each storm in turn
 - a. Redistribute rate within appropriate bin
 - b. Calculate maximum percentage change in average annual loss over all counties
3. Choose storm that minimizes the cost function in 2b for deletion
4. Repeat steps 2 and 3 as long as the target remains in a satisfactory range

S-5 Replication of Known Hurricane Losses

The hurricane model shall estimate incurred hurricane losses in an unbiased manner on a sufficient body of past hurricane events from more than one company, including the most current data available to the modeling organization. This standard applies separately to personal residential and, to the extent data are available, to commercial residential. Personal residential hurricane loss experience may be used to replicate structure-only and contents-only hurricane losses. The replications shall be produced on an objective body of hurricane loss data by county or an appropriate level of geographic detail and shall include hurricane loss data from Hurricane Irma (2017), Hurricane Michael (2018), and Hurricane Ian (2022) to the extent data from Hurricane Ian are available.

The Moody's model is able to reliably and without significant bias reproduce incurred losses on a large body of past hurricanes, both for personal residential and commercial residential. Validations of known storm losses have been performed in several ways, including:

For recent events, on an industry basis. The Moody's model is able to reasonably reproduce aggregate incurred industry losses in recent events.

For recent events, on a company-specific basis. The Moody's model is able to reasonably reproduce aggregate incurred losses for a diverse set of insurers.

For recent events, on a geographic and demographic basis. The Moody's model is able to reasonably reproduce the geographic spread of company specific losses, and the spread of losses between various lines of business and between various types of coverages.

For less recent events, on an industry basis. The Moody's model is able to reasonably reproduce industry losses for less recent hurricanes, both in aggregate and on a broad geographic basis, for which some level of industry loss data is available.¹

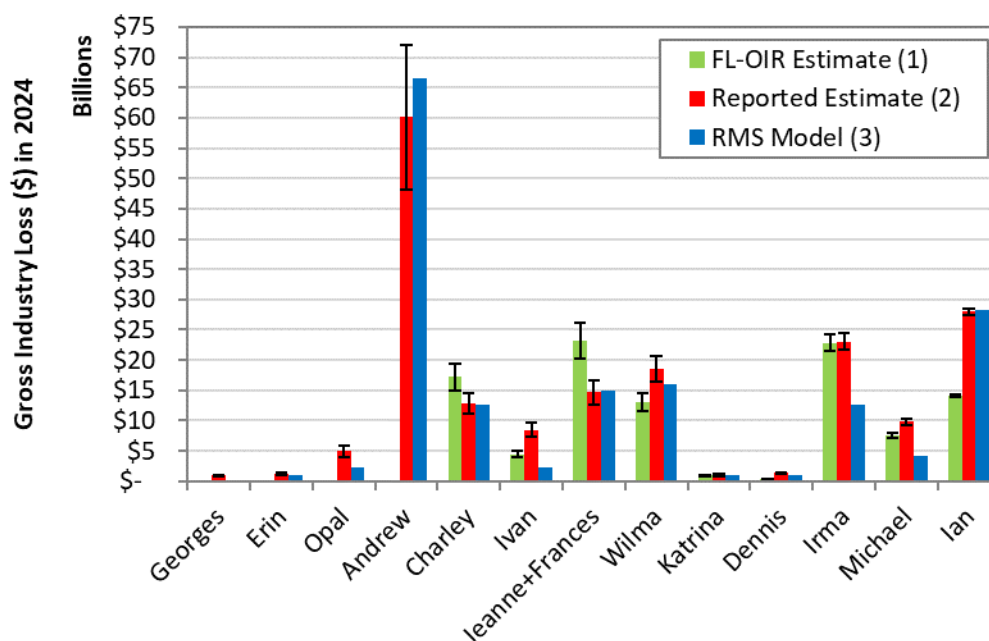
S-5.1 ***Describe the nature and results of the analyses performed to validate the hurricane loss projections generated for personal and commercial residential hurricane losses separately. Include analyses for the 2017 and 2018 hurricane seasons, and for Hurricane Ian (2022) to the extent data from Hurricane Ian are available.***

Moody's has compiled reported loss information from industry sources at the time of key historical events. The reported losses are normalized to the year 2024 with a methodology that accounts for increases in cost of construction, growth of the building population, the change in building quality over time, and the change in average living area per house from the time of the event until 2024. Comparisons are made to modeled losses based on the Moody's industry exposure model.

In addition, insurance companies have supplied Moody's with datasets containing the locations and building types associated with coverage and loss amounts. These datasets have been run against historical storms and the computed losses have been compared to the actual losses.

Figure 42 and Figure 43 show the results of representative samples of the comparative analyses that have been performed.

¹ While these industry loss estimates, particularly the older ones, are potentially unreliable and must be adjusted to reflect current demographic and economic conditions, these older events do provide a means for checking potential bias in the model.

Figure 42: Florida industry loss estimates (residential) for recent storms²**Table 11: Comparison of actual and estimated industry loss (\$ million)**

Storm	Year	Reported Estimate (2)	FL-OIR Estimate (1)	Moody's Model (3)
Andrew	1992	60,115	-	66,486
Erin	1995	1,284	-	1,029
Opal	1995	4,988	-	2,258
Georges	1998	916	-	260
Charley	2004	12,892	17,263	12,611
Ivan	2004	8,497	4,483	2,313
Jeanne+Frances	2004	14,650	23,236	14,924
Wilma	2005	18,596	13,132	15,951
Katrina	2005	1,012	962	1,118
Dennis	2005	1,354	411	1,043
Irma	2017	22,973	22,814	12,630
Michael	2018	9,825	7,650	4,185
Ian	2022	27,976	14,089	28,374

*See notes for Figure 42.

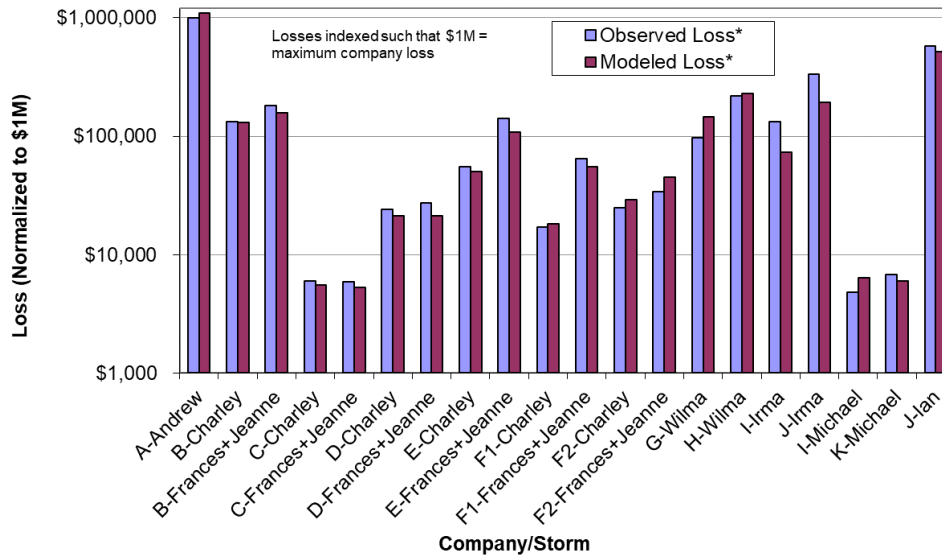
² Notes on Figure and Table:

(1) Estimates from Florida Office of Insurance Regulation (FL-OIR) report, "Hurricane Summary Data: CY 2004 and CY 2005" from August 2006 for all storms except for Hurricanes Irma, Michael, and Ian. Irma and Michael losses are current as of November 2020 and Ian as of April 2024 as reported on the FL-OIR website. Losses are normalized to 2024 values, represent residential lines, include demand surge and underreporting estimates, and exclude loss adjustment expense.

(2) Reported estimate of losses from industry sources. Losses for Florida are normalized to 2024 values, represent residential lines and includes demand surge and excludes loss adjustment expense.

(3) Moody's estimates for residential lines are based on Moody's RMS Industry Exposure for 2024. Losses include demand surge and exclude loss adjustment expenses.

Industry feedback indicates that Hurricanes Frances and Jeanne have been treated as one event from a claims and adjusting standpoint due to the inability of claims and adjusters to differentiate loss between the two events.

Figure 43: Company specific loss comparisons for residential (RES) structure types

*Loss includes demand surge but does not include loss adjustment expense.

The following table shows a sampling of aggregated loss comparisons by company.

Table 12: Sample client loss data comparison

(Losses normalized such that maximum actual loss = \$1,000,000)

Comparison	Storm	TIV*	Observed Loss**	Modeled Loss **	Ratio
A	Andrew	17,496,000	1,000,000	1,097,833	1.10
B	Charley	7,962,000	131,670	131,199	1.00
B	Frances+Jeanne	68,468,000	180,632	158,137	0.88
C	Charley	347,000	5,948	5,507	0.93
C	Frances+Jeanne	2,352,000	5,896	5,284	0.90
D	Charley	928,000	24,050	21,379	0.89
D	Frances+Jeanne	7,451,000	27,321	21,390	0.78
E	Charley	1,693,000	54,949	50,336	0.92
E	Frances+Jeanne	48,269,000	140,340	107,696	0.77
F1	Charley	1,749,000	17,114	18,226	1.06
F1	Frances+Jeanne	16,097,000	64,280	55,045	0.86
F2	Charley	3,108,000	24,955	28,978	1.16
F2	Frances+Jeanne	21,448,000	33,876	45,118	1.33
G	Wilma	9,491,000	97,056	146,601	1.51
H	Wilma	22,652,000	219,822	229,683	1.04
I	Irma	9,447,000	133,606	73,300	0.55
J	Irma	74,783,000	335,235	193,691	0.58
I	Michael	207,000	4,817	6,414	1.33
K	Michael	87,000	6,751	5,946	0.88
J	Ian	78,163,000	574,325	521,448	0.91

*Abbreviation: Total Insured Value (TIV) **Includes demand surge

S-5.2 *Provide a completed Form S-4. Provide a link to the location of the form in the submission appendix [[Form S-4](#)].*

S-6 Comparison of Projected Hurricane Loss Costs

The difference, due to uncertainty, between historical and modeled annual average statewide hurricane loss costs shall be reasonable, given the body of data, by established statistical expectations and norms.

The difference between historical and modeled annual average statewide loss costs provided in this year's submission is statistically reasonable, given the body of data, by established statistical expectations and norms. The following standards, disclosures, and forms provide comparisons between historical and modeled annual average statewide hurricane loss costs along with relevant discussion on the differences.

S-6.1 Describe the nature and results of the tests performed to validate the expected hurricane loss projections generated. If a set of simulated hurricanes or simulation trials was used to determine these hurricane loss projections, specify the convergence tests that were used and the results. Specify the number of hurricanes or trials that were used.

The losses produced by the set of stochastic storms have been compared to losses produced by historical storms impacting Florida.

Moody's has validated estimates by first comparing the modeled frequency of various storm characteristics with the historic record. The number of modeled storms of various intensities making landfall in each of the segments was compared to the historical record. For most region/category combinations, we found a reasonable agreement.

The losses produced by the set of stochastic storms have been compared to losses produced by historical storms impacting Florida. For example, historical and stochastic storm sets were compared in terms of exceedance probability curves for industry level losses. In addition, the geographic progression of loss costs by ZIP Code was reviewed for smoothness, consistency, and logical relation to risk.

The Moody's model contains 20,153 hurricanes that cause damaging winds in Florida. In order to ensure that the set of stochastic storms is sufficient and converges, the county level standard errors for the average annual loss have been checked to verify that the error in loss costs estimates induced by the sampling process is negligible.

S-6.2 Identify and justify differences, if any, in how the hurricane model produces hurricane loss costs for specific historical events versus hurricane loss costs for events in the stochastic hurricane set.

Available observed track paths, central pressure series, and over-water Vmax values are used to model historical events. Other storm parameters are realizations of the same model used for the stochastic set, with additional constraints derived from added wind field data, if available. For historical storms up to the 2008 season, gusts over land are consistent with the urban exposures of the 2004 and 2005 seasons, while for more recent historical storms and all stochastic storms, gusts reflect later changes in urbanization. Vulnerability and financial modeling functions are identical for both stochastic and historic storms.

S-6.3 Provide a completed Form S-5. Provide a link to the location of the form in the submission appendix [\[Form S-5\]](#).

VULNERABILITY HURRICANE STANDARDS

V-1 Development of Building Hurricane Vulnerability Functions

- A. *Development of the building hurricane vulnerability functions shall be based on a combination of available insurance company hurricane claims data and rational engineering analysis, supported by laboratory testing, field testing, or post-event site investigations.***

The development of hurricane vulnerability functions for residential classes of construction in Florida (including mobile/manufactured homes) for building coverages, is primarily based upon well-supported structural and wind engineering principles and detailed analyses of historical claims data. The methodology is described in further detail in Disclosures [V-1.2](#), [V-1.5](#), and [V-1.11](#). This has been supplemented by post-storm site inspections and an extensive review of published literature on building damage assessment. This development is supported by \$15.1 billion of historical hurricane loss data as described in [Disclosure V-1.3](#).

As outlined in [Disclosure G-2.2](#) and [Appendix B](#) the individuals within Moody's involved in the development of vulnerability functions have extensive experience in the field of structural and wind engineering and data analysis.

- B. *The development of the building hurricane vulnerability functions and the treatment of associated uncertainties shall be theoretically sound and consistent with fundamental engineering principles.***

The methods used by Moody's to derive the vulnerability functions and associated uncertainties are theoretically sound and consistent with fundamental engineering principles. Details of the methodology are provided in [Disclosure V-1.5](#).

- C. *Residential building stock classification shall be representative of Florida construction for personal and commercial residential buildings.***

The schema used to classify buildings and assign appropriate vulnerability curves to each risk is able to represent all typical types of Florida construction for personal and commercial residential buildings.

- D. *Building height/number of stories, primary construction material, year of construction, location, building code, and other construction characteristics, as applicable, shall be used in the development and application of building hurricane vulnerability functions.***

Unique vulnerability functions are defined based on a combination of the construction class, building occupancy, building height, year built, and location as explained in [Disclosure V-1.11](#). The effects of different building code changes are accounted for by the combination of year built and region of state. Floor area can also have an impact for single-family construction.

- E. *Hurricane vulnerability functions shall be developed for commercial residential building structures, personal residential building structures, manufactured homes, and appurtenant structures.***

Damage curves for all classes of construction, including mobile/manufactured homes, are developed separately. The model contains separate functions for commercial residential and personal residential building structures. Moody's has derived separate functions to explicitly deal with residential and commercial appurtenant structures, such as fences, carports, and screen enclosures.

F. *The minimum windspeed that generates damage shall be consistent with fundamental engineering principles.*

Damage associated with a declared hurricane includes damage incurred for wind speeds above and below the hurricane threshold of 74 mph (1-minute sustained). The minimum peak gust wind speed that generates damage is consistent with fundamental engineering principles.

G. *Building hurricane vulnerability functions shall include damage as attributable to windspeed and wind pressure, water infiltration, and missile impact associated with hurricanes. Building hurricane vulnerability functions shall not include explicit damage to the building due to flood (including hurricane storm surge and wave action).*

The wind vulnerability functions include damage caused by wind speed and pressure, water infiltration (from rain water entering through breaches in the building envelope) and missile impact. The wind vulnerability functions exclude damages due to flooding, storm surge and wave action. Damage caused by storm surge and wave action can be modeled, if desired; however, to do so, the model uses a separate set of storm surge and wave vulnerability functions that are not applied for wind-only analyses.

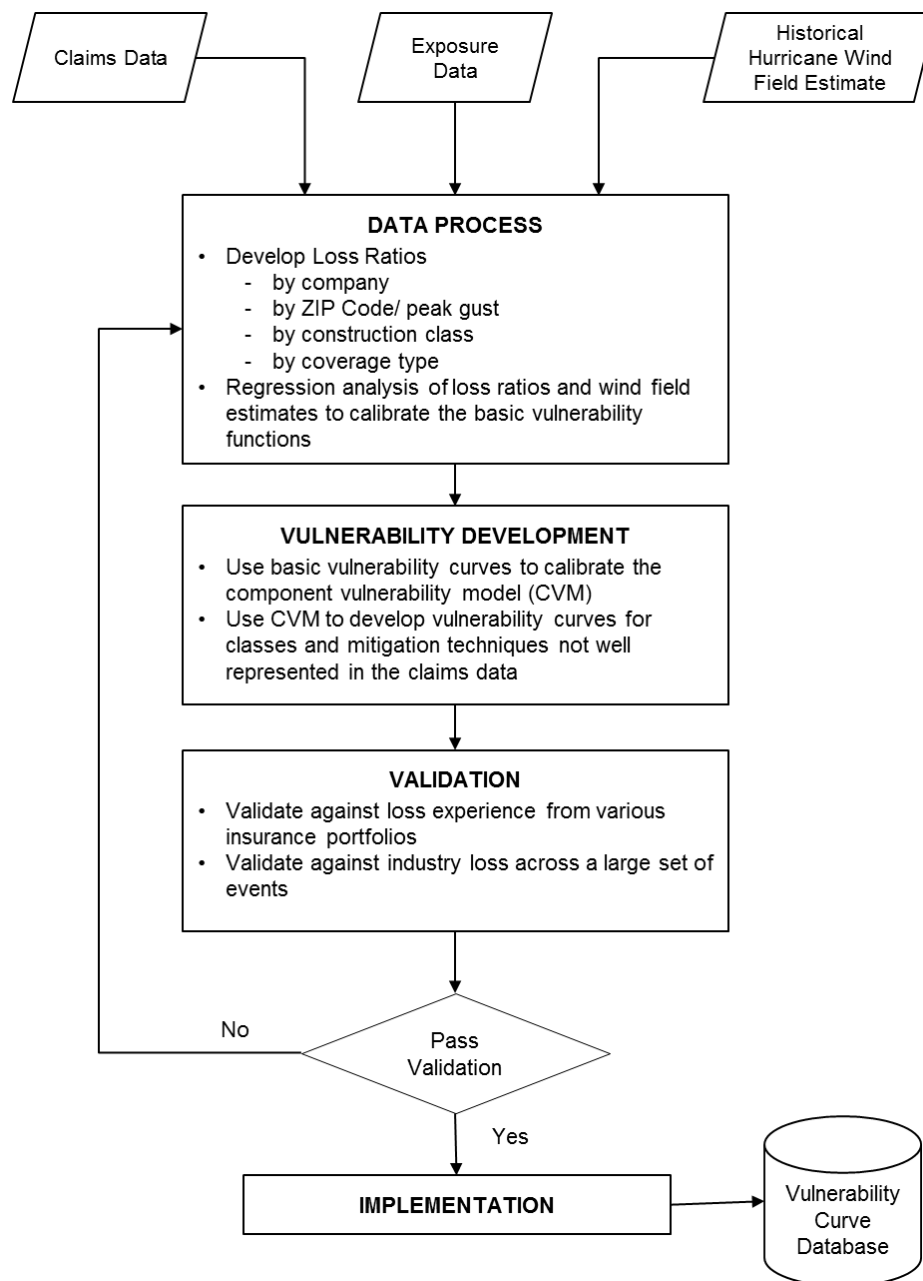
V-1.1 *Provide details of modifications to the building vulnerability component in the hurricane model since the current accepted hurricane model.*

The following item listed in [Disclosure G-1.7.A](#) describes the only change related to building vulnerability:

- Updated vulnerability mapping for ISO FIRE 3 (Non-Combustible) construction class from RMS 4B (Light Metal) to RMS 2 (Masonry) construction class

V-1.2 *Provide a flowchart documenting the process by which the building hurricane vulnerability functions are developed and implemented.*

The general procedure used to process such data is diagrammed in [Figure 44](#).

Figure 44: Process for deriving and implementing vulnerability functions

The implementation of vulnerability functions is described in the response to [Disclosure V-1.8](#).

V-1.3 Describe the nature and extent of insurance company hurricane claims data used to develop the building hurricane vulnerability functions. Describe in detail the breakdown of data into number of policies, number of insurers, dates of hurricane loss, amount of hurricane loss, and amount of dollar exposure, separated into personal residential, commercial residential, and manufactured homes.

Moody's has collected loss data from its clients for the purpose of developing and calibrating the model's vulnerability functions. Construction characteristics and insured value information of the

associated exposure is supplied directly to us by our clients. This information is assumed to be correct but is also subjected to checks by Moody's. Summaries of exposure and loss data sets and their use in the development of vulnerability functions will be available for on-site review by the professional team.

Overall, Moody's has used over \$15.1 billion of hurricane loss data from the U.S. corresponding to 2.28 million claims and more than \$2.0 trillion in corresponding exposure data in the development and calibration of damage functions. This includes the following amounts of loss data by line of business (with number of claims in parentheses): \$14 billion for residential (1.98 million), \$427 million for mobile/manufactured homes (207,000), \$165 million for condo unit owners (12,000), \$263 million for homeowners association (4,000), and \$216 million for multi-family dwelling (78,000). A sample of the datasets is shown in the following table.

Moody's received additional claims data from some of its clients. Details of the new data will be shared with the professional team at the on-site audit.

Table 13: Sample of residential datasets used for development and calibration of vulnerability functions

LOB*	Storm	Company	Data Resolution
RES	Andrew	A	ZIP/Coverage/Construction Class
RES	Andrew	B	ZIP/Coverage
RES	Andrew	C	ZIP/Construction Class
RES	Bob	A	ZIP/Coverage/Construction Class
RES	Erin	A	ZIP/Coverage/Construction Class
RES	Fran	A	ZIP/Coverage/Construction Class
RES	Fran	B	ZIP/Coverage
RES	Hugo	A	ZIP/Coverage/Construction Class
RES	Hugo	B	ZIP/Coverage
RES	Opal	A	ZIP/Coverage/Construction Class
RES	Georges	D	ZIP/Coverage/Construction Class
MH	Fran	E	ZIP/Coverage/Construction Class
MH	Hugo	F	ZIP/Coverage/Construction Class
MH	Charley/ Frances/ Jeanne 2004	H	Location/Construction Class
MH	Charley/ Frances/ Jeanne 2004	I	Location/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	J	Location/Coverage/Construction Class
MH	Charley/Frances/Jeanne/Ivan 2004	J	Location/Coverage/Construction Class
MFD	Charley/Frances/Jeanne/Ivan 2004	J	Location/Coverage/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	K	Location/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	L	Location/Coverage/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	M	Location/Coverage/Construction Class
MH	Charley/Frances/Jeanne/Ivan 2004	M	Location/Coverage/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	N	Location/Coverage/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	O	Location/Coverage/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	P	Location/Coverage/Construction Class
RES	Charley/Frances/Jeanne/Ivan 2004	Q	Location/Coverage/Construction Class
MH	Charley/Frances/Jeanne/Ivan 2004	V	Location/Coverage/Construction Class
RES	Wilma 2005	J	Location/Coverage/Construction Class
RES	Wilma 2005	K	Location/Coverage/Construction Class

LOB*	Storm	Company	Data Resolution
RES	Wilma 2005	R	Location/Coverage/Construction Class
HOA	Wilma 2005	J	Location/Coverage/Construction Class
CO	Wilma 2005	J	Location/Coverage/Construction Class
MH	Wilma 2005	K	Location/Coverage/Construction Class
RES	Ike 2008	B	Location/Coverage/Construction Class
RES	Ike 2008	L	Location/Coverage/Construction Class
RES	Ike 2008	S	Location/Coverage/Construction Class
RES	Ike 2008	T	Location/Coverage/Construction Class
RES	Ike 2008	U	Location/Coverage/Construction Class
MH	Ike 2008	B	Location/Coverage/Construction Class
RES	Dennis 2005	N	Location/Coverage/Construction Class
RES	Wilma 2005	N	Location/Coverage/Construction Class
MFD	Wilma 2005	N	Location/Coverage/Construction Class
MH	Sandy 2012	V	Location/Coverage/Construction Class
RES	Charley 2004	D	Location/Coverage/Construction Class
RES	Frances 2004	D	Location/Coverage/Construction Class
RES	Jeanne 2004	D	Location/Coverage/Construction Class
RES	Ivan 2004	D	Location/Coverage/Construction Class
RES	Wilma 2005	D	Location/Coverage/Construction Class
RES	Irma 2017	J	Location/Construction Class
RES	Irma 2017	K	Location/Coverage/Construction Class
RES	Michael 2018	J	Location/Construction Class
RES	Michael 2018	K	Location/Coverage/Construction Class
MFD	Irma 2017	V	Location/Coverage/Construction Class
MFD	Michael 2018	V	Location/Coverage/Construction Class
MFD	Irma 2017	K	Location/Coverage/Construction Class
HOA	Irma 2017	K	Location/Coverage/Construction Class
MFD	Michael 2018	K	Location/Coverage/Construction Class
HOA	Michael 2018	K	Location/Coverage/Construction Class
MFD	Irma 2017	X	Location/Construction Class
HOA	Irma 2017	X	Location/Construction Class
MFD	Michael 2018	X	Location/Construction Class
HOA	Michael 2018	X	Location/Construction Class
SFD	Ian 2022	J	Location/Construction Class

*RES–Residential; MH–Mobile/Manufactured Homes; MFD–Multi-Family; CO–Condo Owners; HOA–Condo Association

V-1.4 Describe any new insurance company hurricane claims data received and reviewed since the current accepted hurricane model. Indicate whether the new data, if any, have been incorporated in the hurricane model under review.

Moody's received \$1.1 billion in new single-family dwelling and condo unit owner insurance claims from Hurricane Ian since the previously accepted hurricane model. The new data has not been used to update the hurricane model under review.

V-1.5 *Describe the assumptions, data (other than insurance company hurricane claims data), methods, and processes used for the development of the building hurricane vulnerability functions.*

The data used in the development of the building vulnerability functions is described in [Disclosure V-1.3](#). The data sets vary in resolution and are used for different validation purposes. To adequately use loss data for development of vulnerability functions, the data must contain several types of information including: loss per coverage (A, B, C, and D), line of business, exposure value per coverage, description of structures (construction type, etc.), and actual location of structures.

The underlying assumption is that future claims practices will be the same as the claims practices that were in effect at the time that the historical losses used in the model development and validation were paid. Where this assumption is known or thought to be false, actions are taken to minimize the possibility of the data introducing bias into the development process such as partitioning of data or setting contaminated data aside.

Best estimate wind fields are prepared for all the storms for which there are insurance data sets. Then the insurance data sets are geocoded and plotted on the wind fields, thus assigning a hazard parameter to each point in the insurance data set. Vulnerability functions are developed through a regression analysis of the loss ratios and estimated wind speed data.

The vulnerability functions are based on analyses of historical building loss data and engineering principles using the component vulnerability model (CVM) as documented in the process shown in [Disclosure V-1.2](#). The Moody's Component Vulnerability Model is based on the methodology outlined by Professors Dale Perry and Norris Stubbs of Texas A&M University (Stubbs et al., 1995). This methodology has been augmented by internal research by Moody's staff and has been published by Moody's staff (Khanduri 2003). The CVM enables an engineering-based approach to assess the reasonableness of the vulnerability functions derived from the analysis of historical building loss data, especially for higher wind speed ranges or building classes for which historical loss data is sparse or incomplete. Additionally, the CVM is used to gain insights into the potential reduction of losses associated with building features and hurricane mitigation measures.

References used by Moody's for developing the vulnerability functions include references listed in [Disclosure G-1.6](#) including: Davenport et al. (1989), Hart (1976), Liu et al. (1989), McDonald (1986, 1990), Mehta (1983, 1992), Minor (1979), Cook (1985), Sparks (1988, 1990, 1993), Stubbs (1993), Zollo (1993), Skerlj (2004), FEMA (2005a, 2005b, 2006a, 2006b, 2009b), IBHS (2007, 2009, 2010b), and Gurley (2006).

The process and method of developing the building curves relevant to renter and condo-unit owners follow the same process as for other residential risks and is outlined in [Disclosure V-1.2](#). The claims data used in this process is described in [Disclosure V-1.3](#).

Renter and condo-unit owner are assumed to be related to commercial residential risks as follows:

1. It is assumed that two unrelated entities have insurable interests in commercial residential properties. The nature of the insured interests held by these entities depends on the type of commercial residential property as follows:
 - a. For condominium or townhouse complexes in which the units are owned by different individuals, the home owner's association holds title to the building envelope and common areas and contents while the unit owners hold title to the interior space of their units and any personal belongings.
 - b. For apartment buildings in which the units are rented from the building owner, the building owner holds title to the structure and any contents in the common areas of the building, while the renters hold title to their personal belongings.

2. The building and contents vulnerability functions for the insured interests of the entities identified above are derived under the assumption that the building envelope must be breached before the interior spaces or contents contained within are damaged.
3. It is assumed that the contents vulnerability functions for all entities identified above are the same, reflecting the fact that the contents held by these different entities are similar in nature.

V-1.6 *Describe the basis, development, modeling, and treatment of uncertainties associated with the building hurricane vulnerability functions.*

Location-level claims data shows that significant uncertainty exists in the damage ratios for the same class of buildings (i.e., same primary building characteristics) due to uncertainties in the hazard (e.g., building specific wind speeds, shielding effects, etc.) and variation in building attributes (including varying secondary building characteristics). The uncertainties associated with the vulnerability functions are derived from statistical analyses of historical building loss data for different building classes and coverage types. These analyses indicate that the uncertainty, as measured by the coefficient of variation (CV), is a function of the MDR. The MDR-CV relationship is used to compute the uncertainty to associate with the computed MDR.

V-1.7 *Summarize post-event site investigations, including the sources, and provide a brief description of the resulting use of these data in the development of building hurricane vulnerability functions.*

Moody's has conducted post-event reconnaissance missions for the hurricanes listed in [Table 14](#). Typically, immediately after a hurricane makes landfall, teams of two or three wind and/or structural engineers are deployed to areas affected by the storm to collect information necessary to assess the extent and nature of the damage and to provide qualitative insights into the overall performance of the building stock.

The primary objective of the reconnaissance teams deployed immediately after a storm makes landfall is to provide a real-time, first-hand assessment of the severity of the damage in different areas and to different building types, and to identify the primary causes of the damage. It is critical that the reconnaissance teams conduct these initial field inspections quickly and thoroughly immediately after the storm makes landfall in order to document the damage before it is cleaned up or concealed. For example, building owners typically start cleaning up their properties within days of an event and once the debris is removed, any evidence of poor construction practices is lost. Similarly, once tarps are placed on leaking roofs, it is difficult to assess the true extent of the roof damage caused by a storm.

The data collected during these reconnaissance missions is used by Moody's in two ways. First, it is provided to the Moody's catastrophe response team who uses this information, in conjunction with modeled loss estimates based on reported wind speeds for the storm, to develop an estimate of the overall industry loss and its geographic extent. This estimate is then provided to Moody's clients to help them better manage their response to the event (e.g., to help them set appropriate reserve amounts and manage the deployment of their claims adjusters). The second use of the data collected during these reconnaissance missions is to suggest and guide any modifications to the vulnerability functions for the affected region. For example, the severity of the roof damage caused by Hurricane Ike noted by the Moody's reconnaissance teams was greater than expected for the wind speeds recorded during the storm. In response to this observation, Moody's convened a workshop of roof engineers to better understand the reasons for the poor performance of the roofs in Texas and whether or not similar problems exist elsewhere in the U.S. The conclusions drawn from this workshop were incorporated into the 2011 U.S. Hurricane Model.

Table 14: Post-storm reconnaissance missions conducted by Moody's

Hurricane/Typhoon	Year	Region
Opal	1995	Florida
Erin	1995	Florida
Marilyn	1995	Virgin Islands, Puerto Rico
Fran	1996	North Carolina
Bonnie	1998	North Carolina
Georges	1998	U.S. Gulf Coast, Puerto Rico
Floyd	1999	North Carolina
T. Paka	1997	Guam
Fabian	2003	Bermuda
Isabel	2003	North Carolina, Virginia
Charley	2004	Florida
Frances	2004	Florida
Ivan	2004	Mississippi, Alabama, Florida, Louisiana
Jeanne	2004	Florida
Dennis	2005	Florida
Katrina	2005	Mississippi, Alabama, Florida, Louisiana
Rita	2005	Texas
Wilma	2005	Florida
Gustav	2008	Louisiana
Ike	2008	Texas
Irene	2011	North Carolina, Mid-Atlantic, Northeast U.S.
Sandy	2012	Northeast U.S.
Matthew	2016	Florida, Georgia, North and South Carolina, Bahamas
Harvey	2017	Texas
Irma	2017	Florida, Puerto Rico, U.S. Virgin Islands
Maria	2017	Puerto Rico, U.S. Virgin Islands
Florence	2018	South Carolina, North Carolina
Michael	2018	Florida, Georgia
Ian	2022	Florida

V-1.8 *Provide the total number of building hurricane vulnerability functions available for use in the hurricane model for personal and commercial residential classifications. Describe the categories of the different building hurricane vulnerability functions. Specifically, include descriptions of the building types and characteristics, building height, number of stories, regions within the state of Florida, year of construction, and occupancy types for which a unique building hurricane vulnerability function is used.*

There is a total of 2,875 building vulnerability classes per vulnerability region. Each class has both building and contents damage functions. The vulnerability classes depend on a combination of:

- Construction Class
- Building Height (number of stories)
- Building Occupancy

- Year Built
- Floor Area (single-family residential and low-rise commercial only)
- Region of State (vulnerability region)

Many of these functions are applicable to commercial building classes. Of the 2,875 per region, 845 are applicable to the residential lines (including multi-family and manufactured homes). The state of Florida is divided into six vulnerability regions that have their own unique set of functions. The possible classifications for each of the six primary characteristics are listed in the following table.

The various vulnerability classes were defined to allow for the grouping together of structures with similar performance under wind loads.

Table 15: Moody's hurricane primary building classification options

Construction Class	Number of Stories	Occupancy	Year Band (non-MH)
Unknown	Unknown	Unknown	Unknown
Wood Frame	1	Single Family	Pre 1995
Masonry	2–3	Multiple Family	1995–2001
Unreinforced Masonry	4–7	Condo Unit Owner	2002–2008
Reinforced Masonry	8–14	Condo Association	2009–2020
Reinforced Concrete	15+	Non-Residential ¹	2021 + later
Steel			(For MH only)
Mobile/Manufactured Home w/o Tie-Downs			Unknown
Mobile/Manufactured Home with Tie-Downs			Pre 1976
			1976–1994
			1995–2008
			2009 + later
Region	Floor Area (Single Family)		
South FL inland (≥ 0.5 miles from coast)	Unknown (≤ 10 ft ²)		
South FL coastal (< 0.5 miles from coast)	11–1,506 ft ² (1–139 m ²)		
Central FL inland (≥ 0.5 miles from coast)	1,507–2,507 ft ² (140–232 m ²)		
Central FL coastal (< 0.5 miles from coast)	2,508–5,005 ft ² (233–464 m ²)		
North FL inland (≥ 0.5 miles from coast)	5,006–10,010 ft ² (465–929 m ²)		
North FL coastal (< 0.5 miles from coast)	$\geq 10,011$ ft ² (≥ 930 m ²)		

¹There are multiple sub-categories of Non-Residential occupancy in the model that are not listed in detail here.

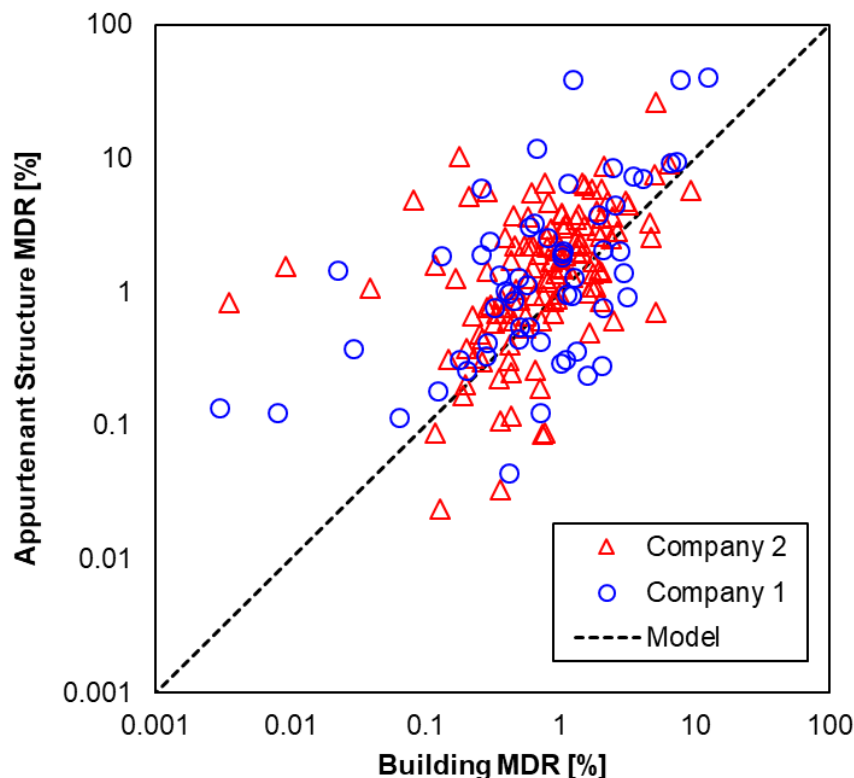
V-1.9 Describe the process by which local construction practices and statewide and county building code adoption and enforcement are considered in the development of the building hurricane vulnerability functions.

The changes in local construction practices, building code adoption, and enforcement are modeled through vulnerability functions that vary by year of construction of the building and also region of the state (vulnerability regions). The vulnerability functions for different year bands and different regions are reasonable and theoretically sound based on Moody's research on the changes of building code provisions and construction practices in Florida and across the U.S., as well as the region's experience with natural catastrophes.

V-1.10 Describe the relationship between building structure and appurtenant structure hurricane vulnerability functions and their consistency with insurance company hurricane claims data.

Appurtenant structures are modeled separately using the same vulnerability functions as buildings. Moody's has used actual insurance data to validate the vulnerability functions used to represent appurtenant structure losses. The following figure illustrates the model's consistency with insurance claims data through a comparison using two company data sets showing the building structure mean damage ratio versus the appurtenant structure mean damage ratio. Users can also specify the Residential Appurtenant Structures modifier (e.g., fences, carport, screen enclosure, etc.) to specify the appurtenant structure, which will increase the vulnerability.

Figure 45: Relationship of building structure versus appurtenant structure mean damage ratios (MDR): observed and modeled



V-1.11 Describe the assumptions, data (including available insurance company hurricane claims data), methods, and processes used to develop building hurricane vulnerability functions when:

- a. *residential construction types are unknown, or*
 - b. *one or more primary building characteristics are unknown, or*
 - c. *one or more secondary characteristics are known, or*
 - d. *building input characteristics are conflicting.*
- a. For a specified occupancy type (e.g., single-family dwelling or commercial residential), the loss cost for an unknown residential construction type is computed using a composite vulnerability function that is a weighted average of the vulnerability functions corresponding to unique combinations of height, year built, and construction class for the specified occupancy type. The weight applied to each vulnerability function included in the composite curve is specified by the inventory distribution for the location of the building and is dependent on the occupancy type. The Florida inventory distributions implemented in the Moody's model are specified by ZIP Code and are based on an

extensive industry database compiled by Moody's from third party data sources and Moody's in-house research, aggregate insurance exposure data, and studying aerial and satellite imagery.

- b. When one or more of the primary characteristics (construction, year built, number of stories, or occupancy) are unknown, the software will build a composite vulnerability function that is a weighted average of the appropriate subset of vulnerability functions corresponding to unique combinations of height, year built, construction class, and occupancy type associated with the unknown characteristics.

For single-family occupancy, when floor area is unknown, the model defaults to the vulnerability function for the 1507–2507 square foot floor area band.

- c. When one or more secondary characteristics is known, a series of modifiers and options for each modifier are available for the user to select. The base (unmodified) vulnerability curves are adjusted based on modifier selections chosen by the user. The modifier values vary by base vulnerability curve, modifier option, and wind speed. The modifier values can decrease or increase the base vulnerability curves, depending on the modifier. The default setting for each of the modifiers is "unknown." Therefore, if no modifier options are chosen, the base (average) vulnerability curve is utilized. Users may change one or more mitigation factors from the unknown state based on specific attributes for the modeled structure. The individual impact of single mitigation factors is combined together with a multiplicative methodology to reflect the combined effect of different attributes that may increase or decrease the loss.
- d. When input data are conflicting, the software includes logic to pick up the most appropriate vulnerability curve. For instance, if the user specifies manufactured homes (MH) construction with commercial occupancy class, the model ignores the occupancy input as MH vulnerability is independent of occupancy. Similarly, if the user specifies 20-story wood frame single-family building, the software ignores the height, and assumes the highest wood frame curve for that occupancy class which is a 2–3 story.

V-1.12 *Identify the one-minute average sustained windspeed and the windspeed reference height at which the hurricane model begins to estimate damage.*

The model begins to estimate losses at 1-minute sustained wind speeds at 10 m (33 ft) above 42 mph.

V-1.13 *Describe how the duration of windspeeds at a particular location over the life of a hurricane is considered.*

The model does not explicitly consider the duration of wind speed at a particular location over the life of a hurricane. There is a general consensus among experts that for extreme wind conditions generated by hurricanes, damage should be correlated to peak gust. However, Moody's vulnerability functions are based on observed losses during hurricanes. These observed losses include a variety of factors, including duration of wind speeds above a certain threshold at which damage occurs due to fatigue under repeated loading, and thus implicitly include wind duration effects.

V-1.14 *Describe how the hurricane model addresses wind-borne missile impact damage and water infiltration.*

Wind borne debris impacts and water infiltration following breaches in the building envelope are key causes of damage that are implicitly part of all claims data. As the model is validated against claims data, the model implicitly includes losses associated with wind borne debris and water infiltration.

The model includes secondary modifier options to reduce/increase the vulnerability of structures that are protected/not protected from wind borne debris.

The model includes secondary modifier options to alter the likelihood of building envelope breaches and thus control water infiltration. It also includes options specifically designed to alter/eliminate water infiltration when the roof cover fails (secondary water resistance).

V-1.15 *Provide a completed Form V-1. Provide a link to the location of the form in the submission appendix [\[Form V-1\]](#).*

V-2 Development of Contents Hurricane Vulnerability Functions

- A. Development of the contents hurricane vulnerability functions shall be based on a combination of available insurance company hurricane claims data and rational engineering analysis supported by laboratory testing, field testing, or post-event site investigations.**

The development of content vulnerability functions is primarily based primarily on detailed analyses of historical claims data. Separate vulnerability functions have been derived for damage to building contents for each of the hurricane building classes.

As outlined in [Disclosure G-2.2](#) and [Appendix B](#) the individuals within Moody's involved in the development of vulnerability functions have extensive experience in the field of structural and wind engineering and data analysis.

- B. The relationship between the hurricane model building and contents hurricane vulnerability functions shall be consistent with, and supported by, the relationship observed in insurance company hurricane claims data.**

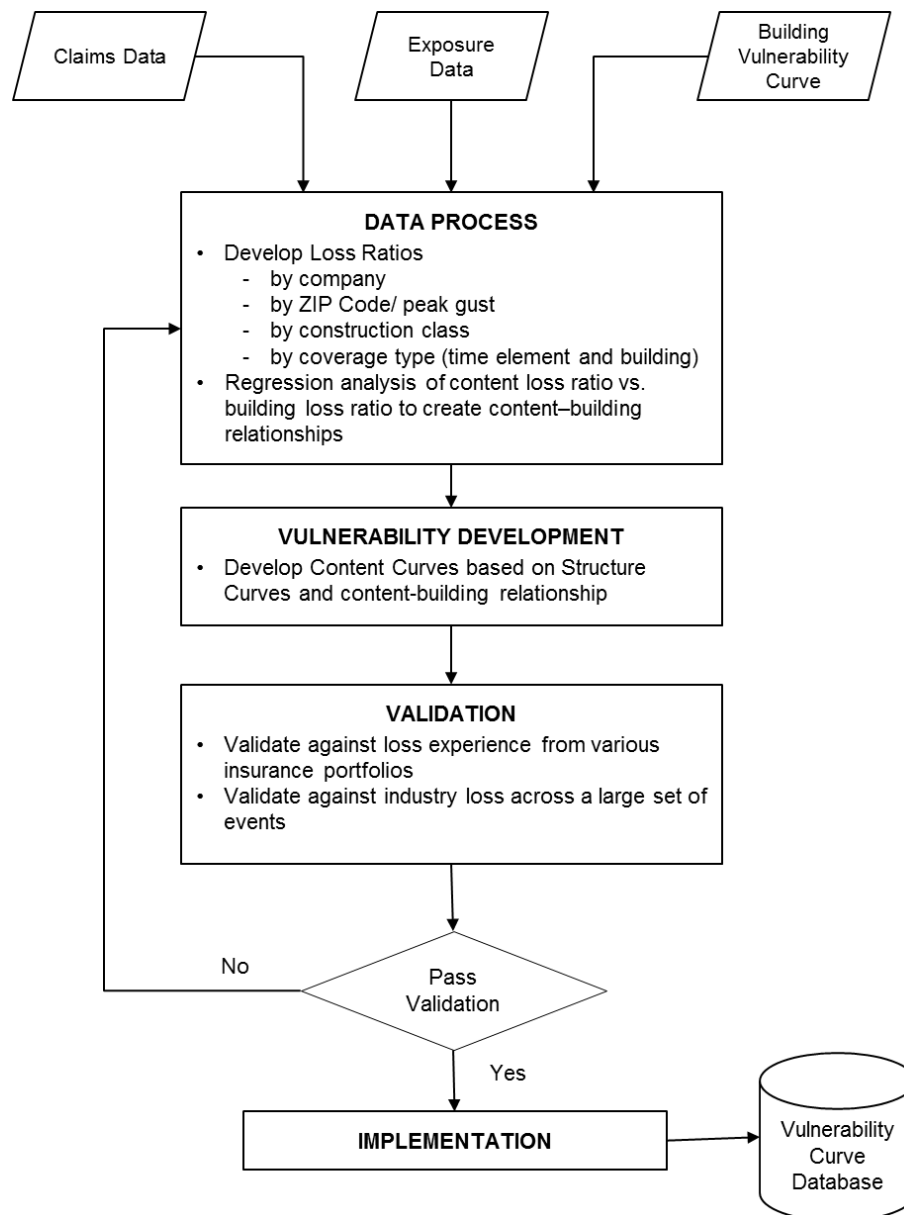
Moody's develops and calibrates relationships between modeled building and content vulnerability functions from actual loss data and as such the relationship between functions and historical losses is reasonable.

- V-2.1 Provide details of modifications to the contents vulnerability component of the hurricane model since the current accepted hurricane model.**

There are no modifications to the contents vulnerability component in the hurricane model since the current accepted hurricane model

- V-2.2 Provide a flowchart documenting the process by which the contents hurricane vulnerability functions are developed and implemented.**

The general procedure used to process such data is diagrammed in [Figure 46](#).

Figure 46: Process for deriving and implementing contents vulnerability functions

V-2.3 Describe the assumptions, data, methods, and processes used to develop the contents hurricane vulnerability functions.

The damage to contents is a function of the amount of damage to the building structure and in particular damage to the roof, openings (i.e., windows and doors) and envelope (i.e., cladding). This function depends on the building class and establishes the rate at which damage to contents accumulates as a function of damage to the building structure. Content curves are derived from structure curves for each of the hurricane building classes and are stored as separate vulnerability functions. The development of stand-alone contents damage curves provides a separate mathematical representation of damage to contents in order to provide reasonable representations of contents only policies.

The data used by Moody's to develop and validate the contents vulnerability functions are described in [Disclosure V-1.3](#). To adequately use loss data for development of vulnerability functions, the data must contain several types of information including: loss per coverage (A, B, C, and D), line of business, exposure value per coverage, description of structures (construction type, etc.), and actual location of structures.

The underlying assumption is that future claims practices will be the same as the claims practices that were in effect at the time that the historical losses used in the model development and validation were paid. Where this assumption is known, or thought to be false, actions are taken to minimize the possibility of the data introducing bias into the development process such as partitioning of data or setting contaminated data aside.

Moody's has used actual insurance data to validate the vulnerability functions used to represent contents losses.

V-2.4 Describe the basis, development, modeling, and treatment of uncertainties associated with the contents hurricane vulnerability functions.

For contents to be affected by a hurricane wind, a breach of the building envelope is required. Therefore, the uncertainty in building damage propagates to contents damage. The uncertainties associated with the contents vulnerability functions are derived from statistical analyses of historical loss data for different building classes and coverage types. In the same fashion as building, contents uncertainty, as measured by the coefficient of variation (CV), is a function of the MDR. The MDR-CV relationship is used to compute the uncertainty associated with the computed contents MDR.

V-2.5 Provide the total number of contents hurricane vulnerability functions. Describe whether different contents hurricane vulnerability functions are used for personal residential, commercial residential, manufactured homes, unit location for condo owners and apartment renters, and various building classes.

For every building vulnerability function, there is a separately derived content vulnerability function. Therefore, the number of functions is the same as that listed in [Disclosure V-1.8](#). Different vulnerability relationships are used for personal residential, commercial residential, mobile/manufactured homes, condo unit owners, apartment renter unit locations and also commercial and industrial properties.

V-2.6 Describe the relationship between building structure and contents hurricane vulnerability functions.

Losses to contents are dependent on the damage to the structure. From an engineering standpoint, losses to contents will be relatively small in comparison to structure losses until the envelope of the structure is breached. At that point, both structure and contents damage will quickly escalate with increasing wind speeds with the contents damage curve approaching that of the structure as wind speeds increase.

V-2.7 Describe how the impact of water infiltration is accounted for in the contents vulnerability functions.

The impact of water infiltration following breaches in the building envelope are key causes of damage to contents that are implicitly part of all claims data. As the model is validated against contents claims data, the model implicitly includes losses associated with water infiltration.

V-3 Development of Time Element Hurricane Vulnerability Functions

- A. Development of the time element hurricane vulnerability functions shall be based on a combination of available insurance company hurricane claims data and rational engineering analysis supported by laboratory testing, field testing, or post-event site investigations.**

Time element vulnerability functions were derived separately and exist for each occupancy class supported by the model. Time element vulnerability is related to the building damage state. Time element losses consider only direct losses (i.e., expense paid to a policyholder while the house is being repaired). Moody's has used historical loss data to calibrate time element vulnerability functions.

As outlined in [Disclosure G-2.2](#) and [Appendix B](#), the individuals within Moody's involved in the development of vulnerability functions have extensive experience in the field of structural and wind engineering and data analysis.

- B. The relationship between the hurricane model building and time element hurricane vulnerability functions shall be consistent with, and supported by, the relationship observed in insurance company hurricane claims data.**

In a manner similar to contents, losses to time element coverages are dependent on the damage to the structure. Time element loss ratios will be relatively small compared to structure loss ratios up to the point where the structure is severely damaged resulting in the building being uninhabitable. In the Moody's hurricane model, the time element vulnerability functions have been validated against actual coverage specific loss data ensuring that the relationships between these vulnerability functions is consistent with loss data.

- C. Time element hurricane vulnerability function development shall consider the estimated time required to repair or replace the property.**

The time required to repair or replace a property used in the derivation of the time element vulnerability functions is inferred from the ratio of the time element claims and exposure values reported by insurance companies.

- D. Time element hurricane vulnerability functions shall include time element hurricane losses associated with damage to the infrastructure caused by a hurricane.**

Since the time element model is calibrated with actual historic loss data, it implicitly includes claims arising from damage to the infrastructure associated with wind, missile impact, flood, and storm surge, to the degree to which they are included in the historic loss data.

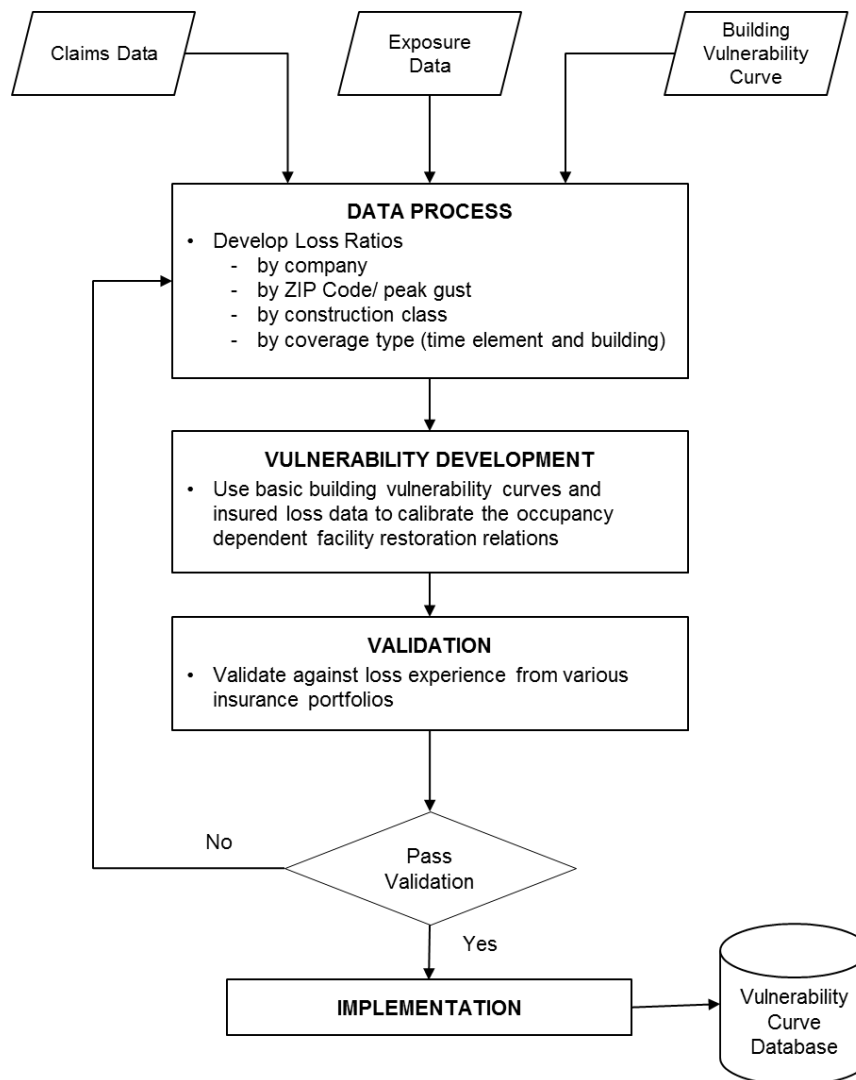
Direct flood damage to infrastructure is not calculated in the model; however, the impact on time element losses due to storm surge damage to infrastructure was not excluded in calibrating time element loss functions.

- V-3.1. Provide details of modifications to the time element vulnerability component of the hurricane model since the currently accepted hurricane model.**

There are no modifications to the time element vulnerability component in the hurricane model since the current accepted hurricane model.

- V-3.2 Provide a flowchart documenting the process by which the time element hurricane vulnerability functions are developed.**

The general procedure used to process such data is diagrammed in [Figure 47](#).

Figure 47: Process for deriving and implementing time element vulnerability functions

V-3.3 Describe the assumptions, data, methods, and processes used to develop the time element hurricane vulnerability functions.

The hurricane model has separate time element vulnerability functions. There is a time element function for each occupancy class supported by the model. Time element vulnerability is related to the building damage state. Time element losses consider only direct losses (i.e., expense paid to a policy holder while the house is being repaired).

Moody's has used actual loss data to develop and validate the time element vulnerability functions. Indirect losses are not separated from the actual loss data and therefore the modeled functions include both direct and indirect loss to the building.

Calculated time element losses are dependent on the structure damage, starting at the same threshold as building damage. Claims data has been used to verify the approach of starting time element loss at the threshold of building damage. From claims data reviewed from Hurricane Andrew less than 0.1 percent of time element claims were associated with no structure coverage claim.

V-3.4 *Describe the basis, development, modeling, and treatment of uncertainties associated with the time element hurricane vulnerability functions.*

Time element losses originate from a policyholder not being able to occupy the structure while the hurricane damage to the building is being repaired. The uncertainty associated with time element losses are directly related to variation in what is acceptable living conditions in a building damaged by a hurricane and the accommodation used, both of which can vary by policyholder. The uncertainties associated with the vulnerability functions are derived from analyses of historical loss data for different building classes and coverage types. These analyses indicate that the time element uncertainty, as measured by the coefficient of variation (CV), is a function of the time element MDR and corresponding effective down time (EDT). The MDR-CV relationship is used to compute the uncertainty associated with the computed MDR.

V-3.5 *Describe how time element hurricane vulnerability functions take into consideration the damage to local and regional infrastructure.*

Modeled time element loss costs include direct losses only (e.g., expense paid to a policyholder while the house is being repaired). However, the impact of storm surge damage to infrastructure on time element losses was not excluded in calibrating wind-based time element loss functions. Local and regional infrastructure damage is also considered in the Moody's post-event loss amplification (PLA) methodology (see [Disclosure A-4.3](#)).

V-3.6 *Describe the relationship between building structure and time element hurricane vulnerability functions.*

Time element functions are proportional to the effective down time (EDT) of a structure, which is computed as a function of the physical damage state of the structure. The ratio of time element mean damage ratios to structure mean damage ratios is small at low building damage ratios and increases with increasing building damage ratio.

V-4 Hurricane Mitigation Measures and Secondary Characteristics

- A. *Modeling of hurricane mitigation measures to improve a building's hurricane wind resistance, the corresponding effects on hurricane vulnerability and associated uncertainties shall be theoretically sound and consistent with fundamental engineering principles. These measures shall include fixtures or construction techniques that affect the performance of the building and the damage to contents and shall include:***

- **Roof strength**
- **Roof covering performance**
- **Roof-to-wall strength**
- **Wall-to-floor-to-foundation strength**
- **Opening protection**
- **Window, door, and skylight strength.**

The North Atlantic Hurricane Models support modification of the base vulnerability functions through the application of secondary modifiers developed using the component vulnerability model. The modifiers can be building-characteristic specific (e.g., improved roof sheathing or anchors) or external (e.g., storm shutters). These characteristics must be specifically selected by the user. The default case is to not include any modifiers. If modifiers are selected, they are clearly identified in the input files and output reports. The secondary modifiers available in the model include the fixtures or construction techniques required in the standard and are listed in [Table 16](#).

In addition to affecting the mean vulnerability, the secondary modifiers also affect the associated uncertainty in a manner that is theoretically sound and consistent with engineering principles as described in [Disclosure V-4.8](#).

- B. *The modeling organization shall justify all hurricane mitigation measures and secondary characteristics considered by the hurricane model.***

The mitigation measures and secondary characteristics considered by the hurricane model are common components and elements used on buildings that research and damage investigations have shown influence hurricane wind-related losses. The full list of mitigation measures and secondary characteristics is provided in [Disclosure V-4.4](#).

- C. *Application of hurricane mitigation measures that affect the performance of the building and the damage to contents shall be justified as to the impact on reducing damage whether done individually or in combination.***

Mitigation measures impact both the mean damage ratio (MDR) and the coefficient of variation (CV) of the damage ratio. The application of mitigation measures is reasonable when applied both individually and in combination.

- D. *Treatment of individual and combined secondary characteristics that affect the performance of the building and the damage to contents shall be justified.***

Moody's develops and calibrates secondary characteristics that affect the performance of the building and the damage to contents based on loss data, published reports and papers, and engineering judgment and as such, treatment of individual and combined secondary characteristics is reasonable.

- V-4.1 *Provide details of modifications to hurricane mitigation measures and secondary characteristics in the hurricane model since the currently accepted hurricane model.***

There are no modifications to the hurricane mitigation measures and secondary characteristics in the hurricane model since the current accepted hurricane model.

V-4.2 Describe the procedures used to calculate the impact of hurricane mitigation measures and secondary characteristics, including software, its identification, and current version. Describe whether or not such procedures have been modified since the currently accepted hurricane model.

The impact of hurricane mitigation measures and secondary characteristics has been developed using various published reports and studies combined with engineering judgment. This procedure has not been modified from the currently-accepted hurricane model.

V-4.3 Provide a completed Form V-2. Provide a link to the location of the form in the submission appendix [Form V-2].

Form V-2 has been calculated using zero deductible structural losses only on \$100,000 base structure wood frame and masonry buildings as described in Form V-2.

V-4.4 Provide a description of the hurricane mitigation measures and secondary characteristics used by the hurricane model, whether or not they are listed in Form V-2.

The following table lists all the secondary modifier options available in the model. Only modifiers relevant to wind hazard for residential occupancy are presented here; option numbers within a modifier are not necessarily consecutive as a result.

Table 16: Moody's secondary characteristic options in North Atlantic Hurricane Models

Characteristic	Options	Notes
2–Construction Quality	0-Unknown	Buildings with poor construction quality will suffer more losses than buildings with certified design and construction. Options are included to account for the Institute for Business and Home Safety (IBHS) hurricane risk mitigation programs. *Certified Design & Construction and obvious signs of duress are applicable to mobile homes to reflect the enhancements or deterioration of tie-down systems.
	1-Obvious signs of duress or distress	
	2-Wind Only - Fortified Home/Multifamily/Commercial, Roof, Option 1	
	3-Wind Only - Fortified Home/Multifamily/Commercial, Roof, Option 2	
	4-Wind Only - Fortified Home/Multifamily/Commercial, Silver, Option 1	
	5-Wind Only - Fortified Home/Multifamily/Commercial, Silver, Option 2	
	6-Wind Only - Fortified Home/Multifamily/Commercial, Gold, Option 1	
	7-Wind Only - Fortified Home/Multifamily/Commercial, Gold, Option 2	
	8-Wind Only - Fortified for Safer Living/Business – [Post 2001]	
	9-Certified design & construction	
	10-Hail&Wind - Fortified Home/Multifamily/Commercial, Roof, Option 1	
	11-Hail&Wind - Fortified Home/Multifamily/Commercial, Roof, Option 2	

Characteristic	Options	Notes
	12-Hail&Wind - Fortified Home/Multifamily/Commercial, Silver, Option 1	
	13-Hail&Wind - Fortified Home/Multifamily/Commercial, Silver, Option 2	
	14-Hail&Wind - Fortified Home/Multifamily/Commercial, Gold, Option 1	
	15-Hail&Wind - Fortified Home/Multifamily/Commercial, Gold, Option 2	
	16-Hail&Wind - Fortified for Safer Living/Business – [Post 2001]	
4–Roof Covering	0-Unknown	Damage is directly correlated to the type of roof covering material used on the building.
	1-Metal sheathing with exposed fasteners	
	2-Metal sheathing with concealed fasteners	
	3-Built-up roof or single-ply membrane roof with the presence of gutters	
	4-Built-up roof or single-ply membrane roof without the presence of gutters	
	5-Concrete / clay tiles	
	6-Wood shakes	
	7-Normal shingle	
	8-Normal shingle with Secondary Water Resistance (SWR)	
	9-Shingle rated for high wind speeds	
	10-Shingle rated for high wind with SWR	
	16-Concrete roof	
	17-Bermuda-style roof	
	18-Fabric (tensile membrane)	
6–Roof Age / Condition	Unknown	Older roofs will suffer more loss than newer roofs.
	0–5 years	
	6–10 years	
	11 years or more	
	Obvious signs of duress and distress	
7–Roof Geometry	0-Unknown	Roof geometry directly impacts the type of wind forces a roof is likely to experience. Flat roofs are more likely to experience more loading than hipped or high-pitched roofs.
	1-Flat roof with parapets	
	2-Flat roof without parapets	
	3-Hip roof with slope less than or equal to 6:12 (26.5 degrees)	
	4-Hip roof with slope greater than 6:12 (26.5 degrees)	

Characteristic	Options	Notes
	5-Gable roof with slope less than or equal to 6:12 (26.5 degrees)	
	6-Gable roof with slope greater than 6:12 (26.5 degrees)	
	7-Braced gable roof with slope less than or equal to 6:12 (26.5 degrees)	
	8-Braced gable roof with slope greater than 6:12 (26.5 degrees)	
9–Roof Anchor	0-Unknown	The strength of roof anchorage has a direct impact on the damageability of the building envelope. Stronger roof anchors provide more resistance against wind forces.
	1-Toe nailing / No anchorage	
	2-Clips	
	3-Single wraps	
	4-Double wraps	
	5-Structural	
10–Roof Equipment Hurricane Bracing	0-Unknown	If the equipment anchorage is not adequate it can compromise the roof's integrity.
	1-Properly installed with adequate anchorage	
	2-Obvious signs of deficiencies in the installation	
	3-No equipment present	
12–Commercial Appurtenant Structures	0-Unknown	Commercial appurtenant structures do not refer to standalone garages or buildings, typically covered under Coverage B, but instead to large signs, extensive ornamentation, and solar panels. These features can shake loose from either the roof or structural elements of a building.
	1-Large signs	
	2-Extensive ornamentation	
	3-None	
	4-Roof-mounted ballasted PV array	
	5-Roof-mounted mechanically attached PV array	
	6-Large signs and roof-mounted ballasted PV array	
	7-Large signs and roof-mounted mechanically attached PV array	
	8-Extensive Ornamentation and roof-mounted ballasted PV array	
	9-Extensive Ornamentation and roof-mounted mechanically attached PV array	
13–Cladding Type	0-Unknown	Various types of claddings provide various degrees of resistance against wind loads. If there is a combination of two or more cladding types used on the
	1-Brick veneer	
	2-Metal sheathing	
	3-Wood	

Characteristic	Options	Notes
	4-EIFS	structure, select the one of dominant use.
	5-Designed for impact	
	6-Not designed for impact with gravel rooftop on building or adjacent buildings within 1000 ft	
	7-Not designed for impact without gravel rooftop on building or adjacent buildings within 1000 ft	
	8-Vinyl siding / Hardboard	
	9-Stucco	
	10-None	
14–Roof Sheathing Attachment	0-Unknown	Roof sheathing is one of the main components of a building. It helps keep the integrity of the building and is a major line of defense against losses to building and contents due to both wind and rain. The strength of sheathing depends on the way it is attached to the roof rafters. This option accounts for nail size and spacing.
	1-Batten decking / Skipped sheathing	
	2-6d nails – Any nail schedule	
	3-8d Nails – Minimum nail schedule	
	4-8d Nails – High wind nail schedule	
	5-10d Nails – High wind nail schedule	
	6-Dimensional lumber / Tongue & groove decking with a minimum of 2 nails per board	
15–Frame-Foundation Connection	0-Unknown	A building properly connected to its foundation can resist wind loads more effectively, especially at high wind speeds.
	1-Bolted	
	2-Unbolted	
16–Residential Appurtenant Structures	0-Unknown	Residential appurtenant structures do not refer to standalone garages or buildings, typically covered under Coverage B, but instead to carports, screen enclosures, and solar panels. The presence of these features may cause increased wind damage to the structure.
	1-None	
	2-Fences / Carport	
	3-Attached Screen enclosure / Lanai	
	4-Detached Screen enclosure / Lanai	
	7-Roof mounted ballasted PV array	
	8-Roof mounted mechanically attached PV array	
	9-Fences / Carport and Roof mounted ballasted PV array	
	10-Fences / Carport and Roof mounted mechanically attached PV array	
	11-Attached screen enclosure and Roof mounted ballasted PV array	

Characteristic	Options	Notes
	12 -Attached screen enclosure and Roof mounted mechanically attached PV array	
	13-Detached screen enclosure and Roof mounted ballasted PV array	
	14-Detached screen enclosure and Roof mounted mechanically attached PV array	
19–Opening Protection	0-Unknown	Openings with poor wind resistance can expose interior building components and contents to more wind and water hazards than those with good wind resistance. In general, "glazed openings" refers to windows, and "all openings" refers to both doors and windows. Doors designed for pressure only can refer to existing garage doors retrofitted with braces to strengthen resistance to wind pressure.
	1-All openings designed for large missiles	
	2-All openings designed for medium missiles	
	3-All openings designed for small missiles	
	4-All glazed openings designed for large missiles	
	5-All glazed openings designed for medium missiles	
	6-All glazed openings designed for small missiles	
	7-All glazed openings covered with plywood / oriented strand board (OSB)	
	8-At least one glazed exterior opening does not have wind-borne debris protection	
	9-No glazed exterior openings have wind-borne debris protection	
	10-All glazed openings designed for large missiles & doors designed for pressure only	
	11-All glazed openings designed for medium missiles & doors designed for pressure only	
	12-All glazed openings designed for small missiles & doors designed for pressure only	
	13-All glazed openings covered with plywood / oriented strand board (OSB) & doors designed for pressure & missile impact	
	14-All glazed openings covered with plywood / oriented strand board (OSB) & doors designed for pressure only	
	15-No glazed exterior openings have wind-borne debris protection but doors designed for pressure & missile impact	
	16-No glazed exterior openings have wind-borne debris protection but doors designed for pressure only	
26–Flashing and Coping Quality	0-Unknown	Roof covering failures are often attributed to initial failure of roof flashing and coping.
	1-Compliant with ES1	
	2-Not compliant with ES1	

Note that modifiers related to surge are not shown in this list.

V-4.5 *Describe how hurricane mitigation measures and secondary characteristics are implemented in the hurricane model. Identify any assumptions.*

A series of modifiers and options for each modifier are available for the user to select. The base (unmodified) vulnerability curves are adjusted based on modifier selections chosen by the user. The modifier values vary by base vulnerability curve, modifier option, and wind speed. The modifier values can decrease or increase the base vulnerability curves, depending on the modifier. The default setting for each of the modifiers is "unknown." Therefore, if no modifier options are chosen the base (average) vulnerability curve is utilized.

V-4.6 *Describe how the effects of multiple hurricane mitigation measures and secondary characteristics are combined in the hurricane model and the process used to ensure that multiple hurricane mitigation measures and secondary characteristics are correctly combined.*

Users may change one or more mitigation factors from the unknown state based on specific attributes for the modeled structure. The individual impact of single mitigation factors are combined together with a multiplicative methodology to reflect the combined effect of different attributes that can increase or decrease the loss. In addition, caps are placed on the maximum change evoked through the application of many modifiers to prevent unrealistic values from being returned from the model. Moody's has validated the impact of multiple features through a variety of tests and comparisons to external publications (i.e., FEMA 2009b, ARA 2008). Moody's also considers how additional information changes the CV of the loss estimates, and uses a probabilistic methodology to quantify the contribution of each of the mitigation measures to the CV.

V-4.7 *Describe how building and contents damage are affected by performance of hurricane mitigation measures and secondary characteristics. Identify any assumptions.*

As described in [Disclosure V-4.4](#), modifier values can scale (increase or decrease) the base vulnerability functions for building and contents damage. The amount of increase or decrease in building and contents damage for each modifier option varies by wind speed and building attributes such as year built, construction class, etc. For instance, the impact of a good mitigation measure on the mean damage ratio (MDR) is typically larger for older year built structure and lower (in a relative sense) for newer year built structure, all else being equal.

The model requires the input for all primary building characteristics to be specified before the impact of mitigation measures are applied. Therefore, if any of the primary characteristics are unknown, the mitigation measure input is ignored.

The impact of multiple mitigation measures on building and contents damage are also capped (upper and lower bound) in the model.

V-4.8 *Describe how roof age and roof covering type are incorporated in the hurricane model.*

Roof age and roof covering type are incorporated in the hurricane model through the secondary characteristics. Roof age includes three options that specify different roof age ranges. Roof covering type includes 13 unique options that can be specified at a building level (see [Table 16](#)). For both roof age and roof covering type, depending on the option selected, the vulnerability functions can either increase or decrease compared to the default (unknown) case.

V-4.9 *Describe how hurricane mitigation measures and secondary characteristics affect the uncertainty of the vulnerability. Identify any assumptions.*

Similar to the impacts on mean damage ratio described in [Disclosures V-4.4](#) and [V-4.6](#), modifier values impact the uncertainty of building and contents vulnerability as well.

1. As mitigation measures provide more information about the building to evaluate its performance

when subject to wind loads, the epistemic uncertainty in vulnerability is always reduced. In the model, this is achieved through CV reduction factors that vary for each modifier.

2. As vulnerability uncertainty (CV) is modeled as a function of MDR, any increase or decrease in MDR due to mitigation measures leads to a change (corresponding reduction or increase) in CV value.

Thus, the cumulative impact of the above two changes determines the total impact of mitigation measures on the uncertainty of vulnerability.

V-4.10 *Provide a completed Form V-3 if not considered as Trade Secret. Provide a link to the location of the form in the submission appendix [Form V-3].*

V-4.11 *Provide a completed Form V-4. Provide a link to the location of the form in the submission appendix [Form V-4].*

V-4.12 *Provide a completed Form V-5 if not considered as Trade Secret. Provide a link to the location of the form in the submission appendix [Form V-5].*

ACTUARIAL HURRICANE STANDARDS

A-1 Hurricane Model Input Data and Output Reports

- A. *Adjustments, edits, inclusions, or deletions to insurance company or other input data used by the modeling organization shall be based upon generally accepted actuarial, underwriting, and statistical procedures.***

Insurance company input data used in the modeling process contains information provided by the company and Moody's does not make any adjustments, edits, inclusions, or deletions to the input data.

- B. *All modifications, adjustments, assumptions, inputs and input file identification, and defaults necessary to use the hurricane model shall be actuarially sound and shall be included with the hurricane model output report. Treatment of missing values for user inputs required to run the hurricane model shall be actuarially sound and described with the hurricane model output report.***

Input data to the Moody's hurricane model are explicitly provided by the user for each particular analysis. The model assumes that inputs provided by the user reflect actual exposures. Specifically:

Insurance to Value

The model does not make any assumptions regarding insurance to value. The location value and insurance limits are provided as separate inputs. No adjustments are made to these values within the model.

Primary Characteristics

The model itself does not make adjustments for exposure characteristics unless the user is unable to specify any of the primary characteristics or the specific location of the policy. If any of the primary characteristics are unknown, the model defaults to an average mix of the unknown characteristic(s).

Appurtenant Structures

Limits and values of appurtenant structures for each location are a user input. The model does not make assumptions regarding the value of appurtenant structures.

Contents

Contents limits and values are part of the user input. No assumptions are made within the model.

Time Element Coverage

Time element coverage limits and values are part of the user input. The model assumes that the value represents one year of potential expenses.

Insurer Exposures by ZIP Code

As part of the analysis process, each location analyzed is "geocoded" (i.e., geographically positioned). If the location does not geocode (for example, if a ZIP Code is invalid), the location is excluded from the analysis. All locations that are not included in the analysis are easily identified. If the analysis is run at ZIP Code level, the exposure is assumed to be distributed across the ZIP Code. Given that all exposure information is provided as part of the user analysis input, this information can be summarized and clearly identified as part of any rate filing submission. See the Analysis Summary Report in [Appendix F](#).

A-1.1 *Identify insurance-to-value assumptions and describe the methods and assumptions used to determine the property value and associated hurricane losses. Provide a sample calculation for determining the property value.*

The Moody's hurricane model assumes that the value input into it is the true property value. Any assumptions regarding insurance to value must be made by the user prior to running the model.

The Moody's hurricane model has separate inputs for values and limits. This provides the flexibility to estimate policies with or without guaranteed replacement cost coverage. For example, assume an insurer has a policy on its books for a building with an insured value of \$100,000. If the insurer assumes that this building is 10 percent underinsured, the value input is $\$100,000 / (1 - 0.1) = \$111,111$. If the policy has guaranteed replacement cost coverage, the limit input will also be \$111,111. If the policy does not have guaranteed replacement cost coverage, the limit input will be \$100,000.

A-1.2 *Identify depreciation assumptions and describe the methods and assumptions used to reduce insured hurricane losses on account of depreciation. Provide a sample calculation for determining the amount of depreciation and the actual cash value (ACV) hurricane losses.*

The Moody's hurricane model contains no assumptions regarding depreciation. To model actual cash value provisions, the user must input the actual cash values instead of the replacement cost values into the model. Depreciation assumptions are made by the user prior to running the model.

For example, if it is determined that a \$100,000 valued home has depreciated 10 percent and the coverage dictates this depreciation should be reflected in the loss payment, the value input would be \$100,000 and the limit input would be \$90,000 (\$100,000 times .90). Any expected loss payment would be capped at \$90,000.

Neither Moody's nor the model performs any depreciation calculations, including the type given in the example. Any depreciation calculations are done by the user before inputting information into the model.

A-1.3 *Describe the methods and input data used to distinguish among policy form types (e.g., homeowners, dwelling property, manufactured homes, tenants, condo unit owners) and their deductibles and coverage limits.*

Policy forms vary in their terms, conditions, deductibles, and coverage limits and the Moody's hurricane model can model these variable terms. The modeling capabilities include variability in construction (several types of construction classes including mobile/manufactured homes), occupancy, coverages for building, contents and time element, or A, B, C, and D. Given these variables as input, any combination or policy form as well as their limits and deductibles can be entered in the user interface and modeled for either commercial or personal lines.

A-1.4 *Provide a copy of the input form(s) used by the hurricane model with the hurricane model options available for selection by the user for the Florida hurricane model under review. Describe the process followed by the user to generate the hurricane model output produced from the input form. Include the hurricane model name, version identification, and platform identification on the input form. All items included in the input form shall be clearly labeled and defined.*

Appendix E includes screen shots of the RiskLink and Risk Modeler user interfaces showing the location level user inputs. All valid data input in these forms is directly used in generating model output. The model name and version number are accessible in the RiskLink user interface via the About RiskLink option under the help menu. The model name and version number are accessible in the Moody's Peril Models List for Risk Modeler, while the platform name and version number for Risk Modeler are accessible in the Risk Modeler Global Menu. Screen shots for RiskLink and Risk

Modeler are also available in the [Appendix E](#). All items in the RiskLink and Risk Modeler model input forms are clearly labeled and defined.

A-1.5 *Disclose, in a hurricane model output report, the specific inputs required to use the hurricane model and the options of the hurricane model selected for use in a residential property insurance rate filing in Florida. Include the hurricane model name, version identification, and platform identification on the hurricane model output report. All items included in the hurricane model output report shall be clearly labeled, highlighted and defined.*

All required input needed to derive loss projections from the model are clearly labeled and defined in the Post Import Summary. All variables that a model user is authorized to set are clearly labeled and defined in the Analysis Summary Report. See [Appendix F](#) for an example of both output reports.

The Moody's hurricane model contains several optional features that are not part of the FCHLPM approval, such as alternative rate sets reflecting "medium term" versus "historical" perspectives, additional vulnerability curve sets, and settings related to storm surge modeling. Model settings submitted for FCHLPM approval are not the same as the Moody's reference view of risk for the Moody's hurricane model. The Moody's reference view is based on different inclusion of sub-perils and assumptions.

All user modifiable model options are described in sets of model option profiles called "DLM (Detailed Loss Model) profiles" in RiskLink and "Model Profiles" in Risk Modeler – to ensure that results from the certified version of the model are clearly labeled, Moody's provides a specified profile, with approved settings, labeled "FCHLPM Certified Hurricane Losses" in RiskLink and "RMS Default FCHLPM Certified Hurricane Losses 25" in Risk Modeler. Regulators may audit that FCHLPM approved model settings were used by verifying that the field "DLM/Model Profile Name" is set to "FCHLPM Certified Hurricane Losses/RMS Default FCHLPM Certified Hurricane Losses 25" in the Analysis Summary Report ([Appendix F](#)). The model settings corresponding to this certified profile are shown in [Table 17](#).

Table 17: Model settings corresponding to "FCHLPM Certified Hurricane Losses/RMS Default FCHLPM Certified Hurricane Losses 25"

Analysis Option	Approved Setting	Notes
Peril	Windstorm	
Region	Florida	Florida is a sub-region of the main model region "North Atlantic (including Hawaii)", found under the region "United States".
Analysis Mode / Type	Distributed / Exceedance Probability	
Model Version	RMS – RL25	Model Version only available as an option in Risk Modeler
Event Rate Set	RMS 2025 Historical Event Rates	
Vulnerability Curves	Vulnerability Default	Additional vulnerability curves are available for sensitivity analyses and use cases beyond residential ratemaking purposes in the state of Florida.

Analysis Option	Approved Setting	Notes
Assume 2% Deductible when UNKNOWN	Selected	This option will cause any residential locations within the state of Florida, with an unknown deductible, to default to 2% of the structure value.
Calculate Losses from:	Wind	The storm surge option must NOT be selected for ratemaking purposes in the state of Florida.
Calculated loss amplification factors for:	Building and Appurtenant Structures, Contents, and Business Interruption / Time Element	
PLA Scale Factor	Equal to 1.00	No modification
Scale Exposure Factors:	Equal to 1.00	No exposure modification
Non-Modeled Damage Factors	Equal to 1.00	No modification

Post analysis, users must apply annual deductible factors to model output to convert average annual loss and return period loss using occurrence-deductibles to average annual and return period loss using annual-deductibles, as required by Florida Statute 627.701. The table of relevant annual deductible factors is provided with each software version. To demonstrate these factors have been applied post analysis, users should complete a copy of the form included in [Table 54](#) in [Appendix F](#).

A-1.6 Provide the specific set of options acceptable for use in preparing a Florida insurance rate filing.

A list of the specific set of options acceptable for a Florida insurance rate filing is shown in [Table 18](#).

Table 18: List of model options available to users highlighting options acceptable for Florida rate filings

Analysis Option	Available Settings	Notes
Insurance Type	Property	
Peril	Windstorm	
Region	Florida	Florida is a sub-region of the main model region "North Atlantic (including Hawaii)", found under the region "United States".
Analysis Type	Exceedance Probability	
Analysis Mode	Distributed	
Model Version	RMS – RL25	Model Version only available as an option in Risk Modeler
Event Rate Set	RMS 2025 Historical Event Rates	
Sea Level Rise Scenario	0 – No Sea Level Rise	Field disabled unless user licenses the relevant Moody's products. When licensed, the field only affects storm surge analyses in use cases beyond residential ratemaking purposes in the state of Florida
Vulnerability Curves	Vulnerability - Default	
Use RiskAssessor Curves (if present)	Toggled off	Legacy field, only applicable for users of a separately licensable product that is no longer sold.
Calculate Losses From:	Wind (and Wave for offshore U.S. locations)	
Calculate Loss Amplification Factors for:	Building and Appurtenant Structures	
	Contents	All 3 Loss Amplification options should be toggled to 'on'
	Business Interruption/Time Element	
PLA Scale Factor	Equal to 1.00	
Assume 'UNKNOWN' for the following primary characteristics	Construction Class Occupancy Class Year Built Number of Stories Floor Area Floors Occupied	All options should be toggled to 'off'

Analysis Option	Available Settings	Notes
Assume 'UNKNOWN' for secondary modifiers:	Toggled off	
Ignore Local Flood Defenses	Toggled off	
Scale Exposure Values	Equal to 1.00	
Assume 2% Deductible when 'UNKNOWN' (FCHLPM runs only)	Toggled on	
Map IFM to base property model	Toggled off	Option only applicable to users who separately license the RMS Industrial Facilities Model
Map Builders Risk to base property model	Toggled off	Option only applicable to users who separately license the Moody's RMS Builders Risk Model
Map Marine Cargo to base property model	Toggled off	Option only applicable to users who separately license the Moody's RMS Marine Cargo Model
Non-Modeled Damage Factors	Equal to 1.00	

A-1.7 Describe actions performed to ensure the validity of insurer or other input data used for hurricane model inputs or for validation/verification.

The following validations are done during the import or while entering the data:

- Any location that does not geocode to a county level or more geographically detailed resolution will not have any expected loss associated with it. If the user is unable to specify the ZIP Code, but is able to specify the county, the model allocates the exposure to ZIP Codes within the county in proportion to the appropriate exposure for the line of business under consideration. Moody's does not perform loss cost analyses for ratemaking purposes at the county level, and strongly advises its clients not to do so. Limits and deductibles must be greater than or equal to 0. The limits are defaulted to the total value and deductibles default to 2 percent of Coverage A, respectively, if they are not specified.
- The construction and occupancy classes default to unknown if the data is not present or is invalid or if the scheme is not present or is invalid.
- A location must have a building, appurtenant structure, contents, or time element coverage specified or the location will be excluded from the analysis.
- The percentage completion for all the locations must be between 0 and 100. The default value for percentage completion is 100 percent.
- A location can have only one combined coverage (building plus contents).
- The value of the insured asset defaults to zero if not specified. If the currency type is not specified, all monetary units are defaulted to the RiskLink/Risk Modeler system currency.
- All primary characteristics must be coded in order for secondary modifiers to be invoked.
- All hurricane secondary modifiers are defaulted to unknown if not specified.
- All policies must have a valid peril specified.
- All percentage entries in the user interface must be between 0 and 100.
- The number of buildings at a location defaults to 1.
- The square-footage of a building is defaulted to a weighted average of the five square-foot bands when specified as unknown, based on an average square footage of 1,950 sq ft for single-family residential structures.

The following additional validations are done to user-input addresses during geocoding:

- Street address locations are standardized according to U.S. postal service formats, then confidence scored against a reference database comprised of validated street addresses, postcodes, cities, counties and states using a variety of matching algorithms that have been designed to minimize incorrect output. The highest confidence matching address is selected, and coordinates and other valid address elements are returned.
- Address input, including coordinate and ZIP Code level addresses, are validated against the reference database, including county and state, ensuring that matches are constrained to the proper geographic region.

A-1.8 Disclose if changing the order of the hurricane model input exposure data produces different hurricane model output or results.

Changing the order of the model exposure data does not produce a difference in model output or results.

A-1.9 *Disclose if removing or adding policies from the hurricane model input file affects the hurricane model output or results for the remaining policies.*

Each original policy (policies remaining or policies that existed before additions) will have the same AAL after removing or adding policies.

A-2 Hurricane Events Resulting in Modeled Hurricane Losses

- A. *Modeled hurricane loss costs and hurricane probable maximum loss levels shall reflect all insured wind related damages from hurricanes that produce minimum damaging windspeeds or greater on land in Florida.***

The track and pressure of each tropical cyclone are modeled throughout its lifetime in the Atlantic Basin from genesis to decay. For the purposes of calculating losses, a storm is first considered when maximum winds reach hurricane strength and damage is caused in Florida. From that point on, wind speeds and losses are calculated regardless of whether maximum winds are greater than or less than hurricane strength.

- B. *The modeling organization shall have a documented procedure for distinguishing wind-related hurricane losses from other peril losses.***

Moody's has a documented procedure for distinguishing wind-related hurricane losses from other peril losses. These documents can be reviewed on-site.

When examining insurance company claims data, Moody's excludes locations that fall within the Moody's modeled storm surge footprint for the event. This removes locations that have a wind claim that may be contaminated by storm surge damage.

- A-2.1 *Describe how damage from hurricane model generated storms (landfalling and by-passing hurricanes) is excluded or included in the calculation of hurricane loss costs and hurricane probable maximum loss levels for Florida.***

The stochastic database contains events making landfall in the U.S. and by-passing storms. Losses from by-passing storms are considered only once the storm reaches hurricane strength wind speeds and causes loss in Florida. The wind speeds causing damage for that hurricane could be greater than or less than hurricane strength, but the hurricane's maximum winds must correspond to at least hurricane strength for the storm to be considered.

- A-2.2 *Describe how damage resulting from concurrent or preceding flood (including hurricane storm surge) is treated in the calculation of hurricane loss costs and hurricane probable maximum loss levels for Florida.***

Loss due to coastal flood or storm surge is not included in the calculations of loss costs or probable maximum loss levels for structure, contents, or time element coverages.

A-3 Hurricane Coverages

A. *The methods used in the calculation of building hurricane loss costs, including the effect of law and ordinance coverage, shall be actuarially sound.*

The methods used in the development of building loss costs are actuarially sound. The vulnerability relationships, which implicitly include the impacts of law and ordinance coverage, are developed using structural and wind engineering principles coupled with the analysis of historical storm loss data, building codes, published studies, and Moody's internal engineering developments in consultation with wind engineering experts. In addition, Moody's has reviewed research and data contained in numerous technical reports, special publications, and books related to wind engineering and damage to structures due to wind. Moody's engineers have also participated in several reconnaissance missions. The knowledge and data gathered during these site visits have been used to guide the calibration and validation of the vulnerability functions. The final calibration of the vulnerability functions has been made using billions of dollars of loss data, with corresponding exposure information.

The model calculates loss distributions using damage ratios for each stochastic event and the rates for each event. These loss distributions are used to determine expected loss, which is divided by exposure to express the information in a loss cost. The methods are actuarially sound.

B. *The methods used in the calculation of appurtenant structure hurricane loss costs shall be actuarially sound.*

The methods used in the development of appurtenant structure loss costs are similar to the methods used for building loss costs and are actuarially sound.

C. *The methods used in the calculation of contents hurricane loss costs shall be actuarially sound.*

The North Atlantic Hurricane Models' treatment of contents damage is derived from and reflects the relationships apparent in the data and is actuarially sound.

D. *The methods used in the calculation of time element hurricane loss costs shall be actuarially sound.*

In the Moody's hurricane model, time element losses include only factors that are hurricane related, are theoretically sound, and consider the time to repair the structure. Time element losses are determined based upon the estimated damage to the structure. Additionally, time element loss functions have been calibrated / validated with actual hurricane event time element coverage losses. The methods are actuarially sound.

A-3.1 *Describe the methods used in the hurricane model to calculate hurricane loss costs for building coverage associated with personal and commercial residential properties.*

To calculate losses, the damage ratio for each stochastic event derived in the Vulnerability Module is translated into dollar loss by multiplying the building damage ratio (including loss amplification as appropriate) by the building coverage value of the property. This is done at each location. Using the mean and coefficient of variation, a beta distribution is fit to represent the loss distribution. From the loss distribution one can find the expected loss.

The Moody's hurricane model uses the loss distribution to estimate the portion of loss carried by each participant within a financial structure (insured, insurer, re-insurer). This distribution is used to calculate the expected loss net of any deductibles and limits.

The loss cost is equal to the expected loss divided by the exposure.

A-3.2 *Describe the methods used in the hurricane model to calculate hurricane loss costs for appurtenant structure coverage associated with personal and commercial residential properties.*

To calculate losses, the damage ratio for each stochastic event derived in the Vulnerability Module is translated into dollar loss by multiplying the appurtenant damage ratio (including loss amplification as appropriate) by the appurtenant coverage value of the property. This is done at each location. Using the mean and coefficient of variation, a beta distribution is fit to represent the loss distribution. From the loss distribution one can find the expected loss.

The Moody's hurricane model uses the loss distribution to estimate the portion of loss carried by each participant within a financial structure (insured, insurer, re-insurer). This distribution is used to calculate the expected loss net of any deductibles and limits.

The loss cost is equal to the expected loss divided by the exposure.

A-3.3 *Describe the methods used in the hurricane model to calculate hurricane loss costs for contents coverage associated with personal and commercial residential properties.*

To calculate losses, the damage ratio for each stochastic event derived in the Vulnerability Module is translated into dollar loss by multiplying the contents damage ratio (including loss amplification as appropriate) by the content coverage value of the property. This is done at each location. Using the mean and coefficient of variation, a beta distribution is fit to represent the loss distribution. From the loss distribution one can find the expected loss.

The Moody's hurricane model uses the loss distribution to estimate the portion of loss carried by each participant within a financial structure (insured, insurer, re-insurer). This distribution is used to calculate the expected loss net of any deductibles and limits.

The loss cost is equal to the expected loss divided by the exposure.

A-3.4 *Describe the methods used in the hurricane model to calculate hurricane loss costs for time element coverage associated with personal and commercial residential properties.*

The hurricane model has separate time element vulnerability functions. There is a time element function for each occupancy class supported by the model. Time element vulnerability is related to the building damage state. Time element losses consider only direct losses (i.e., expense paid to a policy holder while the house is being repaired). Moody's has used actual loss data to calibrate time element vulnerability functions. Indirect losses are not separated from the actual loss data and therefore the modeled functions include both direct and indirect loss to the building.

To calculate losses, the damage ratio for each stochastic event derived in the Vulnerability Module is translated into dollar loss by multiplying the time element damage ratio (including loss amplification as appropriate) by the time element coverage value of the property. This is done at each location. Using the mean and coefficient of variation, a beta distribution is fit to represent the loss distribution. From the loss distribution one can find the expected loss.

The Moody's hurricane model uses the loss distribution to estimate the portion of loss carried by each participant within a financial structure (insured, insurer, re-insurer). This distribution is used to calculate the expected loss net of any deductibles and limits.

The loss cost is equal to the expected loss divided by the exposure.

A-3.5 *Describe the methods used in the hurricane model to account for law and ordinance coverage associated with personal residential properties.*

The impacts of law and ordinance coverage, such as the roof replacement rule in the Florida Building Code, is implicitly included in the base vulnerability functions for personal residential properties.

In addition, the impact of the statutory required 25 percent and 50 percent coverage options for personal residential properties is factored into the post-event loss amplification (PLA).

A-4 Modeled Hurricane Loss Cost and Hurricane Probable Maximum Loss Level Considerations

- A. *Hurricane loss cost projections and hurricane probable maximum loss levels shall not include expenses, risk load, investment income, premium reserves, taxes, assessments, or profit margin.***

Neither loss cost projections nor probable maximum loss levels include expenses, risk load, investment income, premium reserves, taxes, assessments, or profit margin.

- B. *Hurricane loss cost projections and hurricane probable maximum loss levels shall not make a prospective provision for economic inflation.***

Neither loss cost projections nor probable maximum loss levels include any prospective provision for economic inflation. Vulnerability functions project losses as a percentage of coverage values. Coverage values are input by the user and no modifications are made within the program to account for economic inflation.

- C. *Hurricane loss cost projections and hurricane probable maximum loss levels shall not include any explicit provision for direct flood losses (including those from hurricane storm surge).***

Loss cost projections and probable maximum loss levels do not include any provision for direct flood or hurricane storm surge losses. Flood and storm surge losses are explicitly calculated using separate models and are provided separately from wind-related losses.

- D. *Hurricane loss cost projections and hurricane probable maximum loss levels shall be capable of being calculated from exposures at a geocode (latitude and longitude) level of resolution.***

The Moody's hurricane model is capable of calculating loss cost projections and probable maximum loss levels at a geocode (latitude-longitude) level of resolution.

- E. *Demand surge shall be included in the hurricane model's calculation of hurricane loss costs and hurricane probable maximum loss levels using relevant data and actuarially sound methods and assumptions.***

Demand surge is included in the Moody's hurricane model using relevant data and actuarially sound methods and assumptions.

Following a major catastrophic event, claims costs can exceed the normal cost of settlement due to a unique set of economic, social, and operational factors. Commonly called demand surge, these factors are quantified using a methodology that Moody's calls post-event loss amplification (PLA). These factors are included in the software, its loss costs, and its probable maximum loss levels.

- A-4.1 *Describe the method(s) used to estimate annual hurricane loss costs and hurricane probable maximum loss levels and the treatment of associated uncertainties. Identify any source documents used and any relevant research results.***

Expected losses associated with each stochastic storm are multiplied by the annual rate of occurrence for the corresponding storm. These are summed over all storms to determine the average annual loss.

Probable maximum loss levels are associated with exceedance probability (EP) curves. Occurrence exceedance probability (OEP) curves provide information on the largest loss from a single occurrence in a year and are generated from the event frequency distribution and the event severity distribution. Aggregate exceedance probability (AEP) curves provide information on losses from the accumulation of all events in a year and are generated using the Fast Fourier Transform

methodology described in Robertson (Proceedings of the Casualty Actuarial Society, Vol. LXXIX, 1992).

As explained in the response to [Disclosure G-1.2](#), beta distributions are fitted to each stochastic event that are used to obtain the severity distribution that describes the distribution of the size of losses, given that an event has occurred. The beta distributions provide the information used to calculate the standard deviations as well as other secondary uncertainty metrics. A Poisson distribution is used for event frequency with the mean frequency obtained as the sum of all the event rates. The primary uncertainty in the model is derived from the Poisson distribution. The OEP curve is calculated on an occurrence basis and is obtained from the severity distribution along with the overall mean frequency. The AEP curve is calculated on an aggregate basis, showing the probability that aggregate losses in a year (the sum of losses from all occurrences in a year) will be greater than a given loss threshold. Thus, multiple occurrences in a year are considered for which the severity distribution is convolved as many times as occurrences may happen in a year.

Model output statistics are provided for various financial perspectives. Gross losses are net of primary company deductibles, as demonstrated in the response to [Disclosure A-5.1](#). In addition to these perspectives, the model includes the capability for the model user to include reinsurance terms that form the basis of information such as pure premium and variability for treaty layers, which can be seen from either the ceding or assuming company perspective.

A-4.2 *Identify all possible resolutions available for the reported hurricane output ranges. Identify the finest level of resolution (i.e., the most granular level) for which hurricane loss costs and hurricane probable maximum loss levels can be provided.*

Table 7 shown in the response to [Disclosure G-3.3](#) shows the possible resolutions.

A-4.3 Describe how the hurricane model incorporates demand surge in the calculation of hurricane loss costs and hurricane probable maximum loss levels.

The North Atlantic Hurricane Models component that quantifies demand surge is called post-event loss amplification (PLA). The PLA model has three major components that escalate loss following major catastrophic events:

- **"Economic" demand surge (EDS)**—Increase in the costs of building materials and labor costs as demand exceeds supply. This factor has the biggest overall impact.
- **Claims Inflation (CI)**—Cost inflation due to the difficulties in fully adjusting claims following a catastrophic event. For example, shortcuts such as setting a threshold loss amount under which claims are simply paid with little to no investigation is a practice historically taken by insurers that are overloaded with claims following a catastrophic event. Intuitively, the impact of this factor varies with the estimated number of claims occurring for an event. Overall CI has a minor impact compared to the other two PLA components.
- **Super Catastrophe Scenarios**—Coverage and loss expansion due to a complex collection of factors such as containment failures, evacuation effects, and systemic economic downturns in selected urban areas. This factor has an impact for high return period events striking earthquake and hurricane exposed metropolitan areas. Primary escalation for super catastrophe events occurs with respect to BI losses.

Each of these PLA components has a different type of trigger and a unique loss escalation function that quantifies actual aspects of loss amplification noted in historical catastrophe events. PLA factors are quantified uniquely by coverage (building, contents, and time element) and are applied uniformly to all ground up loss estimates on a per-storm basis before the application of any financial structures such as deductibles, or limits.

Additionally, for residential single-family dwelling occupancy properties, the impact of the statutory required 25 percent and 50 percent coverage options for law and ordinance is factored into the PLA.

A-4.4 Provide citations to published papers, if any, or modeling-organization studies that were used to develop how the hurricane model estimates demand surge.

There are references that address in very general terms economic theories of demand and supply with applications to demand surge (for example, Dacy and Kunreuther, 1969). However, because of the lack of research specific to this area, Moody's is not aware of publicly published papers that specifically address the topic of quantification of demand surge following natural disasters and therefore none have been referenced.

A-4.5 Describe how economic inflation has been applied to past insurance experience to develop and validate hurricane loss costs and hurricane probable maximum loss levels.

As described in [Disclosure S-5.1](#), in order to create replications of known hurricane losses, Moody's uses a normalization process on past reported historical losses to trend them to the date of the exposure used in the loss validation exercises. This process accounts for increases in cost of construction, growth of the building population, the change in building quality over time, and the change in average living area per house from the time of the event until the date of the exposure used in the loss validation exercises. These normalization factors are only used for validation of the model and are not incorporated into loss cost or probable maximum loss level outputs.

A-5 Hurricane Policy Conditions

A. The methods used in the development of mathematical distributions to reflect the effects of deductibles and policy limits shall be actuarially sound.

The methods used in the development of mathematical distributions to reflect the effects of deductibles, policy limits, and coinsurance are actuarially sound. [Disclosure A-5.1](#) provides more detailed information on how deductibles and policy limits are handled in the Moody's model.

B. The relationship among the modeled deductible hurricane loss costs shall be reasonable.

The relationship among the modeled deductible loss costs is reasonable. [Disclosure A-5.1](#) provides more detailed information on how deductibles and policy limits are handled in the Moody's model.

C. Deductible hurricane loss costs shall be calculated in accordance with s. 627.701(5)(a), F.S.

Deductible loss costs are calculated in accordance with s. 627.701(5)(a), F.S. [Disclosure A-5.1](#) provides more detailed information on how deductibles and policy limits are handled in the Moody's model.

A-5.1 Describe the methods used in the hurricane model to treat deductibles (both flat and percentage), policy limits, and insurance-to-value criteria when projecting hurricane loss costs and hurricane probable maximum loss levels. Discuss data or documentation used to validate the method used by the hurricane model.

The Moody's hurricane model uses a distributed approach for estimating losses net of deductibles and limits for each event. When projecting losses, the Moody's hurricane model considers not only the mean damage ratio, but also the loss distribution around the mean. It does this by fitting a beta distribution by way of matching the first two moments of the distribution. The loss net of deductible and limit is calculated considering the pdf of the loss distribution between these two quantities as indicated in the example below.

Equation 3

$$\text{Loss net of deductible and limit} = \int_D^{D+L} (x - D) f(x) dx + L[1 - F(D + L)]$$

Where:

- x = ground-up loss
- D = deductible
- L = limit
- f(x) = pdf of the ground-up loss
- F(x) = cdf of the ground-up loss

The Moody's hurricane model computes the loss as a percentage of the property values, which are input parameters. The insured value is assumed to be the same as the property value unless a different insured value is input. If the insured value is lower than the property value, the insured value is treated as a limit to the insurer's liability.

The Moody's hurricane model assumes that the property value input into it is the true property value. Any assumptions regarding insurance to value must be made by the user prior to running the model.

The Moody's hurricane model has separate inputs for values and limits. This gives it the flexibility to estimate policies with or without guaranteed replacement cost coverage. For example, assume an insurer has a policy on its books with an insured value of \$100,000. If the insurer assumes that this policy is 10 percent underinsured, the value input is $\$100,000 / (1 - 0.1) = \$111,111$. If the policy has guaranteed replacement cost coverage, the limit input will also be \$111,111. If the policy does not have guaranteed replacement cost coverage, the limit input will be \$100,000.

The calculation of the loss net of deductibles as shown in the formula in [Disclosure A-5.1](#) is based on actuarial theory of deductibles and limits. See Hogg and Klugman, 1984. The distributions of the losses given that an event has occurred are validated using engineering studies and claims data.

Additional refinements to insurer gross loss due to deductibles and/or limits may be effective when more than one limit and/or deductible is applicable, such as when there are limits on individual locations as well as a policy limit in a multi-location policy.

A-5.2 Describe if and how the hurricane model treats policy exclusions and loss settlement provisions.

The model quantifies expected damage arising from hurricanes. Perils other than wind are not included (unless the user explicitly selects storm surge). No other peril exclusions can be made by the user. Moody's publishes a list of potential financial impacts that are not included in expected loss. Examples of these are loss assessments and inland flooding.

The users can input the specific coverages (building, contents, additional living/business interruption) to be modeled, and the values and limits for each coverage. The model does not make any adjustments to these inputs.

Damage functions are based on claims experience and assumes the treatment of loss settlement at the time of the loss will prevail in the future.

A-5.3 Describe how the hurricane model treats annual hurricane deductibles.

The approach is to estimate the loss net of the deductible for each event in the year times the probability that there are that many occurrences.

Equation 4

Let N_k = loss net of the deductible for the k^{th} event in the year.

And let $p(k)$ = probability that there are exactly k events in the year.

Then the projected loss cost net of the deductible is $\sum_{k \geq 1} N_k p(k)$.

The values of the N_k 's depend on k . For example, if $k = 1$, then N_k is calculated using the full deductible amount. If $k = 2$, then N_k is calculated using the amount of the deductible left over after the first occurrence.

A-6 Hurricane Loss Outputs and Logical Relationships to Risk

- A. *The methods, data, and assumptions used in the estimation of hurricane loss costs and hurricane probable maximum loss levels shall be actuarially sound.***

The methods, data, and assumptions used in the estimation of loss costs and probable maximum loss levels are actuarially sound. These have all been reviewed by credentialed actuaries.

- B. *Hurricane loss costs shall not exhibit an illogical relation to risk, nor shall hurricane loss costs exhibit a significant change when the underlying risk does not change significantly.***

Loss costs generated by Moody's do not show an illogical relation to risk nor do they exhibit a significant change when the underlying risk does not change significantly. Loss costs were reviewed by credentialed actuaries.

- C. *Hurricane loss costs produced by the hurricane model shall be positive and non-zero for all valid Florida ZIP Codes.***

Loss costs produced by the model are positive and non-zero for all ZIP Codes, including Florida ZIP Codes.

- D. *Hurricane loss costs cannot increase as the quality of construction type, materials and workmanship increases, all other factors held constant.***

Loss costs do not increase as the quality of construction type, materials and workmanship increases, all other factors held constant.

- E. *Hurricane loss costs cannot increase as the presence of fixtures or construction techniques designed for hazard mitigation increases, all other factors held constant.***

Loss costs do not increase as the presence of fixtures or construction techniques designed for hazard mitigation increases, all other factors held constant. The model incorporates information related to fixtures and construction techniques designed for hazard mitigation as secondary modifiers as explained in [Standard V-3](#). Details regarding these fixtures and construction techniques are input by the user.

- F. *Hurricane loss costs cannot increase as the wind resistant design provisions increase, all other factors held constant.***

Loss costs do not increase as wind resistant design increases, meaning if all other factors are held constant, more recent buildings are less vulnerable than corresponding older buildings. The model addresses wind resistant design provisions implicitly through vulnerability functions that vary with different year bands and vulnerability regions of the state.

- G. *Hurricane loss costs cannot increase as building code enforcement increases, all other factors held constant.***

Loss costs do not increase as code enforcement increases, meaning if all other factors are held constant, more recent buildings are less vulnerable than corresponding older buildings. The model addresses building code enforcement implicitly through vulnerability functions that vary with different year bands and vulnerability regions of the state.

- H. *Hurricane loss costs shall decrease as deductibles increase, all other factors held constant.***

Loss costs decrease as deductibles increase, all other factors held constant.

- I. *The relationship of hurricane loss costs for individual coverages (e.g., building, appurtenant structure, contents, and time element) shall be consistent with the coverages provided.***

The relationship of loss costs for individual coverages is consistent with the coverages provided.

- J. *Hurricane output ranges shall be logical for the type of risk being modeled and apparent deviations shall be justified.***

Output ranges provided by Moody's are logical and without apparent deviations.

- K. *All other factors held constant, hurricane output ranges produced by the hurricane model shall in general reflect lower hurricane loss costs for:***

- 1. *masonry construction versus frame construction,***

Output ranges derived from Moody's model reflect lower loss costs for masonry construction compared to frame construction, all other factors held constant.

- 2. *personal residential risk exposure versus manufactured home risk exposure,***

Output ranges derived from Moody's model reflect lower loss costs for the residential risk exposure compared to mobile/manufactured home risk exposure, all other factors held constant.

- 3. *inland counties versus coastal counties,***

Output ranges derived from the Moody's model reflect lower loss costs for inland counties compared to coastal counties in general, all other factors held constant.

- 4. *northern counties versus southern counties, and***

Output ranges derived from the Moody's model reflect generally lower loss costs for northern counties compared to southern counties, all other factors held constant.

- 5. *newer construction versus older construction.***

Output ranges derived from the Moody's model reflect generally lower loss costs for newer construction compared to older construction, all other factors held constant.

- L. *For hurricane loss cost and hurricane probable maximum loss level estimates derived from and validated with historical insured hurricane losses, the assumptions in the derivations concerning (1) construction characteristics, (2) policy provisions, (3) coinsurance, and (4) contractual provisions shall be appropriate based on the type of risk being modeled.***

As noted in Disclosures [V-1.2](#) and [V-1.3](#), historical loss information is used in the development of the Moody's vulnerability functions. This information, including construction type, line of business, policy structure, insured value, coinsurance and certain contractual provisions, is supplied directly to us by our clients as part of the exposure information provided with claim information. The information is reviewed by Moody's and any peculiarities are clarified directly with the client. Underwriting practices, and contractual provisions not explicitly described in the exposure data are assumed to be representative of residential insurance underwriting in general; that is, the vulnerability of property observed in historical events is assumed to be indicative of vulnerability of such property types in future events where the property is subjected to similar wind loads.

- A-6.1 *Provide details of modifications to the financial component of the hurricane model since the current accepted hurricane model.***

No modifications were made to the financial component of the hurricane model since the current accepted hurricane model.

- A-6.2** *Provide a completed Form A-1. Provide a link to the location of the form in the submission appendix [Form A-1].*
- A-6.3** *Provide a completed Form A-2. Provide a link to the location of the form in the submission appendix [Form A-2].*
- A-6.4** *Provide a completed Form A-3. Provide a link to the location of the form in the submission appendix [Form A-3].*
- A-6.5** *Provide a completed Form A-4. Provide a link to the location of the form in the submission appendix [Form A-4].*
- A-6.6** *Provide a completed Form A-5 using the 2017 FHCF exposure data. Provide a link to the location of the form in the submission appendix [Form A-5].*
- A-6.7** *Provide a completed Form A-6 if not considered as Trade Secret. Provide a link to the location of the form in the submission appendix [Form A-6].*
- A-6.8** *Explain any assumptions, deviations, and differences from the prescribed exposure information in Form A-6. Explain how the treatment of unknown is handled in each sensitivity exhibit.*

There are no assumptions, deviations, or differences from the prescribed exposure information in Form A-6. When one or more of the primary characteristics (construction, year built, number of stories, or occupancy) are unknown, the software will build a composite vulnerability function that is a weighted average of the appropriate subset of vulnerability functions corresponding to unique combinations of height, year built, construction class, and occupancy type associated with the unknown characteristics. This is described in [Disclosure V-1.11](#).

- A-6.9** *Provide a completed Form A-8. Provide a link to the location of the form in the submission appendix [Form A-8].*
- A-6.10** *Describe the calculation of uncertainty intervals.*
- See the response to [Disclosure A-4.1](#).
- A-6.11** *Describe how the hurricane model produces hurricane probable maximum loss levels.*
- See the response to [Disclosure A-4.1](#).
- A-6.12** *Provide citations to published scientific literature and technical literature, if any, or modeling-organization studies that were used to estimate hurricane probable maximum loss levels.*
- See the response to [Disclosure A-4.1](#).
- A-6.13** *Describe how the hurricane probable maximum loss levels produced by the hurricane model include the effects of personal and commercial residential insurance coverage.*
- Probable maximum loss levels produced by the model are based on exposure and coverage information input by the user. This input includes identification of personal or commercial residential coverage.
- A-6.14** *Explain any differences between the values provided in Form A-8, Part A and those provided in Form S-2 using the 2017 FHCF exposure data.*

There are no differences between the values.

A-6.15 *Explain any differences between the values provided in Form A-8, Part B and those provided in Form S-2 using the 2023 FHCF exposure data.*

There are no differences between the values.

A-6.16 *Provide an explanation for all hurricane loss costs that are not consistent with the requirements of this standard.*

Loss costs are consistent with the requirements of this Standard with no anomalies.

A-6.17 *Provide an explanation of the differences in hurricane output ranges between the current accepted hurricane model and the hurricane model under review.*

The differences are due to factors described in [Disclosure G-1.7](#), where the impact of each component change is also given.

A-6.18 *Identify the assumptions used to account for the effects of coinsurance on commercial residential hurricane loss costs.*

The underlying assumption is that the exposure information received with claims data accurately represents the coinsurance provisions. The Moody's hurricane financial model has specific logic to calculate coinsurance provisions.

COMPUTER/INFORMATION HURRICANE STANDARDS

CI-1 Hurricane Model Documentation

- A. Hurricane model functionality and technical descriptions shall be documented formally in an archival format separate from the use of correspondence including emails, presentation materials, and unformatted text files.**

Model functionality and technical descriptions are documented for our users through a series of user guides, reference manuals, and white papers available from a limited-access portion of a website maintained by Moody's.

- B. All documentation, code, and scripts shall be located in central repositories controlled by repository software. Repository software shall support track changes, versioning, and collaborative editing.**

A Computer/Information Standards primary document binder in electronic form has been prepared by Moody's and is available for on-site review by the professional team. The primary document binder contains an index that links each subsequent Computer/Information Standard to one or more sections within the binder and, where appropriate, to other more detailed documents such as the RiskLink System Administration Guide. All documentation is easily accessible from a central location. This collection of material specifies the model structure, detailed software description, and functionality. This material is indicative of the accepted software engineering practices that are followed by the RiskLink and Risk Modeler development teams.

- C. All computer software relevant to the hurricane model shall be consistently documented and dated.**

Through the use of various techniques such as documentation templates and development standards, the RiskLink and Risk Modeler software and model development tools are documented and dated in a consistent manner. Appropriate personnel for software, data preparation and validation, as well as internal users of the software, will be available to the professional team when the Computer/Information Standards are being audited.

- D. The following shall be maintained: (1) a table of all changes in the hurricane model from the current accepted hurricane model to the initial submission this year, and (2) a table of all substantive changes since this year's initial submission.**

A table containing items listed in Standard G-1, [Disclosure 7](#) has been prepared. The table contains an item number in the first column, and the remaining columns contain specific document or file references for affected components or data relating to Computer/Information Standards [CI-2](#), [CI-3](#), [CI-4](#), [CI-5](#), [CI-6](#), and [CI-7](#).

- E. Documentation shall be created separately from the source code.**

Modeling and software documentation has been created separately from and is maintained consistently with the source code. This external documentation is augmented by detailed technical documentation that is integrated with the source code.

- F. A list of all externally acquired, currently used, hurricane model-specific software and data assets shall be maintained. The list shall include (1) asset name, (2) asset version number, (3) asset acquisition date, (4) asset acquisition source, (5) asset acquisition mode (e.g., lease, purchase, open source), and (6) length of time asset has been in use by the modeling organization.**

A list of externally acquired assets have been created and will be available for review during the audit.

- CI-1.1 Provide a description of the software engineering methodologies (e.g., Scrum, Agile, Waterfall, Hybrid) utilized for the software lifecycle.**

Moody's uses Hybrid software engineering methodologies for the software lifecycle, which is comprised of Agile methodologies and waterfall processes.

- CI-1.2. Document compliance with external international, national, or organizational standards and certifications, where applicable to the Computer/Information Hurricane Standards.**

Moody's has dedicated cyber-security, privacy, and compliance teams to manage data protection practices. Our security controls and risk management framework, including those that inform our catastrophe models, are based on multiple standards and frameworks. See <https://www.rms.com/trust> for a complete list of trust, security, and compliance approaches and certifications, including Security by Design principles, data security, cloud security, product security, and business continuity. See [CI-8.2](#) for information on certifications Moody's has earned with respect to cyber-security compliance. Additional information can be made available by request during the professional team on-site audit.

CI-2 Hurricane Model Requirements

A complete set of requirements for each software component, as well as for each database or data file accessed by a component, shall be maintained. Requirements shall be updated whenever changes are made to the hurricane model.

Moody's maintains a complete set of requirements for each component, database, and data file accessed by a component that is relevant to this submission. These requirements are updated whenever changes are to be made to the model. This documentation, which is described in the response to [Standard CI-2](#), is available for on-site review by the professional team.

CI-2.1 Provide a description of the hurricane model and platform(s) documentation for interface, human factors, functionality, system documentation, data, human and material resources, security, and quality assurance.

Moody's maintains documentation of user interface/human factors requirements, functional specifications, documentation requirements, data specifications, human and material resource requirements, security measures, and quality assurance requirements.

Requirements documentation available for on-site review by the professional team includes:

- RiskLink System Administration Guide—detailed user-level documentation of product configuration and platform considerations, setup and installation, database maintenance, and advanced configuration settings
- RiskLink System Recommendations—material resource requirements in the form of computer system recommendations, certified platforms, and possible deployment configurations for RiskLink
- Database Schema Guide—database schema changes summary, and documentation of database schema tables
- RiskLink DLM User Guide—product reference guide that describes detailed steps on getting started with RiskLink DLM, importing data, managing exposure data, running analyses, viewing results, administering databases, and understanding the financial model
- RiskLink DLM Reference Guide—reference material necessary to use RiskLink effectively, including import file structures, construction classes and occupancy types, country-specific information, and a glossary
- Risk Modeler What's New and Release Notes—covers the release details
- Risk Modeler User Guide—product reference guide that describes detailed steps on getting started with Risk Modeler, importing data, managing exposure data, running DLM and HD analyses, viewing results
- Risk Modeler Highlights—product reference guide and focus on main features
- Coding Standards—a collection of documents listing standards for software coding, database development, development environment setup, component design, file versioning, and source control system usage
- Market Requirements Documents—a collection of documents, typically generated by the Moody's model management or product management groups, describing the business need for major feature or product changes, along with a summary of what the feature/change is intended to do (versus how it is to be implemented)
- Functional Specifications—a collection of documents, typically generated by Moody's product management or senior modeling personnel, describing how a feature or product change is to be implemented, covering all aspects that have impact on the product end user (for example, user interface, loss calculations, database schema, data validity checking, documentation, and testing recommendations)

- Project Management Documents—a collection of Microsoft Project files, Microsoft Excel spreadsheets, and Microsoft Word documents that track the human resource requirements of project tasks
- Microsoft Team Foundation Server (TFS) and Visual Studio—documentation of the version control management systems used by Moody's to provide secure access, auditing, and backup facilities for source code
- Information Technology Security Documents—a collection of documents explaining Moody's requirements related to password protection, data backup, and other security policies and procedures
- Quality Assurance Test Plans—documents that outline testing requirements for product components, and are used to guide test case development

CI-3 Hurricane Model Organization and Component Design

- A. *The following shall be maintained and documented: (1) detailed control and data flowcharts and interface specifications for each software component, (2) schema definitions for each database and data file, (3) flowcharts illustrating hurricane model-related flow of information and its processing by modeling organization personnel or consultants, (4) network organization, and (5) system model representations associated with (1)-(4) above. Documentation shall be to the level of components that make significant contributions to the hurricane model output.***

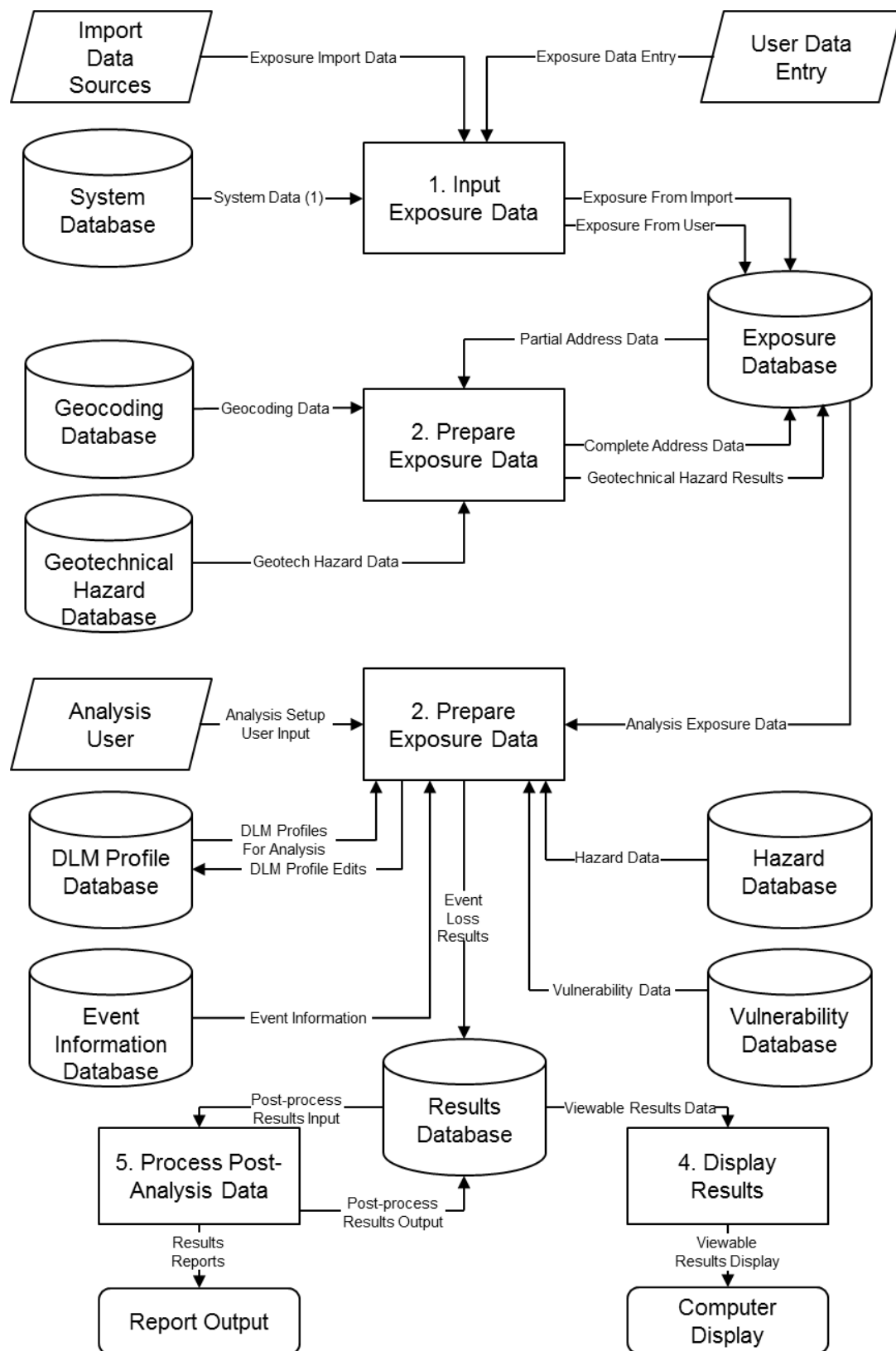
Moody's maintains documentation of detailed control and data flow, interface specifications, and the schema definitions for all data files and database tables. Data flow diagrams are used to illustrate the relationship between software components and data using a network representation consisting of labeled component processes connected by data arcs, with components expanded into more detailed sub-component diagrams where appropriate. The top-level data flow diagram for the Moody's hurricane model software is shown in the following figures.

The architecture for the hurricane model involves breaking the basic components into smaller modules and sub-modules, such as the wind hazard module and the vulnerability module. This structure is carried over into the software architecture. This internal model architecture and component design documentation, as well as the developers or modelers responsible for each component, are available for on-site review by the professional team.

Moody's maintains diagrams illustrating flow of information and processing by modeling personnel for items such as form generation for this submission.

- B. *All flowcharts (e.g., software, data, and system models) in the submission or in other relevant documentation shall be based on (1) a referenced industry standard (e.g., UML, BPMN, SysML), or (2) a comparable internally-developed standard which is separately documented.***

All flowcharts comply with an internally-developed standard which is separately documented, and available for review on-site.

Figure 48: Moody's hurricane model top level data flow

CI-4 Hurricane Model Implementation

- A. A complete procedure of coding guidelines consistent with accepted practices shall be maintained. Coding guidelines shall be referenced for each programming language used in the hurricane model or submission document.**

Moody's has developed and maintained a set of coding guideline documents, consistent with accepted software engineering practices. These documents contain standards for software coding, database development, development environment setup, component design, file versioning, and source control system usage for each programming language. Compliance with these standards is monitored through peer and management review.

- B. Network organization documentation shall be maintained.**

Moody's maintains the network topology diagrams for RiskLink and Risk Modeler applications. RiskLink is deployed on premise within a group of dedicated servers called as a cluster, over an Enterprise network, which allows high bandwidth data exchange between the RiskLink Database Server, HPC Head and Compute Nodes. RiskLink Client computers are used to submit jobs to the RiskLink clusters.

Risk Modeler application is deployed on a public cloud provider like AWS and utilizes a virtual private cloud (VPC) network isolation technology to create a secured network for all the servers to communicate with each other, without external interference. All servers are connected to a network with bandwidth exceeding 10 GBps. Topology diagrams of RiskLink and Risk Modeler are shown in [Disclosure G-1.4](#).

- C. A complete procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components shall be maintained.**

Moody's maintains a complete procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components. This procedure includes extensive validation procedures designed to guarantee that data integrity is maintained throughout the product development process.

- D. All components shall be traceable, through explicit component identification in the hurricane model representations (e.g., requirements, flowcharts) down to the implementation level.**

The software is fully traceable from the flow diagrams to the implementation level. Detailed data flow diagrams of the model components will be available for review by the professional team. The data flow diagrams are organized hierarchically, with highest design level components incrementally translated into a larger number of subcomponents. A data dictionary provides a textual description of each data flow component in addition to documenting the linkage of those components to the source code.

- E. A table of all software components affecting hurricane loss costs and hurricane probable maximum loss levels shall be maintained with the following table columns: (1) component name, (2) number of lines of code, minus blank and comment lines, and (3) number of explanatory comment lines.**

Moody's maintains a table of all software components affecting loss costs and probable maximum loss levels, with the table columns providing the information required by this standard.

- F. *Each component shall be sufficiently and consistently commented so that a software engineer unfamiliar with the code shall be able to comprehend the component logic at a reasonable level of abstraction.***

As outlined in the Moody's coding guidelines, software components are commented with a statement of purpose (requirements summary), input and output description (interface specification), summary of important changes, and "tactical comments" explaining any potentially confusing software code. These comments allow a software engineer unfamiliar with the code to comprehend the component logic at a reasonable level of abstraction.

- G. *The following documentation shall be maintained for all components or data modified by items identified in Hurricane Standard G-1, Disclosure 7 and Audit 4:***

- 1. *A list of all equations and formulas used in documentation of the hurricane model with definitions of all terms and variables, and***
- 2. *A cross-referenced list of implementation source code terms and variable names corresponding to items within G.1 above.***

For all components and data modified by items identified in Standard G-1, [Disclosure 7](#), Moody's maintains a list of all equations and formulas used in documentation of the model modifications, with definitions of all terms and variables, along with a cross-referenced list of implementation source code terms and variable names corresponding to those equations and formulas.

- H. *Hurricane model code and data shall be accompanied by documented review plans, testing plans, and if needed, update plans through regularly scheduled intervals. The vintage of the hurricane model code and data shall be justified.***

Moody's regularly reviews and updates vintages of data, code, and both scientific and technical literature as needed to inform a model that reflects a current view of the hurricane risk landscape. As a result of regular updates, vintages vary by component. This information may be reviewed on-site.

- CI-4.1 *Specify the hardware, operating system, and essential software required to use the hurricane model on a given platform.***

The following are required to use the Moody's model running RiskLink 25.0 (Build 2450):

- Operating system options:
 - Microsoft Windows Server 2019 and Microsoft Windows Server 2022 64-bit operating system for desktop installations and client (remote database) installations
 - Microsoft Windows 10 and Windows 11 64-bit operating system for client installations
 - Microsoft Windows Server 2019 and Microsoft Windows Server 2022 64-bit operating system for database server installations
 - Microsoft Windows HPC Pack 2019 Update 1 for Enterprise Grid Computing (EGC) 64-bit compute nodes (analysis servers)
 - Microsoft Windows HPC Pack 2019 Update 1 for EGC 64-bit head nodes
 - Microsoft Windows Server 2019 and Microsoft Windows Server 2022 for EGC database installations
- Any hardware capable of running one of the Microsoft operating systems listed above, with a recommended minimum of 8 processor cores, 64 GB RAM, 1024 x 768 display, one available USB connector, and at least 1 TB disk space
- Database options:

- SQL Server 2019 Update 26 or later Standard/Enterprise or SQL Server 2022 Cumulative update 12 or later Standard/Enterprise for EGC database server installations
- .NET 4.8 Framework
- Microsoft ODBC 18 for SQL Server
- Microsoft Command Line Utilities 15 for SQL Server
- Microsoft SQL Server 2012 Native Client
- Microsoft SQL Server 2016 Management Objects (SMO)
- Visual C++ 2019 Redistributable
- Microsoft XML Core Services (MSXML)
- Microsoft Enterprise Library
- Microsoft HPC Class Library
- SAP Crystal Reports runtime engine for .NET Framework (64-bit) Group 1 (Sagent) geocoding software
- SQLite/Spatialite version 5.0
- Objective Grid display software
- Objective Toolkit display software
- Olectra Chart display software
- Rogue Wave C++ class libraries

The primary language for the development of RiskLink is C#. C++ code is being incrementally replaced by code written in the C# language. The following are required to use the Moody's model running on Risk Modeler 2.38.0:

- Google Chrome browser Version 129 and above
- Operating system options:
 - macOS Sonoma 14.6.1 and above
 - Windows 10 (Build 22H2) and above

CI-5 Hurricane Model Verification

A. General

For each component, procedures shall be maintained for verification, such as code inspections, reviews, calculation crosschecks, and walkthroughs, sufficient to demonstrate code correctness. Verification procedures shall include tests performed by modeling organization personnel other than the original component developers.

Modifications or additions to the model are typically designed and prototyped by engineers. Prototypes are coded, for example, in spreadsheets or in programs written in C, C++, C#, or FORTRAN. Once the concept has been proven in the prototype, a written specification is prepared to describe the purpose of the change and to provide a detailed description of the algorithm to be introduced to the production software. This description typically takes the form of narrative, "pseudo-code" (similar to computer code but stripped of computer language details for the sake of readability), control flowcharts, or data flow diagrams. This description is sometimes augmented by actual computer code from the prototype. The specification is peer-reviewed by other engineers and by senior software developers. Once the specification is approved, the changes are then made to the production software.

Moody's model development and quality assurance (QA) departments rigorously check output generated from the model. Calculations are performed outside the model and compared to the software-generated results to ensure that they are correct. A series of test cases are run to ensure that the computer program generates consistent and reasonable results on a wide variety of client data. Data sets include end-condition test cases using very large and very small values, large-data-volume test datasets of many locations spread across multiple ZIP Codes, and data sets focused on testing specific areas of the model.

Code inspections, reviews, and walkthroughs are performed on a regular basis to verify code correctness. Both software management and model development engineers participate in this process. Reviewers check code both during and after initial development. Code changes are often isolated and inspected using the features of our source code management system. Reviewers also use source-code debugging tools to verify run time behavior.

The software source code contains numerous logical assertions, exception-handling mechanisms, and flag-triggered output statements that are used to test the values of key variables for correctness.

Verification procedures for each component include tests performed by modeler personnel other than the original component developers. The Moody's QA department has primary responsibility for independent verification. In addition, peer review of model changes typically includes testing by development staff other than the original component developers.

B. Component Testing

1. Testing software shall be used to assist in documenting and analyzing all components.

The IBM/Rational Enterprise Suite is the primary software development toolkit used at Moody's for analyzing and testing all components. This suite contains several tools that assist in component testing. Both software developers and quality assurance personnel use Rational Robot, Rational Functional Tester, and Rational Test Manager for test plan development, test case generation, and test case execution.

Microsoft Visual Studio is the primary software development toolkit used at Moody's. It contains an extensive collection of debugging tools that allows developers to "walk through"

software components on a line-by-line basis, and at any point, view the control stack, the value of all variables, debug trace statement output, etc.

For key "lower-level" components, a custom test driver is developed to execute the methods of the components using a range of input values, and to test the resulting outputs of the methods. For "higher-level" components that depend upon a large collection of other components or significant amount of state information (for example, those that implement the RiskLink user interface) custom test drivers are not practical. Instead, we develop automated test suites using IBM/Rational tools to check, for example, for specific property values of user interface objects.

2. *Unit tests shall be performed and documented for each updated component.*

All software components are unit tested as they are developed or modified. The results of the unit tests are summarized in technical specification documents that are written by software developers while implementing and testing software components, or in the JIRA incident database.

3. *Regression tests shall be performed and documented on incremental builds.*

A large suite of regression tests is performed and documented on incremental builds of the RiskLink and Risk Modeler software. Most of the regression tests are implemented using automated tools, including Rational Robot and Rational Functional Tester test scripts, though some additional manual testing is always performed. The automated regression tests are split into two sets. The first set is a broad but shallow set of tests that are executed by the software development team before passing the build to the QA department. The QA department then executes an extensive, broad and deep set to check for stability of results in all areas of the software.

4. *Integration tests shall be performed and documented to ensure the correctness of all hurricane model components. Sufficient testing shall be performed to ensure that all components have been executed at least once.*

Integration tests are performed and documented to ensure correctness of all components and data defining the model. Most of the integration testing is done by executing the product as a complete package, using a comprehensive suite of test scripts supplemented with additional manual tests, to ensure that component interactions that would escape unit testing are checked. These tests cover the complete start-to-finish workflow of the user of the software, and contain a wide range of possible inputs, thus ensuring that all components relevant to this submission are executed at least once.

C. *Data Testing*

1. *Testing software shall be used to assist in documenting and analyzing all databases and data files accessed by components.*

Moody's uses a range of testing software to assist in documenting and analyzing all databases and data files accessed by components. In many cases, this involves the use of Microsoft Excel, Microsoft Access, or other generic data manipulation packages. Commercial mapping software (e.g., ArcInfo) is used to check the spatial distribution of data. In some cases, special-purpose test programs are written to automate data validation. In addition, database and data file values are validated indirectly via the regression test scripts described above.

2. *Integrity, consistency, and correctness checks shall be performed and documented on all databases and data files accessed by the components.*

Moody's performs and documents data integrity, consistency, and correctness checks on all databases and data files accessed by components. Tools such as Microsoft Excel and Microsoft Access are used to perform cross checks, run statistical tests, or generate data

visualization output (e.g., graphs and charts) from datasets. Visual inspection of geographic data displayed as maps is another key testing methodology used to check the spatial distribution of data. All data that is packaged as binary files are checked via software that converts data from text to binary, binary to text, then performs a comparison of the input and output text files.

CI-5.1 *State whether any two executions of the hurricane model with no changes in input data, parameters, code, and seeds of random number generators produce the same hurricane loss costs and hurricane probable maximum loss levels.*

The model produces the same loss costs and probable maximum loss levels if run with the same information more than once. A random number generator is not used during model execution. Repeatability of results is tested as part of our standard testing suite.

CI-5.2 *Provide an overview of the component testing procedures.*

The component testing procedures can be grouped in the following categories:

Unit Tests

- Manual unit tests are run when components are created or changed. Actual results are compared against expected results documented within specification documents or test cases.
- Automated unit tests are written to test key components that are added or modified. These tests are run periodically throughout the product development cycle.

Integration Tests

- Manual integration tests are developed and run for features added with the current product release cycle.
- Automated integration tests are developed and run for each new feature once it has been integrated into the product and manually tested. Each automated test script is added to the overall product test suite.

Performance Tests

- A suite of performance regression tests is run at specific time intervals within the product development cycle.
- Memory checking tools and code performance profilers are run periodically during the product release cycle, either as a regression test or to diagnose known or suspected performance problems.

These testing procedures are described in more detail in the responses to Sections A, B, and C of this standard.

CI-5.3 *Provide a description of verification approaches used for externally acquired data, software, and models.*

When Moody's receives data, software, or models from third party sources, our developers use a variety of methods and approaches to verify that the material is appropriate for use in the hurricane model.

Verification approaches depend on what data/software/models are being reviewed, but include:

- Checks for quality and consistency
- Comparisons to previous versions, and logical explanations
- Benchmarking against other sources
- Geospatial analysis, if appropriate

CI-6 Human-Computer Interaction

- A. Interfaces shall be implemented as consistent with accepted principles and practices of Human-Computer Interaction (HCI), Interaction Design, and User Experience (UX) engineering.**

The interfaces in both RiskLink and Risk Modeler are consistent with accepted principles and practices of HCI, Interaction Design, and user UX engineering. Moody's has developed internal standards based on industry standards. Documented principles can be shared on-site.

- B. Interface options used in the hurricane model shall be unique, explicit, and distinctly emphasized.**

The interface options in the hurricane model are unique, explicit, and distinctly emphasized. These options are meant to provide the users with choices as to the output granularity, the peril to be analyzed, and other factors. The factors are listed in responses to A-1.5.

- C. For a Florida insurance rate filing, interface options shall be limited to those options found acceptable by the Commission.**

The interface options in RiskLink and Risk Modeler are limited to those options that will produce a Florida Commission approved analysis, as defined in the Moody's response to section A-1.5.

CI-6.1 Identify procedures used to design, implement, and evaluate interface options.

Moody's has developed an internal set of procedures to capture the principles related to design implementation and evaluation of the interface options. These procedures are captured within an internal standard called the RadiusSM Design System that contains all the elements needed to create experiences consistent with our principles, design language, and best practices. Through well-defined guidelines, components, and patterns, this site provides a range of resources to support designers, developers, and UX writers as they deliver best-in-class applications serving the insurance and reinsurance industries. Examples will be shown on-site.

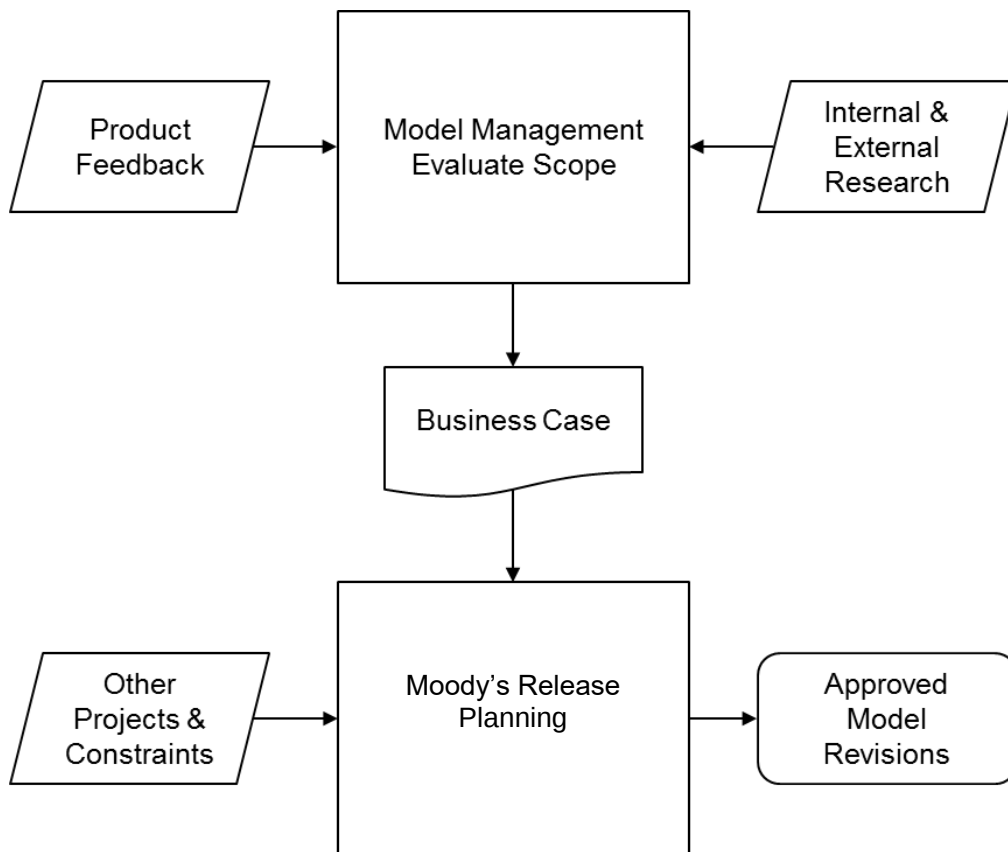
CI-7 Hurricane Model Maintenance and Revision

- A. A clearly written policy shall be implemented for review, maintenance, and revision of the hurricane model and network organization, including verification and validation of revised components, databases, and data files.**

The general policy of Moody's has been to upgrade its North Atlantic Hurricane Models whenever new data or research becomes available that results in a non-trivial improvement in the loss modeling methodology.

The following figure illustrates, at a high level, the process for deciding on the content of model revisions.

Figure 49: High-level description of model-revision policy



The process of model revision and release is rigorous and well-documented. The figure in [Disclosure CI-7.1](#) illustrate the model-revision process in more detail.

- B. A revision to any portion of the hurricane model that results in a change in any Florida personal and commercial residential hurricane loss cost or hurricane probable maximum loss level shall result in a new hurricane model version identification.**

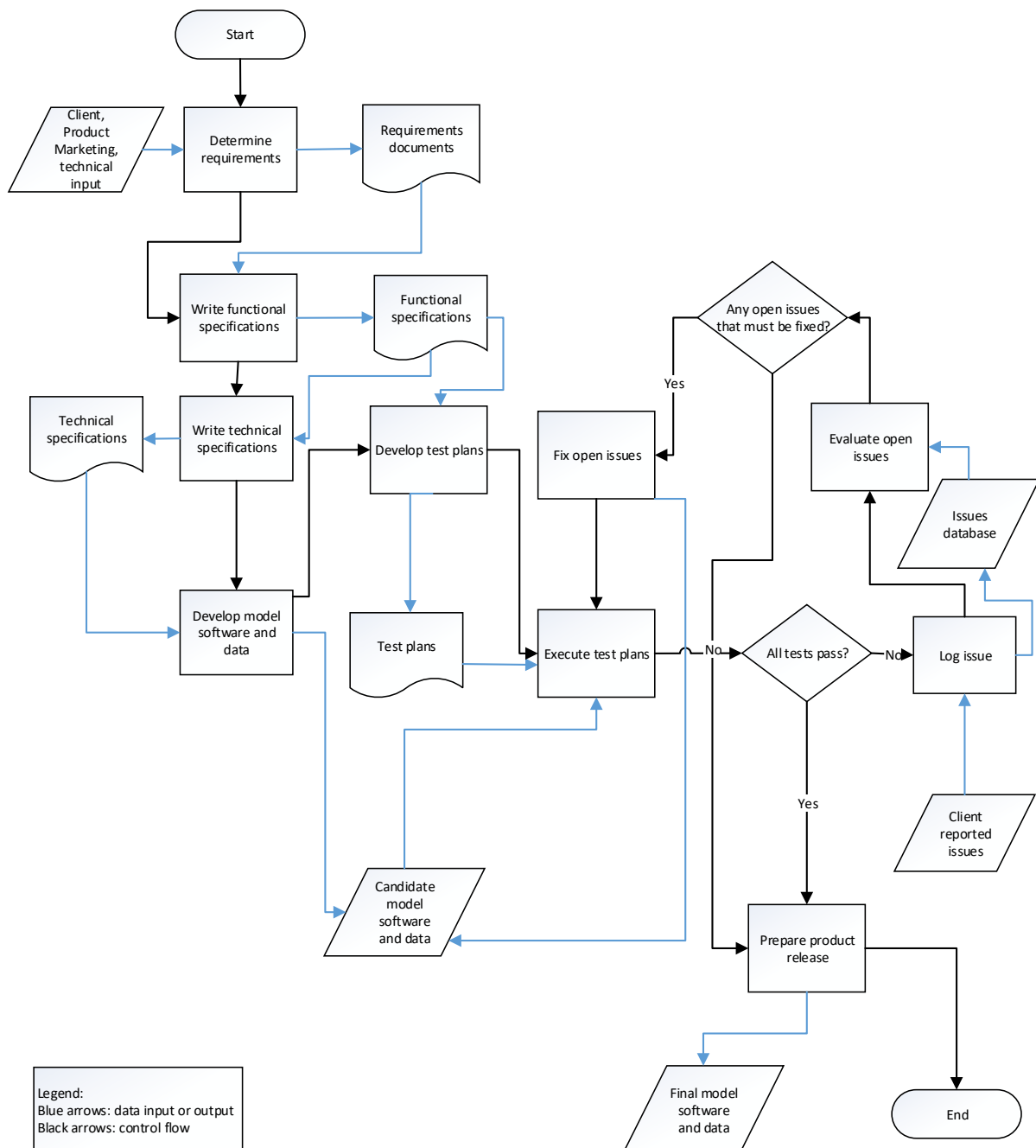
The North Atlantic Hurricane Models are periodically enhanced to reflect advances in our knowledge of hurricanes and the consequences of hurricanes. Whenever Moody's releases a new model with a revision to any portion of the model that results in a change in any Florida residential hurricane loss cost or probable maximum loss, a new model version number is used to designate that release.

- C. *A list of all hurricane model versions since the initial submission for this year shall be maintained. Each hurricane model description shall have a unique version identification and a list of additions, deletions, and changes that define that version.***

Moody's will maintain a list of all model versions since the initial submission for this year, with unique version identification and a list of additions, deletions, and changes that define that version.

CI-7.1 *Identify procedures used to review and maintain code, data, and documentation.*

The following figure depicts the process and procedures used to maintain code, data, and documentation.

Figure 50: Detailed description of model-revision policy

Input from clients, technical resources, product marketing, product management, and other internal and external sources drives the creation of marketing requirements documents, which describe the key goals and constraints of planned upgrades. Those requirements are translated into functional specifications, which map out how those requirements are to be met within the model implementation. Software design specifications (technical specifications) are created to detail the planned implementation.

As implementation proceeds, the need for design changes and, sometimes, requirement changes become apparent. Once approved, these changes are reflected as updates to the documents described in the previous paragraph.

The development process is carefully monitored by numerous individuals within Moody's, using several project tracking tools and procedures. For example, an incident record is created using the JIRA incident tracking system for each requested model change. This is done whether the change is viewed as a new feature or a bug fix. Each incident record is maintained throughout the life cycle of that incident, including resolution and re-testing.

Documentation is developed for proposed engineering enhancements to the model, and this documentation, including the software specification, is used in the development of new or updated test plans and test cases for that release.

When a release is certified by quality assurance management, a product release document, extensive user-level product documentation, and the software and data that comprise the released product are packaged and shipped to clients. Various cross-checks and tests in this final fulfillment step assure that clients are provided a complete and correct package.

Standard test cases are shipped with the release, to allow post-installation verification. All post-installation questions or problems are tracked within the Moody's Client Response System. A product Knowledge Base is maintained and enhanced to assist Moody's client development teams in supporting Moody's client needs.

CI-7.2 Describe the rules underlying the hurricane model and code revision identification systems.

Moody's products that implement specific models are composed of two parts:

- Model infrastructure, i.e., the software code and data that implements the generic processes that underlie a model implementation. This includes not only the computational aspects of a model, but also the features that are a part of model workflow, such as exposure data import, and results viewing.
- Model data which, when used by the model infrastructure, generates modeled loss results.

Moody's uses a four-part revision numbering system to precisely identify a model version in the format *[MajorRevision].[MinorRevision]. SP [PatchRevision] Build ([BuildNumber])* where:

- *MajorRevision* signifies a significant revision to the infrastructure.
- *MinorRevision* indicates a smaller update, but one that still includes a change in product functionality.
- *PatchRevision* (and the SP designation) is an optional portion of the numbering scheme that signifies a revision that fixes model infrastructure functionality or model data that has been previously released to Moody's clients. It is not shown when the PatchRevision is zero.
- *BuildNumber* identifies a particular snapshot or iteration of the model infrastructure and data during a release development cycle.

Moody's typically bundles revisions to model data with revisions to model infrastructure; in other words, infrastructure and data updates are released in one package with one revision number, reflected in the MajorRevision number. For the sake of simplicity, revisions are typically communicated externally in a simplified manner. For example, 25.0.SP0 Build (2460) may simply be referred to externally with clients as Version 25.0.

If the model is updated and released outside of the primary product release cycle, Moody's will increment either the MinorRevision or the PatchRevision depending on the type and magnitude of the change. The criteria regarding which part of the revision numbering is incremented depends on whether the update can be distributed to clients as an incremental software download (PatchRevision) or requires a new installation package (MinorRevision).

Software component (DLL files or binaries files) and analysis results are tagged with an identifier in the format [MajorRevision].[MinorRevision].[BuildNumber].[PatchRevision].

For this submission, the model designation is Version 25.0 (Build 2450), which has software components identified as "25.0.2450.0." All analysis results generated by the software will contain a field called EngineVersion which contains the identified "25.2450.0."

CI-7.3 Provide all accepted and functionally equivalent model version number and platform identifications for the current accepted hurricane model and the previous accepted hurricane model, if applicable.

Table 19 summarizes all accepted and functionally equivalent model version numbers and platform identifications (RiskLink and Risk Modeler) for the currently accepted model: North Atlantic Hurricane Version 23.0 (Build 2250). Table 20 does the same for the previously accepted model (North Atlantic Hurricane Version 21.0 (Build 2050)).

Table 19: List of all accepted and functionally equivalent model version numbers and platform identifications (RiskLink and Risk Modeler) for the currently accepted model: North Atlantic Hurricane Version 23.0 (Build 2250)

Model Version Number	Primary Platform Identification (RiskLink)	Secondary Platform Identification (Risk Modeler)	Comments
23.0 (Build 2250)	23.0 (Build 2250)	2.27.0	Initial FCHLPM Certification under 2021 Report of Activities
23.0 (Build 2250)		2.28.0	Platform equivalence with initial certification
23.0 (Build 2250)		2.28.1	Platform equivalence with initial certification
23.0.1 (Build 2250)	23.0.1 (Build 2250)	2.29.0	Model and platform equivalence with initial certification. On Risk Modeler, the updated model version (23.0.1) supersedes the previous model version (23.0)
23.0.1 (Build 2250)		2.30.0	Platform equivalence with initial certification
23.0.1 (Build 2250)		2.31.0	Platform equivalence with initial certification
23.0.1 (Build 2250)		2.32.0	Platform equivalence with initial certification
23.0.2 (Build 2250)	23.0.2 (Build 2250)	2.32.1	Model and platform equivalence with initial certification. On Risk Modeler, the updated

Model Version Number	Primary Platform Identification (RiskLink)	Secondary Platform Identification (Risk Modeler)	Comments
			model version (23.0.2) supersedes the previous model version (23.0.1)
23.0.2 (Build 2250)		2.32.2	Platform equivalence with initial certification
23.0.2 (Build 2250)		2.33.0	Platform equivalence with initial certification
24.0 (Build 2350)	24.0 (Build 2350)	2.34.0	Model and platform equivalence with initial certification. On Risk Modeler, the updated model version (24.0) sits next to the previous model version (23.0.2) as an additional model version option for users to use.
23.0.2 (Build 2250)		2.34.0	Platform equivalence with initial certification.
24.0 (Build 2350)		2.35.0	Platform equivalence with initial certification
23.0.2 (Build 2250)		2.35.0	Platform equivalence with initial certification.
24.0 (Build 2350)		2.36.0	Platform equivalence with initial certification
23.0.2 (Build 2250)		2.36.0	Platform equivalence with initial certification.
24.0 (Build 2350)		2.37.0	Platform equivalence with initial certification
23.0.2 (Build 2250)		2.37.0	Platform equivalence with initial certification

Table 20: List of all accepted and functionally equivalent model version numbers and platform identifications (RiskLink and Risk Modeler) for the previously accepted model: North Atlantic Hurricane Version 21.0 (Build 2050)

Model Version Number	Platform Identification (RiskLink)	Platform Identification (Risk Modeler)	Comments
21.0 (Build 2050)	21.0 (Build 2050)	2.10.0	Initial FCHLPM Certification under 2019 Report of Activities
21.0 (Build 2050)		2.10.1	Platform equivalence with initial certification
21.0 (Build 2050)		2.10.2	Platform equivalence with initial certification
21.0 (Build 2050)		2.11.1	Platform equivalence with initial certification

Model Version Number	Platform Identification (RiskLink)	Platform Identification (Risk Modeler)	Comments
21.0 (Build 2050)		2.12.0	Platform equivalence with initial certification
21.0.1 (Build 2050)		2.13.1	Model and platform equivalence with initial certification
21.0.2 (Build 2050)	21.0.2 (Build 2050)	2.14.0	Model and platform equivalence with initial certification. On Risk Modeler, the updated model version (21.0.2) supersedes the previous model version (21.0)
21.0.2 (Build 2050)		2.16.0	Platform equivalence with initial certification
21.0.2 (Build 2050)		2.17.1	Platform equivalence with initial certification
21.0.2 (Build 2050)		2.18.0	Platform equivalence with initial certification
22.0 (Build 2150)	22.0 (Build 2150)	2.19.0	Model and platform equivalence with initial certification. On Risk Modeler, the updated model version (22.0) sits next to the previous model version (21.0.2) as an additional model version option for users to use.
21.0.2 (Build 2050)		2.19.0	Platform equivalence with initial certification
21.0.2 (Build 2050)		2.27.0	Platform equivalence with initial certification
21.0.2 (Build 2050)		2.28.0	Platform equivalence with initial certification
21.0.2 (Build 2050)		2.28.1	Platform equivalence with initial certification

CI-8 Hurricane Model Security

Security procedures shall be implemented and fully documented for (1) secure access to individual computers where the software components or data can be created or modified, (2) secure operation of the hurricane model by clients, if relevant, to ensure that the correct software operation cannot be compromised, (3) anti-virus software installation for all machines where all components and data are being accessed, and (4) secure access to documentation, software, and data in the event of a catastrophe.

Moody's has implemented security procedures for access to code, data, and documentation in accordance with standard industry practices. These procedures are described in the disclosure for this standard.

CI-8.1 Describe methods used to ensure the security and integrity of the code, data, and documentation. These methods include the security aspects of each platform and its associated hardware, software, and firmware.

The following is a summary of key aspects of Moody's security procedures that apply to all model platforms:

- Security requirements are documented and enforced by the Moody's legal and information technology departments.
- All company personnel are trained in security requirements and procedures.
- All company personnel are required to sign a non-disclosure agreement as a condition of their employment.
- Physical security is maintained using locked doors, key-card access, video cameras, and security patrols.
- The Moody's network is protected via hardware firewalls.
- All servers and desktops are protected with McAfee Antivirus software.
- All servers and desktops are remotely audited for security compliance.
- Microsoft Visual Studio and GitHub are used to track modifications to all source code. These source control systems maintain source code in an encrypted form. A login is required to access source code. The nature and author of all changes are recorded.
- All servers are backed up nightly. Off-site backups are maintained at a secure commercial facility.

Password and authorized personnel access provisions also apply for client data held on site at Moody's for processing and analysis.

Security for Moody's software licensed for use at the customer premises is primarily controlled by the use of compiled binary files, which are not readily modifiable without access to the original source code (which is not available). An additional measure of protection is provided by our software licensing provisions, which provide legal obstacles to manipulation or unauthorized use of Moody's software.

Access to Risk Modeler application requires licensing and is protected by user name and password combination, only accessible over a secure Hypertext Transfer Protocol Secure (HTTPS) connection from the user browser. Users do not have access to the application binaries that are hosted in Moody's servers.

CI-8.2 Identify certifications, if any, and external standards compliance relevant to cyber-security.

Moody's security controls and risk-management framework are based on multiple standards and globally recognized best practices that include SOC2 Type 2 and C5 security controls and the

information security management system is based on ISO 27001:2013 as well as the risk-management framework based on the National Institute of Standards and Technology (NIST) and CSA STAR. Our Compliance Management System was designed according to the NIST Cybersecurity framework.

Moody's maintains the following controls and certifications/attestations:

- ISO 27001:2013
- SOC 2 Type II
- Cloud Computing Compliance Controls Catalogue (C5)

APPENDIX A – FCHLPM FORMS

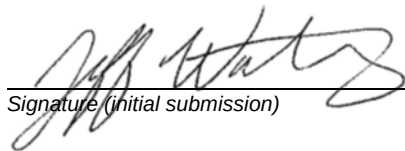
Form G-1: General Hurricane Standards Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the 2023 Hurricane Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

- 1) The hurricane model meets the General Hurricane Standards (G-1 – G-5);
- 2) The disclosures and forms related to the General Hurricane Standards are editorially and technically accurate, reliable, unbiased, and complete;
- 3) My review was completed in accordance with the professional standards and code of ethical conduct for my profession;
- 4) My review involved ensuring the consistency of the content in all sections of the submission; and
- 5) In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.

Jeff Waters
Name

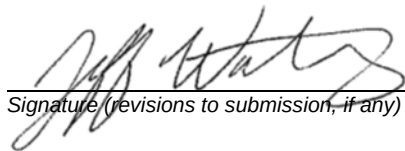
MS, Meteorology
Professional Credentials (Area of Expertise)


Signature (initial submission)

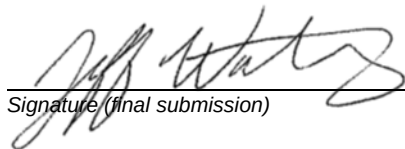
November 5, 2024
Date

Signature (response to deficiencies, if any)

Date


Signature (revisions to submission, if any)

March 2, 2025
Date


Signature (final submission)

March 25, 2025
Date

An updated signature and form are required following any modification of the hurricane model and any revision of the initial submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)

Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-1 in a submission appendix.

Form G-2: Meteorological Hurricane Standards Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the 2023 Hurricane Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

- 1) *The hurricane model meets the Meteorological Hurricane Standards (M-1 – M-6);*
- 2) *The disclosures and forms related to the Meteorological Hurricane Standards are editorially and technically accurate, reliable, unbiased, and complete;*
- 3) *My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and*
- 4) *In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.*

 Emilie Scherer

Name

 PhD, Atmospheric Science

Professional Credentials (Area of Expertise)



Signature (initial submission)

 November 5, 2024

Date



Signature (response to deficiencies, if any)

 January 14, 2025

Date



Signature (revisions to submission, if any)

 March 2, 2025

Date



Signature (final submission)

 March 25, 2025

Date

An updated signature and form are required following any modification of the hurricane model and any revision of the initial submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

 Signature (revisions to submission)

 Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-2 in a submission appendix.

Form G-3: Statistical Hurricane Standards Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the 2023 Hurricane Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

- 1) *The hurricane model meets the Statistical Hurricane Standards (S-1 – S-6);*
- 2) *The disclosures and forms related to the Statistical Hurricane Standards are editorially and technically accurate, reliable, unbiased, and complete;*
- 3) *My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and*
- 4) *In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.*

Enrica Bellone

Name

PhD, Statistics

Professional Credentials (Area of Expertise)

Empirische

Signature (initial submission)

November 5, 2024

Date _____

Empirische

Signature (response to deficiencies, if any)

January 14, 2025

Date

Empirische

Signature (revisions to submission, if any)

March 2, 2025

Date _____

Empirische

Signature (final submission)

March 25, 2025

Date _____

An updated signature and form are required following any modification of the hurricane model and any revision of the initial submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)

Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-3 in a submission appendix.

Form G-4: Vulnerability Hurricane Standards Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the 2023 Hurricane Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

- 1) *The hurricane model meets the Vulnerability Hurricane Standards (V-1 – V-4);*
- 2) *The disclosures and forms related to the Vulnerability Hurricane Standards are editorially and technically accurate, reliable, unbiased, and complete;*
- 3) *My review was completed in accordance with the professional standards and code of ethical conduct for my profession; and*
- 4) *In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.*

Michael Young
Name

PE, MS, Engineering Science
Professional Credentials (Area of Expertise)

State: North Carolina__ Expiration Date: 12/31/24__

Professional License Type: Professional Engineer__


Signature (initial submission)

November 5, 2024
Date

Signature (response to deficiencies, if any)

Date


Signature (revisions to submission, if any)

March 2, 2025
Date


Signature (final submission)

March 25, 2025
Date

An updated signature and form are required following any modification of the hurricane model and any revision of the original submission. If a signatory differs from the initial signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)

Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-4 in a submission appendix.

Form G-5: Actuarial Hurricane Standards Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the 2023 Hurricane Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

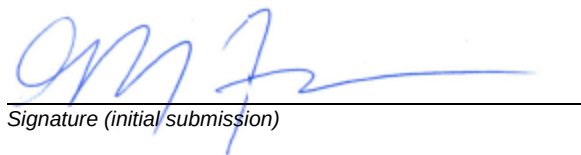
- 1) *The hurricane model meets the Actuarial Hurricane Standards (A-1 – A-6);*
- 2) *The disclosures and forms related to the Actuarial Hurricane Standards are editorially and technically accurate, reliable, unbiased, and complete;*
- 3) *My review was completed in accordance with the Actuarial Standards of Practice and Code of Conduct; and*
- 4) *In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.*

Greg Fano

Name

FCAS, MAAA

Professional Credentials (Area of Expertise)



Signature (initial submission)

November 5, 2024

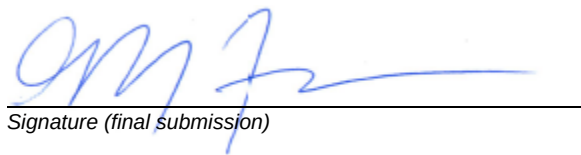
Date

Signature (response to deficiencies, if any)

Date

Signature (revisions to submission, if any)

Date



Signature (final submission)

March 25, 2025

Date

An updated signature and form are required following any modification of the hurricane model and any revision of the original submission. If a signatory differs from the initial signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)

Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-5 in a submission appendix.

Form G-6: Computer/Information Hurricane Standards Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the 2023 Hurricane Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

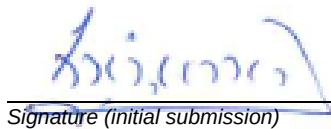
- 1) The hurricane model meets the Computer/Information Hurricane Standards (CI-1 – CI-8),*
- 2) The disclosures and forms related to the Computer/Information Hurricane Standards are editorially and technically accurate, reliable, unbiased, and complete,*
- 3) My review was completed in accordance with the professional standards and code of ethical conduct for my profession, and*
- 4) In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.*

Aviansh Takale

Name

MS, Computer Application

Professional Credentials (Area of Expertise)



Signature (initial submission)

November 5, 2024

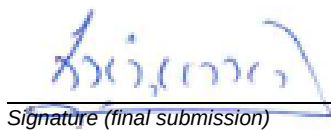
Date

Signature (response to deficiencies, if any)

Date

Signature (revisions to submission, if any)

Date



Signature (final submission)

March 25, 2025

Date

An updated signature and form are required following any modification of the hurricane model and any revision of the original submission. If a signatory differs from the initial signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)

Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-6 in a submission appendix.

Form G-7: Editorial Review Expert Certification

I hereby certify that I have reviewed the current submission of North Atlantic Hurricane Models Version 25.0 (Build 2450) for compliance with the “Process for Determining the Acceptability of a Computer Simulation Hurricane Model” adopted by the Florida Commission on Hurricane Loss Projection Methodology in its Hurricane Standards Report of Activities as of November 1, 2023, and hereby certify that:

- 1) The hurricane model submission is in compliance with the acceptability process Notification Requirements and General Hurricane Standard G-5;
- 2) The disclosures and forms related to each hurricane standards group are editorially accurate and contain complete information and any changes that have been made to the submission during the review process have been reviewed for completeness, grammatical correctness, and typographical errors;
- 3) There are no incomplete responses, charts or graphs, inaccurate citations, or extraneous text or references;
- 4) The current version of the hurricane model submission has been reviewed for grammatical correctness, typographical errors, completeness, the exclusion of extraneous data/information and is otherwise acceptable for publication; and
- 5) In expressing my opinion I have not been influenced by any other party to bias or prejudice my opinion.

Karen Argonza

Name



Signature (initial submission)

B.A. Journalism

Professional Credentials (Area of Expertise)

November 5, 2024

Date

Signature (response to deficiencies, if any)

Date

Signature (revisions to submission, if any)

Date



Signature (final submission)

March 25, 2025

Date

An updated signature and form are required following any modification of the hurricane model and any revision of the initial submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories. Additional signature lines shall be added as necessary with the following format:

Signature (revisions to submission)

Date

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Include Form G-7 in a submission appendix.

Form M-1: Annual Occurrence Rates

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form M-1.**

- B. Provide a table of annual occurrence rates for hurricane landfall from the dataset defined by marine exposure that the hurricane model generates by hurricane category (defined by maximum windspeed at hurricane landfall in the Saffir-Simpson Hurricane Wind Scale) for the entire state of Florida and additional regions as defined in Figure 1. List the annual occurrence rate per hurricane category. Annual occurrence rates shall be rounded to three decimal places.**

As defined, a by-passing hurricane (ByP) is a hurricane which does not make landfall on Florida, but produces minimum damaging windspeeds or greater on Florida. For the by-passing hurricanes included in the table only, the intensity entered is the maximum windspeed at closest approach to Florida as a hurricane, not the windspeed over Florida.

A table providing annual occurrence rates for the model is provided in [Table 21](#). The Reference Hurricane Set numbers in the table provided in the Hurricane Standards Report of Activities correspond to the counts of region and category descriptions in [Form A-2](#) of the same document.

The Model Base Hurricane Set bypass numbers reflect the historical events which cause a loss in the Moody's model.

- C. For a climate-adjusted hurricane model that uses either the Reference Hurricane Set or a Model Adjusted Hurricane Set for the Model Base Hurricane Set, a modeling organization shall provide two Form M-1s, one completed with climate-adjusted modeled rates and one completed without climate-adjusted modeled rates.**

Not applicable.

- D. Describe hurricane model variations from the Reference Hurricane Set frequencies.**

The agreement between modeled and observed frequencies – both by intensity and by region – is reasonable given the limited historical record.

- E. Provide vertical bar graphs depicting distributions of hurricane frequencies by category by region of Florida (Figure 1), for the neighboring states of Alabama/Mississippi and Georgia, and for by-passing hurricanes. For the neighboring states, statistics based on the closest coastal segment to the state boundaries used in the hurricane model are adequate.**

Histograms comparing modeled and observed landfall frequencies by region are given on [Figure 51](#), which denotes the regions of Florida corresponding to Figure 1 of the ROA.

The HURDAT2 data as of May 2023 has not been partitioned or modified.

- F. List all hurricanes added, removed, or modified from the current accepted hurricane model.**

In agreement with HURDAT2 as of May 2023, three storms have been added (Elsa 2021, Ian 2022, and Nicole 2022), and three storms have been modified in the 1966-1970 time frame as a result of the HURDAT2 reanalysis.

The six storms changed since the last submission are listed below, and shown in [Figure 52](#) and [Figure 53](#).

Name	Original HURDAT	HURDAT2 Storm Number	Added/Removed/Modified
Alma 1966	AL011966	AL011966	Modified
Inez 1966	AL091966	AL091966	Modified
Gladys 1968	AL141968	AL141968	Modified
Elsa 2021	NA	AL052021	Added
Ian 2022	NA	AL092022	Added
Nicole 2022	NA	AL172022	Added

- G. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form M-1, in a submission appendix.**

This information is provided in Excel format in the file Moodys23FormM1.xlsx at the link provided to the FCHLPM.

Note:

Except where specified, number of hurricanes does not include by-passing hurricanes. Each time a hurricane goes from water to land (once per region) it is counted as a hurricane landfall in that region. However, each hurricane is counted only once in the Entire State totals. Hurricanes recorded for neighboring states need not have reported damaging winds in Florida.

Table 21: Annual occurrence rates

	Entire State					Region A – NW Florida				
	Reference Hurricane Set		Model Base Hurricane Set		Modeled	Reference Hurricane Set		Model Base Hurricane Set		Modeled
Category	Nbr	Rate	Nbr	Rate	Rate	Nbr	Rate	Nbr	Rate	Rate
1	25	0.203	25	0.203	0.173	15	0.122	15	0.122	0.119
2	17	0.138	17	0.138	0.137	5	0.041	5	0.041	0.042
3	14	0.114	14	0.114	0.098	6	0.049	6	0.049	0.037
4	12	0.098	12	0.098	0.097	0	0.000	0	0.000	0.014
5	3	0.024	3	0.024	0.016	1	0.008	1	0.008	0.003

	Region B – SW Florida					Region C – SE Florida				
	Reference Hurricane Set		Model Base Hurricane Set		Modeled	Reference Hurricane Set		Model Base Hurricane Set		Modeled
Category	Nbr	Rate	Nbr	Rate	Rate	Nbr	Rate	Nbr	Rate	Rate
1	7	0.057	7	0.057	0.053	8	0.065	8	0.065	0.049
2	4	0.033	4	0.033	0.035	7	0.057	7	0.057	0.062
3	5	0.041	5	0.041	0.045	5	0.041	5	0.041	0.034
4	6	0.049	6	0.049	0.031	6	0.049	6	0.049	0.055
5	0	0.000	0	0.000	0.002	2	0.016	2	0.016	0.011

	Region D – NE Florida					Florida By-Passing Hurricanes				
	Reference Hurricane Set		Model Base Hurricane Set		Modeled	Reference Hurricane Set		Model Base Hurricane Set		Modeled
Category	Nbr	Rate	Nbr	Rate	Rate	Nbr	Rate	Nbr	Rate	Rate
1	1	0.008	1	0.008	0.010	5	0.041	13	0.106	0.149
2	2	0.016	2	0.016	0.014	3	0.024	8	0.065	0.077
3	0	0.000	0	0.000	0.002	6	0.049	6	0.049	0.083
4	0	0.000	0	0.000	0.001	0	0.000	3	0.024	0.052
5	0	0.000	0	0.000	0.000	0	0.000	0	0.000	0.012

	Region E – Georgia					Region F – Alabama/Mississippi				
	Reference Hurricane Set		Model Base Hurricane Set		Modeled	Reference Hurricane Set		Model Base Hurricane Set		Modeled
Category	Nbr	Rate	Nbr	Rate	Rate	Nbr	Rate	Nbr	Rate	Rate
1	0	0.000	0	0.000	0.009	7	0.057	7	0.057	0.051
2	2	0.016	2	0.016	0.015	3	0.024	3	0.024	0.026
3	0	0.000	0	0.000	0.005	4	0.033	4	0.033	0.021
4	0	0.000	0	0.000	0.005	0	0.000	0	0.000	0.015
5	0	0.000	0	0.000	0.001	1	0.008	1	0.008	0.002

*All values rounded to 3 decimal places

Figure 51: Comparison of historical and modeled multiple landfall occurrences by region as defined in Figure 1 on Page 138 of the Hurricane Standards ROA

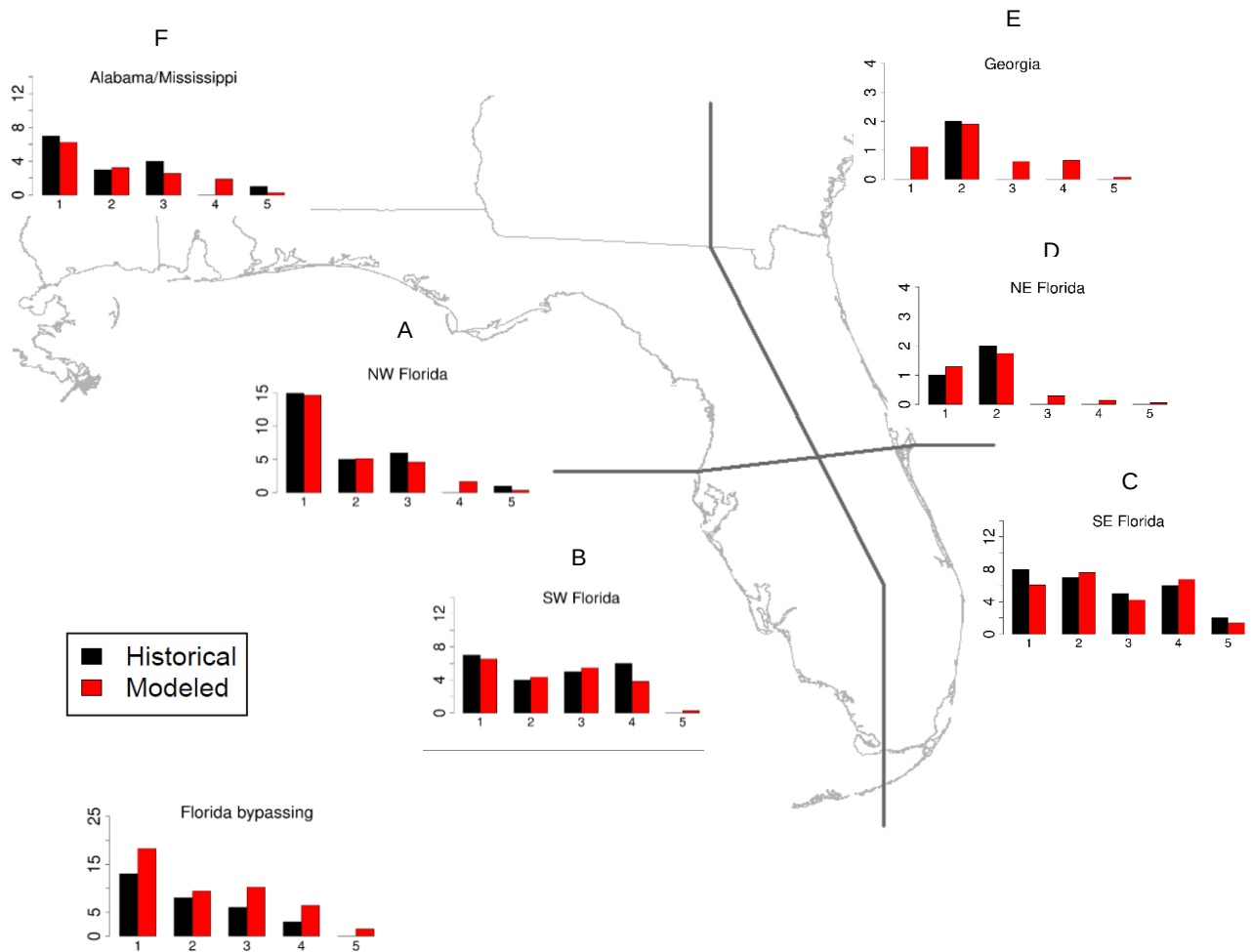


Figure 52: Track parameters for three hurricanes added in the current submission – from top left to bottom right: Elsa 2021, Ian 2022, and Nicole 2022

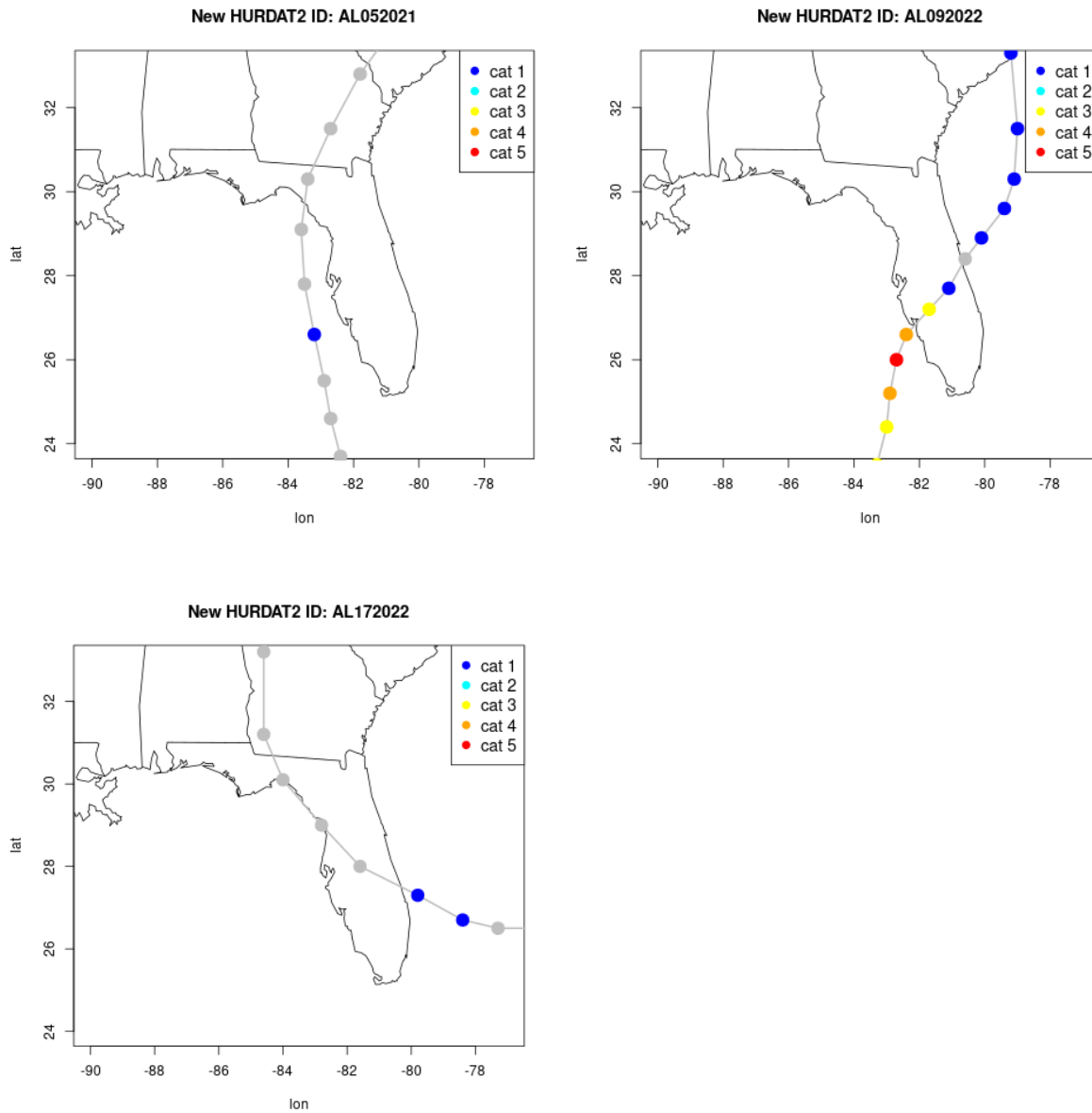
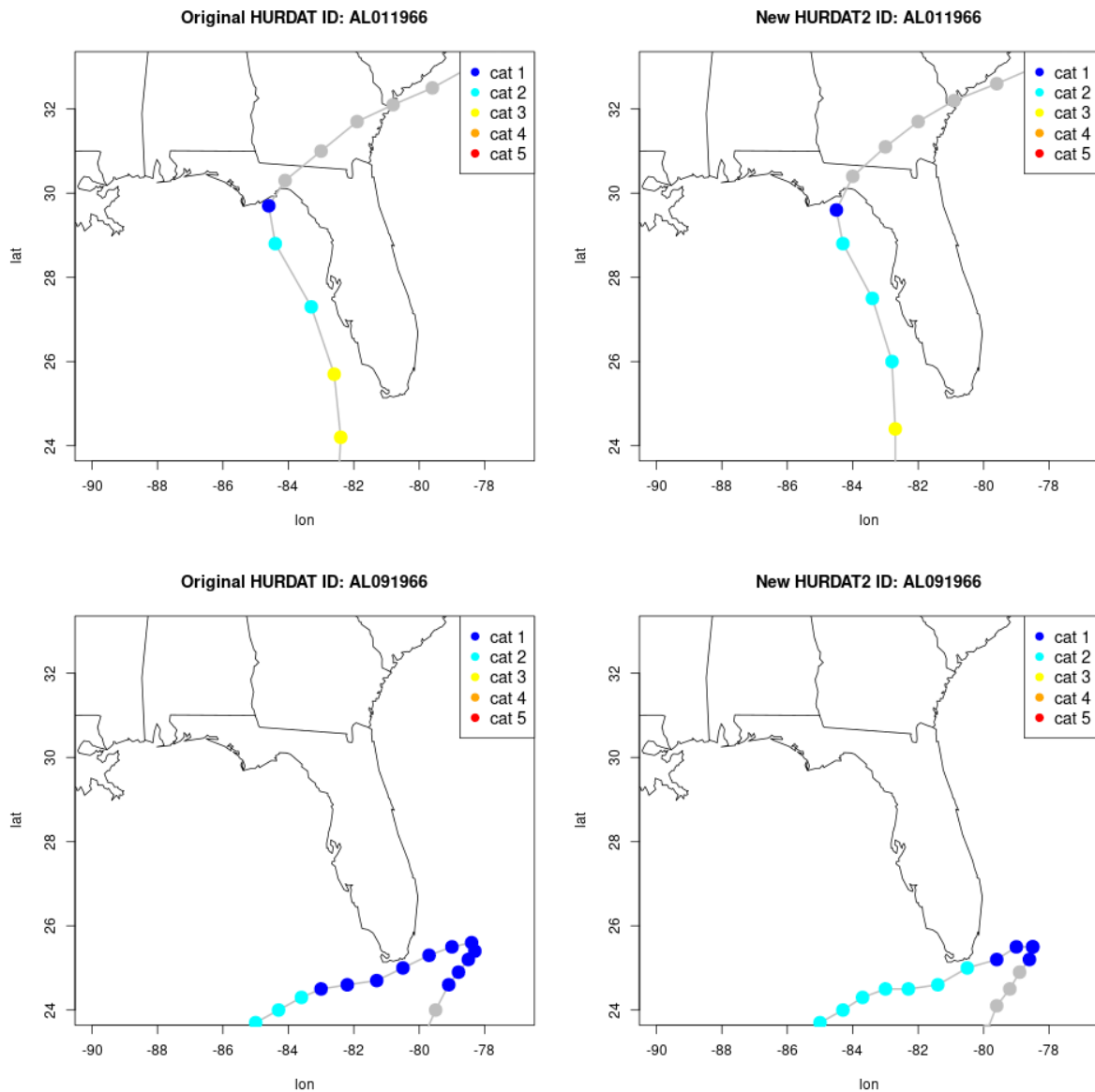
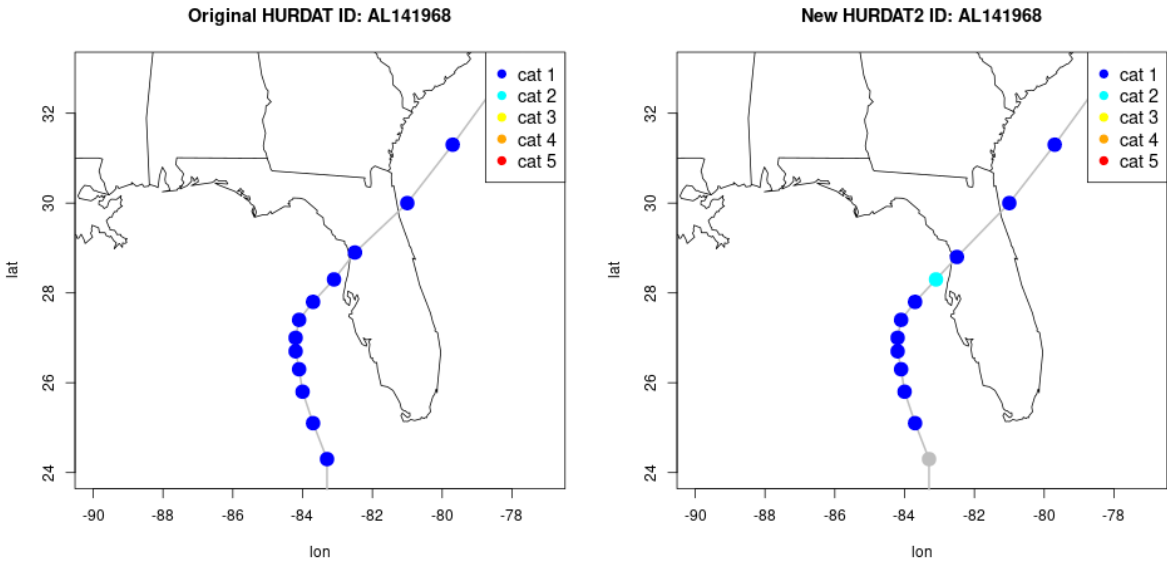


Figure 53: Track parameters for three hurricanes from the 1966-1970 reanalysis period modified in the current submission – from top to bottom: Alma 1966, Inez 1966 and Gladys 1968





Form M-2: Maps of Maximum Winds

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form M-2.**
- B. Provide color-coded contour plots on a map with ZIP Code boundaries of the maximum winds for the modeled version of the Model Base Hurricane Set. Plot the position and value of the maximum windspeed on the contour map.**

See [Figure 54](#).

- C. Provide color-coded contour plots on maps with ZIP Code boundaries of the maximum winds for a 100-year and a 250-year return period from the stochastic storm set. Plot the position and value of the maximum windspeed on each contour map.**

See maps [Figure 55](#) and [Figure 56](#).

Maximum winds in these maps are defined as the maximum one-minute sustained winds as modeled and recorded at each location.

Use the following eight isotach values and interval color coding:

(1)	Minimum damaging	Blue
(2)	50 mph	Medium Blue
(3)	65 mph	Light Blue
(4)	80 mph	Grey
(5)	95 mph	Light Red
(6)	110 mph	Medium Red
(7)	125 mph	Red
(8)	140 mph	Magenta

Contouring in addition to these isotach values may be included.

- D. Include Form M-2 in a submission appendix.**

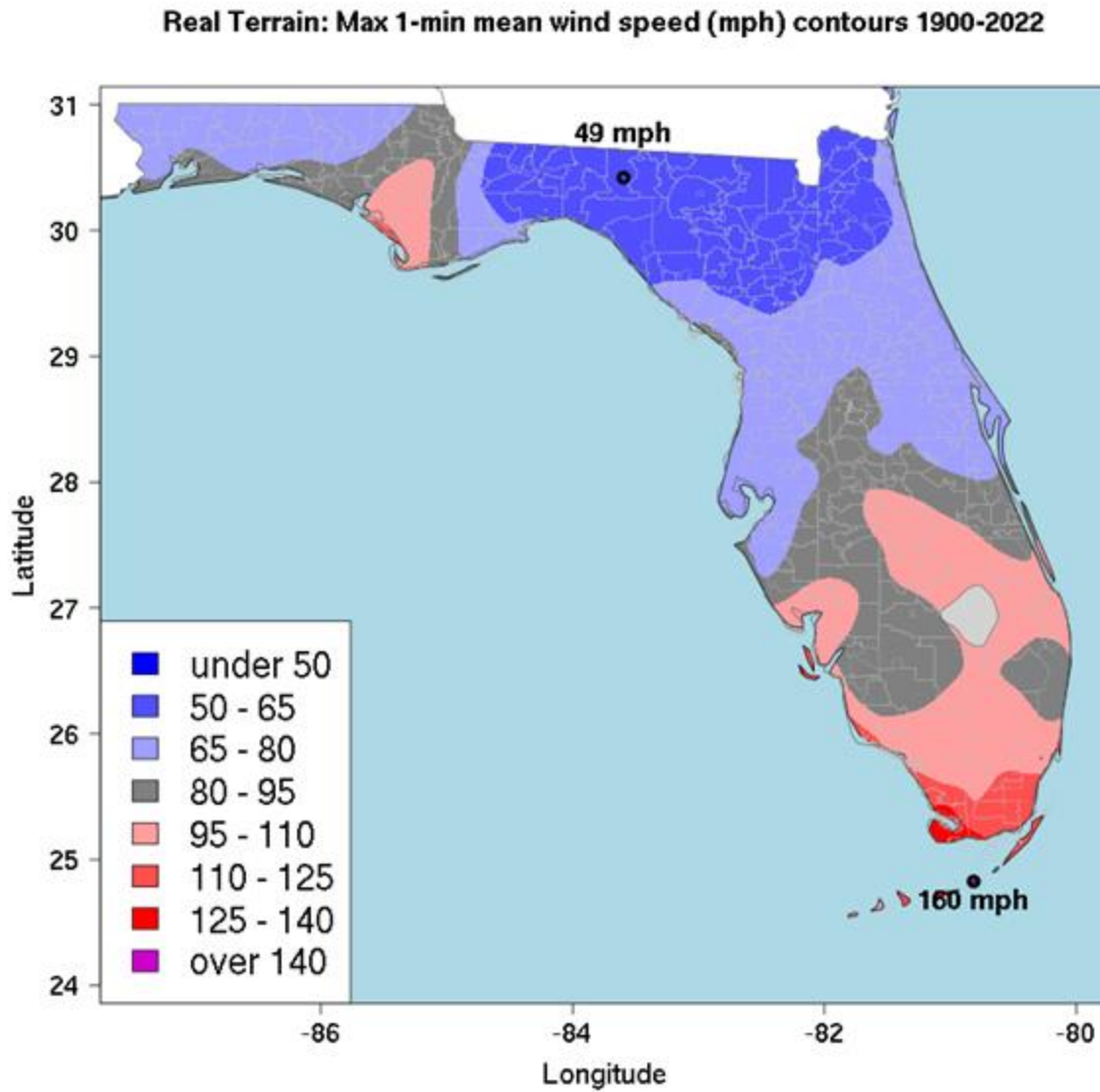
Figure 54: Maximum 1-minute mean wind speed (mph) at ZIP Code level – historical set (1900–2022)

Figure 55: 100-year return period 1-minute mean wind speed (mph) at ZIP Code level – stochastic set

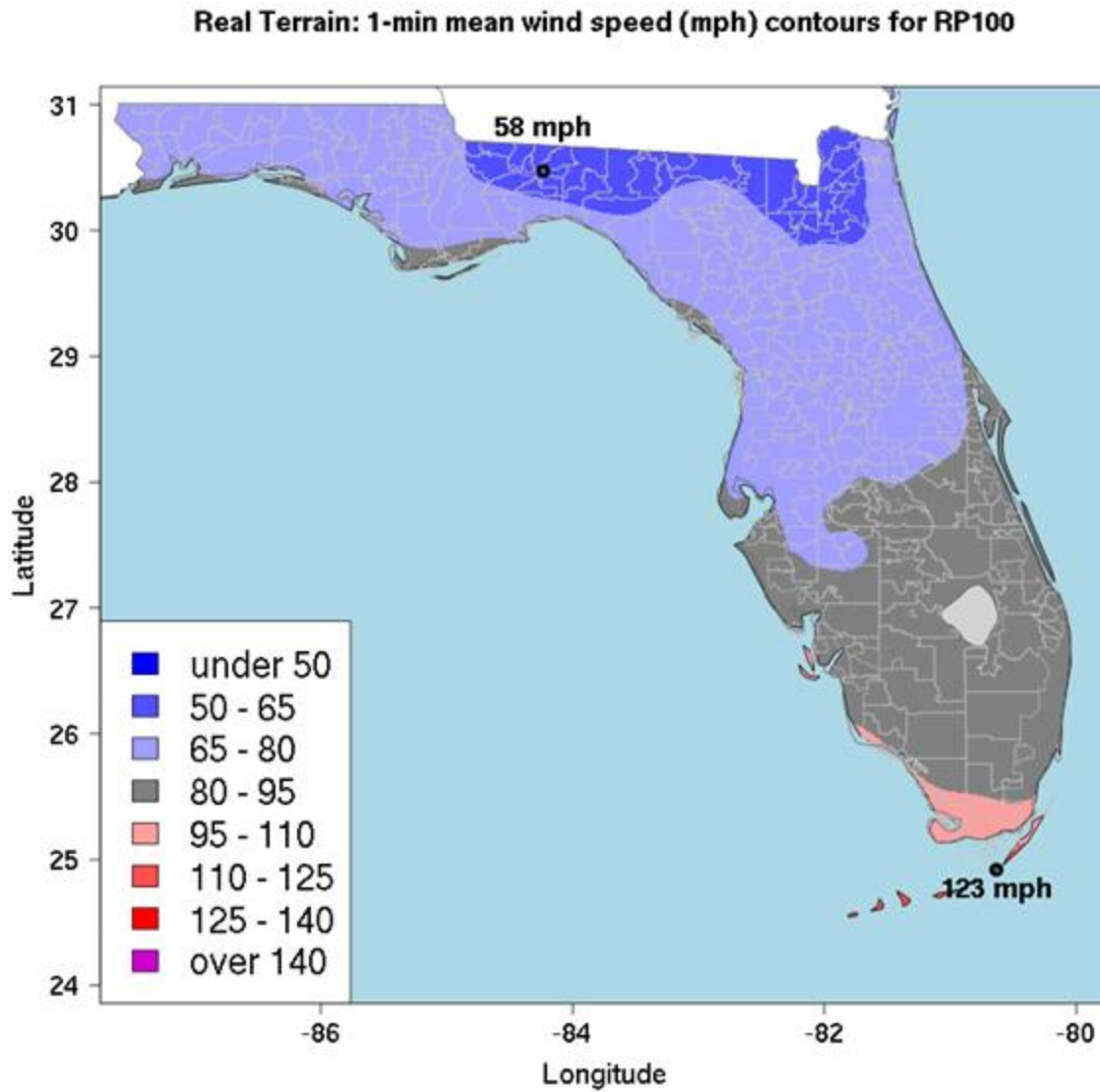
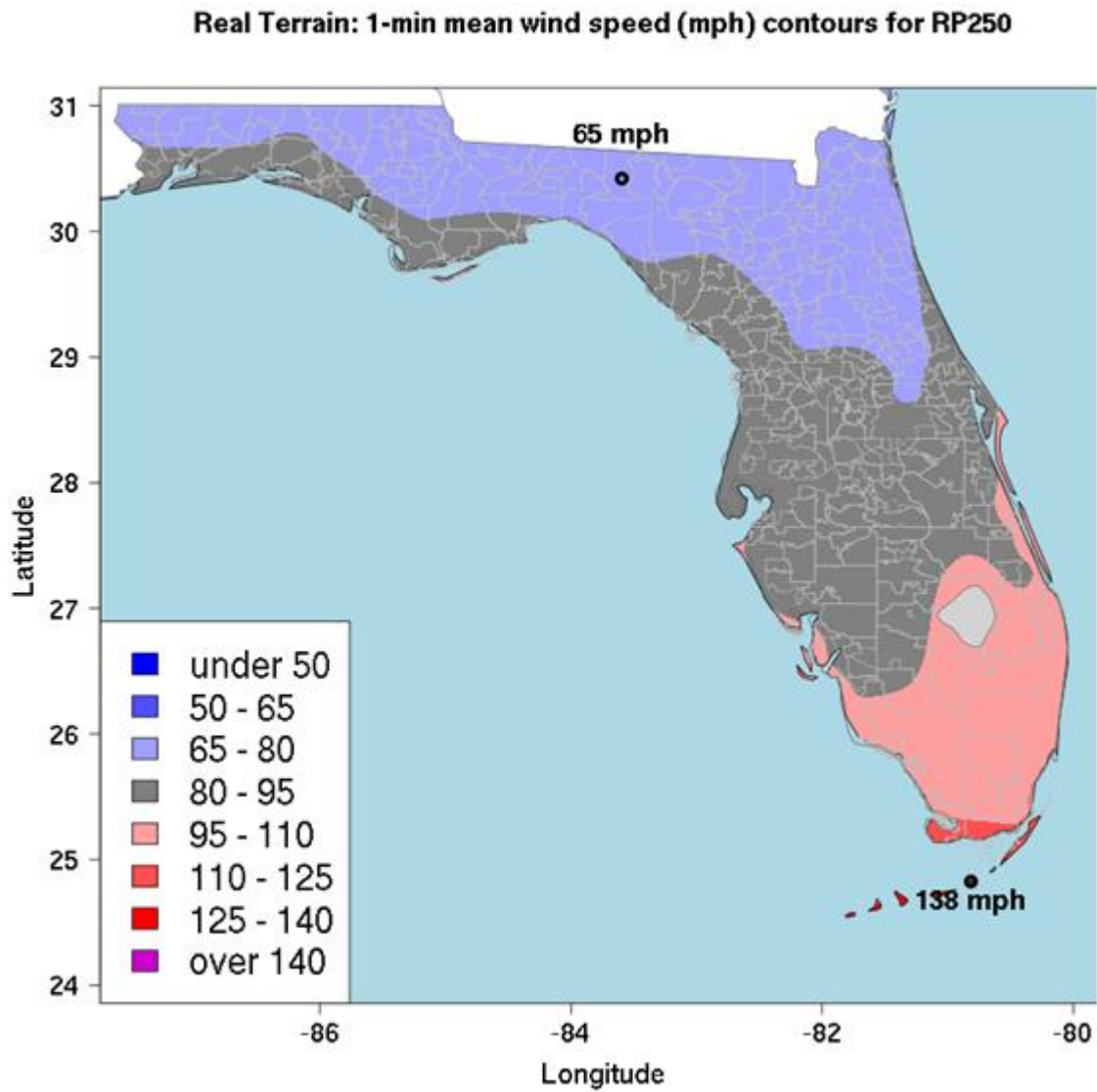


Figure 56: 250-year return period 1-minute mean wind speed (mph) at ZIP Code level – stochastic set



Form M-3: Radius of Maximum Winds and Radii of Standard Wind Thresholds

E. One or more automated programs or scripts shall be used to generate and arrange the data in Form M-3.

A. For the central pressure (CP) ranges in the table below, provide the first quartile (1Q), second quartile (2Q), and third quartile (3Q) in the stochastic storm set of the following quantities: radii to maximum wind (Rmax), the Category 3 (110 mph) wind radii, the Category 1 (73 mph) wind radii, and the gale force (40 mph) wind radii. If a value is unavailable, then populate the table with “NA.”

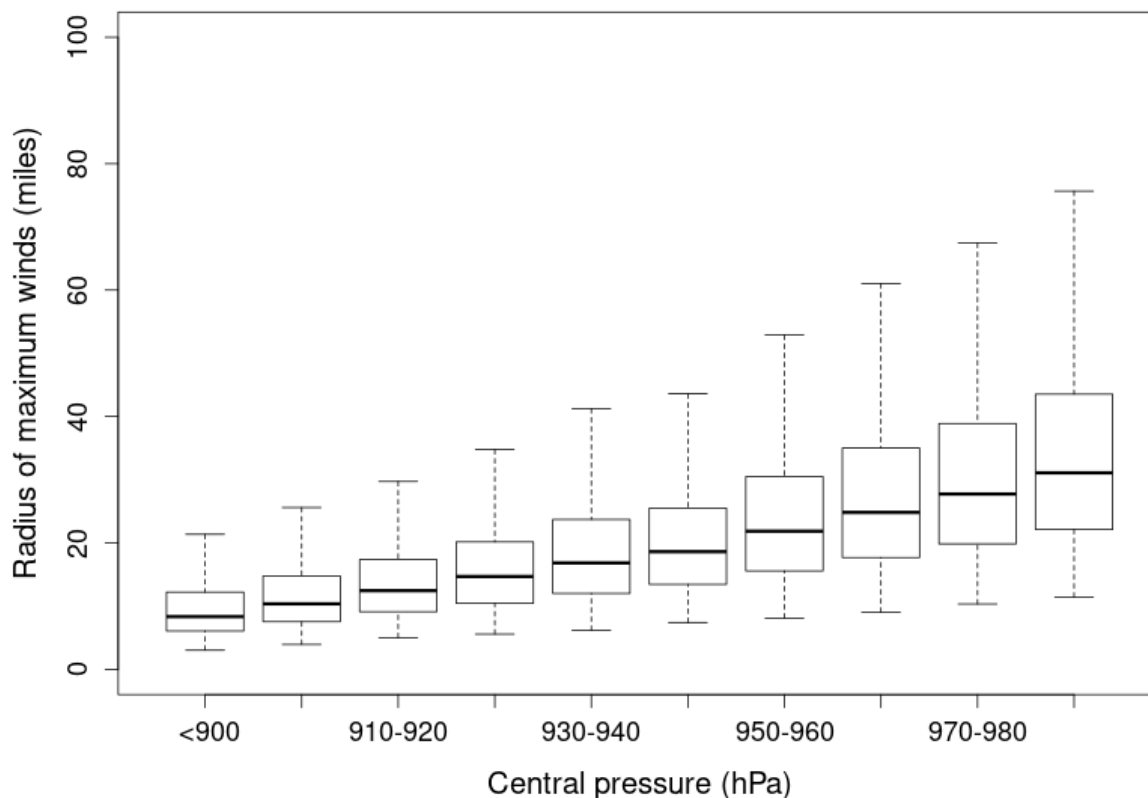
Table 22: Ranges of Rmax used in hurricane model’s stochastic storm set

Central Pressure (mb)	Rmax (mi)			Outer Radii (>110 mph) (mi)			Outer Radii (>73 mph) (mi)			Outer Radii (>40 mph) (mi)		
	1Q	2Q	3Q	1Q	2Q	3Q	1Q	2Q	3Q	1Q	2Q	3Q
980 ≤ cp < 990	22	31	43	NA	NA	NA	33	47	68	115	164	232
970 ≤ cp < 980	20	28	39	NA	NA	NA	36	53	77	118	170	241
960 ≤ cp < 970	18	25	35	NA	NA	26	40	60	86	120	177	251
950 ≤ cp < 960	16	22	30	NA	22	37	45	67	97	123	182	259
940 ≤ cp < 950	13	19	25	14	26	40	45	65	95	114	167	241
930 ≤ cp < 940	12	17	24	18	28	41	45	65	93	110	158	231
920 ≤ cp < 930	10	15	20	19	28	41	45	62	87	104	152	213
910 ≤ cp < 920	9	12	17	18	26	38	40	56	82	87	127	190
900 ≤ cp < 910	7	9	14	16	23	32	34	46	68	75	106	154
cp < 900	5	7	11	13	17	29	31	36	59	68	79	126

B. Specify any truncations applied to Rmax distributions in the hurricane model, and if and how these truncations vary with other variables.

The distribution of Rmax is truncated on the right. The truncation points vary by central pressure bin, and are derived from a large set of in-house numerical simulations.

C. Provide a box and whiskers plot of the data from the table with Central Pressure on the x-axis and Rmax on the y-axis.

Figure 57: Box plot of Rmax (miles) as a function of central pressure (hPa) for the data in Table 22

D. If central pressure is not modeled, describe how the hurricane model intensities were mapped to the central pressure ranges listed in the table.

We do model central pressure.

E. Provide this form in Excel using the format given in the file named “2023FormM3.xlsx.” The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form M-3 in a submission appendix.

This information is provided in Excel format in the file Moodys23FormM3.xlsx at the link provided to the FCHLPM.

Form S-1: Probability and Frequency of Florida Landfalling Hurricanes per Year

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form S-1.**

The frequencies and probabilities in Form S-1 are generated using automated programs.

- B. Complete the table below for the modeled probabilities and frequencies of the number of landfalling Florida hurricanes per year. Values derived from the Reference Hurricane Set (as given in Form A-2 have been provided. Probabilities shall be rounded to three decimal places.**

Model Base Hurricane Set frequency values shall be multiplied by a factor that is the number of years in the Reference Hurricane Set divided by the number of years in the Model Base Hurricane Set.

For a climate-adjusted hurricane model that uses either the Reference Hurricane Set or a Model Adjusted Hurricane Set for the Model Base Hurricane Set, a modeling organization shall provide two Form S-1s, one completed with climate-adjusted modeled probabilities and frequencies, and one completed without climate-adjusted modeled probabilities and frequencies.

- C. Include Form S-1 in a submission appendix.**

The table below provides the probability of landfalling Florida hurricanes per year, for the period 1900 to 2022. Moody's Model Base Hurricane Set is the Reference set, with no modification to the landfalls and associated categories. The Reference Hurricane Set probabilities and frequencies in this Form have been corrected to match Form A-2 and Form M-1.

Table 23: Probability and frequency of Florida landfalling hurricanes per year

Number of Hurricanes Per Year	Reference Hurricane Set Probability	Model Base Hurricane Set Probability	Modeled Probability	Reference Hurricane Set Frequency	Model Base Hurricane Set Frequency	Modeled Frequency
0	0.602	0.602	0.593	74	74	73
1	0.244	0.244	0.310	30	30	38
2	0.130	0.130	0.081	16	16	10
3	0.024	0.025	0.014	3	3	2
4	0.000	0.000	0.002	0	0	0
5	0.000	0.000	0.000	0	0	0
6	0.000	0.000	0.000	0	0	0
7	0.000	0.000	0.000	0	0	0
8	0.000	0.000	0.000	0	0	0
9	0.000	0.000	0.000	0	0	0
10 or more	0.000	0.000	0.000	0	0	0

Form S-2: Examples of Hurricane Loss Exceedance Estimates

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form S-2.**
- B. Provide estimates of the annual aggregate combined personal and commercial residential insured hurricane losses for various probability levels using the notional risk dataset specified in Form A-1 the 2017 FHCF exposure data, and the 2023 FHCF exposure data.**

Provide the total average annual hurricane loss for the hurricane loss exceedance distribution. If the modeling methodology does not allow the hurricane model to produce a viable answer for certain return periods, state so and why.

- C. Include Form S-2 in a submission appendix.**

Part A

Table 24: Examples of hurricane loss exceedance estimates

Return Period (Years)	Annual Probability of Exceedance	Estimated Hurricane Loss Notional Risk Dataset	Estimated Personal and Commercial Residential Hurricane Loss 2017 FHCF Dataset	Estimated Personal and Commercial Residential Hurricane Loss 2023 FHCF Dataset
Top Event	NA	324,535,288	778,130,482,468	1,100,792,289,926
10,000	0.01%	148,287,873	334,764,283,715	473,304,863,534
5,000	0.02%	123,919,773	273,909,373,974	386,027,934,219
2,000	0.05%	95,110,624	202,661,178,954	284,167,586,844
1,000	0.10%	76,403,384	157,772,029,630	220,765,959,415
500	0.20%	60,655,810	121,212,003,381	169,447,876,007
250	0.40%	47,475,282	91,172,844,323	127,260,194,244
100	1.00%	32,754,645	58,636,565,599	81,695,504,735
50	2.00%	23,378,579	39,390,719,483	54,787,536,990
20	5.00%	13,510,420	21,011,127,538	29,125,452,254
10	10.00%	7,630,987	10,902,271,069	15,131,425,992
5	20.00%	3,011,677	3,640,279,428	5,019,732,613

Part B**Table 25: Average annual loss for hurricane loss exceedance distribution**

	Estimated Hurricane Loss Notional Risk Dataset	Estimated Personal and Commercial Residential Hurricane Loss 2017 FHCF Dataset	Estimated Personal and Commercial Residential Hurricane Loss 2023 FHCF Dataset
Mean (Total Average Annual Hurricane Loss)	2,568,217	4,019,672,222	5,587,486,906
Median	17,605	18,104,153	25,428,369
Standard Deviation	7,142,460	13,524,351,344	18,956,608,682
Interquartile Range	1,821,289	1,969,887,354	2,715,977,643
Sample Size	100,000 Years of Simulated Events	100,000 Years of Simulated Events	100,000 Years of Simulated Events

Form S-3: Distributions of Stochastic Hurricane Parameters

- A. Provide the probability distribution functional form used for each stochastic hurricane parameter in the hurricane model.**
- B. Provide a summary of the justification for each functional form selected for each general classification and for the goodness-of-fit tests used.**

Year Range Used for Fitting refers to the year range of data upon which the hurricane model distribution parameters are estimated.

Year Range Used for Validation refers to the year range of data upon which the goodness-of-fit statistics are based.

- C. Include Form S-3 in a submission appendix.**

Table 26: Distributions of hurricane parameters

Stochastic Hurricane Parameter (Function or Variable)	Functional Form of Distribution	Data Sources	Year Range Used	Year Range Used for Validation	Justification for Functional Form and Parameter Estimates
Storm Frequency	Poisson	HURDAT2	1900–2022	1900–2022	The Poisson assumption is supported by historical data. The conditional chi-square test (also known as Poisson dispersion test) is used to check that total annual landfall counts are consistent with a Poisson distribution with constant rate. The Poisson rates by region and category are in good agreement with historical data, as confirmed by the chi-square goodness of fit test. This test is chosen as specifically suited for categorical data.
Central Pressure at Landfall	Smoothed empirical distribution by landfall region	HURDAT HURDAT2	1900–2008	1900–2022	The distribution of central pressure at landfall is calibrated to match historical data. Rather than relying on a single statistical test, both the Kolmogorov-Smirnov and chi-square goodness of fit tests are used to check that the observed

Stochastic Hurricane Parameter (Function or Variable)	Functional Form of Distribution	Data Sources	Year Range Used	Year Range Used for Validation	Justification for Functional Form and Parameter Estimates
					distribution of central pressure is consistent with the modeled distribution. The chi-square is a widely used goodness of fit test but requires binning of the central pressures, while the Kolmogorov-Smirnov test is commonly used for continuous distributions. Visual comparisons are also an important component of assessing goodness of fit.
Inland Filling Rate	Gaussian, with mean that depends on intensity, size, translational speed, and proportion of the storm over different types of terrain.	HURDAT HURDAT2 NHC Reports Numerical simulations	1988–2008	1900-2022	The distribution of the filling rate is in good agreement with historical data. The methods used to estimate, select, and validate the model are described in Colette et al. (2010).

Stochastic Hurricane Parameter (Function or Variable)	Functional Form of Distribution	Data Sources	Year Range Used	Year Range Used for Validation	Justification for Functional Form and Parameter Estimates
Vmax	Log-normal with mean that depends on central pressure, far field pressure, and latitude.	HURDAT HURDAT2	1900–2022 ²⁰ – 2020	1900–2022	The dependence of Vmax on central pressure, far field pressure, and latitude is documented in scientific literature (e.g., Knaff and Zher 2007). The form of the relationship and parameters have been chosen to match historical data. Vmax is further calibrated at landfall to ensure the historical distribution is reproduced well. As for central pressure, rather than relying on a single statistical test, both the Kolmogorov-Smirnov and chi-square goodness of fit tests are used to check that the observed distribution of Vmax is consistent with the modeled distribution. Visual comparisons are also an important component of assessing goodness of fit.
Translational Speed and Heading	Translational speed and heading follow empirical distributions that derive from the modeling of zonal and meridional track steps.	HURDAT HURDAT2	1950–2007	1900–2022	The model for the zonal and meridional track steps is based on Hall and Jewson (2007). The resulting distribution of translational speed and heading agree with the historical data. As for central pressure, rather than relying on a single statistical test, both the Kolmogorov-Smirnov and chi-square goodness of fit tests are used to check that the observed distribution of

Stochastic Hurricane Parameter (Function or Variable)	Functional Form of Distribution	Data Sources	Year Range Used	Year Range Used for Validation	Justification for Functional Form and Parameter Estimates
					translational speed is consistent with the modeled distribution. Visual comparisons are also an important component of assessing goodness of fit.
Rmax	Truncated log-normal. The mean depends on pressure and latitude.	Extended Best Track HURDAT2 Reanalysis Ho et al (1987)	1988–2008	1900-2022	The distribution is fitted to historical data. Truncation is necessary to avoid unrealistic values of Rmax in simulations, especially when extrapolating beyond the range of observed data. As for central pressure, rather than relying on a single statistical test, both the Kolmogorov-Smirnov and chi-square goodness of fit tests are used to check that the observed distribution of Rmax is consistent with the modeled distribution. Visual comparisons are also an important component of assessing goodness of fit.
Wind Profile Parameters	Shape parameters X1 and N: gamma distribution Angle to maximum winds (Amax): truncated Gaussian	RMS HWind	1998–2008	1998-2022	The distributions are chosen to match historical data. Truncation of Amax ensures that the simulated values are between 0 and 2p. The chi-square goodness of fit test is used to check that the observed distribution of Amax is consistent with the modeled distribution. Given the circular nature of this parameter, common goodness of fit tests such as the Kolmogorov-Smirnov are not

Stochastic Hurricane Parameter (Function or Variable)	Functional Form of Distribution	Data Sources	Year Range Used	Year Range Used for Validation	Justification for Functional Form and Parameter Estimates
					appropriate. The chi-square test does not require ordering of the data and can be used for this validation after splitting modeled and observed data into bins. Visual comparisons are also an important component of assessing goodness of fit.

Form S-4: Validation Comparisons

- A. *Provide four validation comparisons of actual personal residential exposures and hurricane loss to modeled exposures and hurricane loss.***

Provide these comparisons by line of insurance, construction type, policy coverage, county or other level of similar detail in addition to total hurricane losses. Include hurricane loss as a percentage of total exposure.

Total exposure represents the total amount of insured values (all coverages combined) in the area affected by the hurricane. This would include exposures for policies that did not have a hurricane loss. If this is not available, use exposures for only those policies that had a hurricane loss. Specify which was used.

Comparisons shall include hurricane losses from Hurricane Irma (2017), Hurricane Michael (2018), and Hurricane Ian (2022) to the extent data from Hurricane Ian are available.

- B. *Provide a validation comparison of actual commercial residential exposures and hurricane loss to modeled exposures and hurricane loss. Use and provide a definition of the hurricane model relevant commercial residential classifications.***
- C. *Provide scatter plot(s) of modeled versus historical hurricane losses for each of the required validation comparisons. (Plot the historical hurricane losses on the x-axis and the modeled hurricane losses on the y-axis)***
- D. *Include Form S-4 in a submission appendix.***

Rather than using a specific published hurricane windfield directly, the winds underlying the modeled hurricane loss cost calculations must be produced by the hurricane model being evaluated and shall be the same hurricane parameters as used in completing Form A-2.

Example A1: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

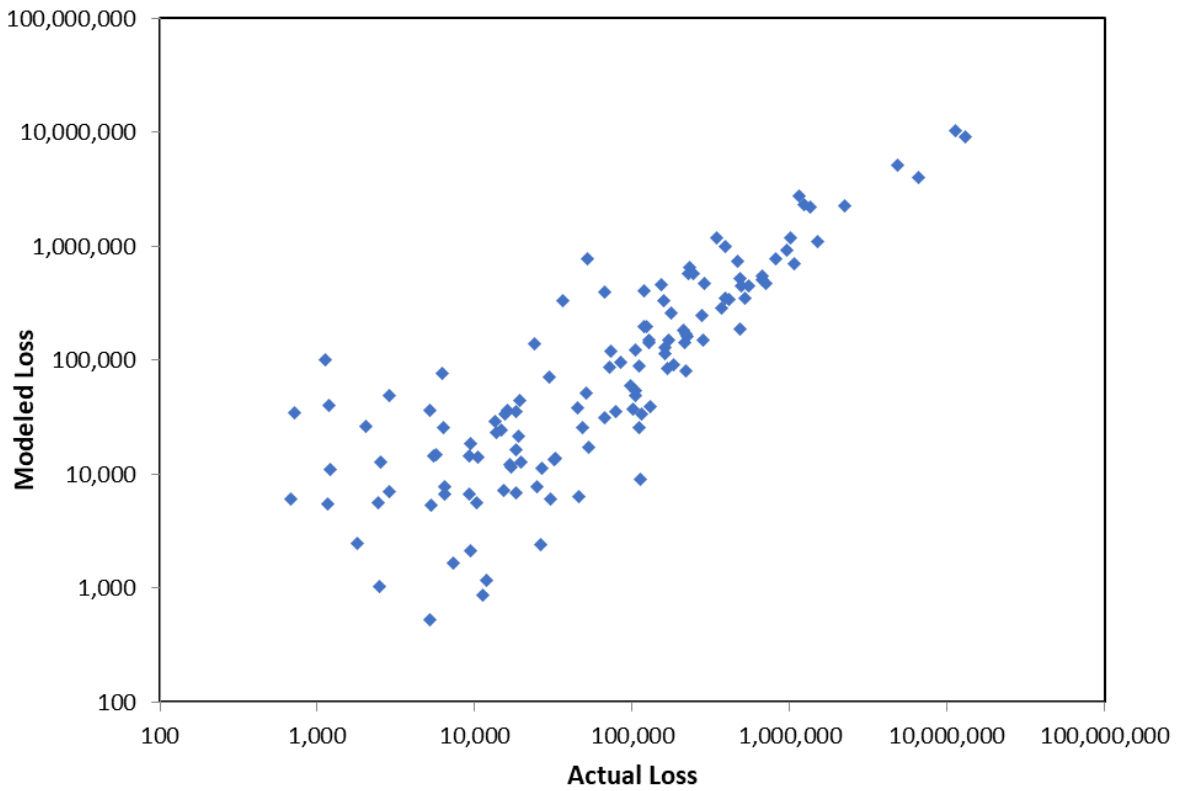
Hurricane = Charley (2004)

Exposure = Manufactured Homes – Total exposure (modeled and actual losses include demand surge)

Table 27: Example A1 portfolio comparison of modeled and actual hurricane loss

Construction	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
Manufactured Home	6.25%	6.21%	0.04%

Figure 58: Example A1 comparison of modeled and actual hurricane losses by ZIP Code



Example A2: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

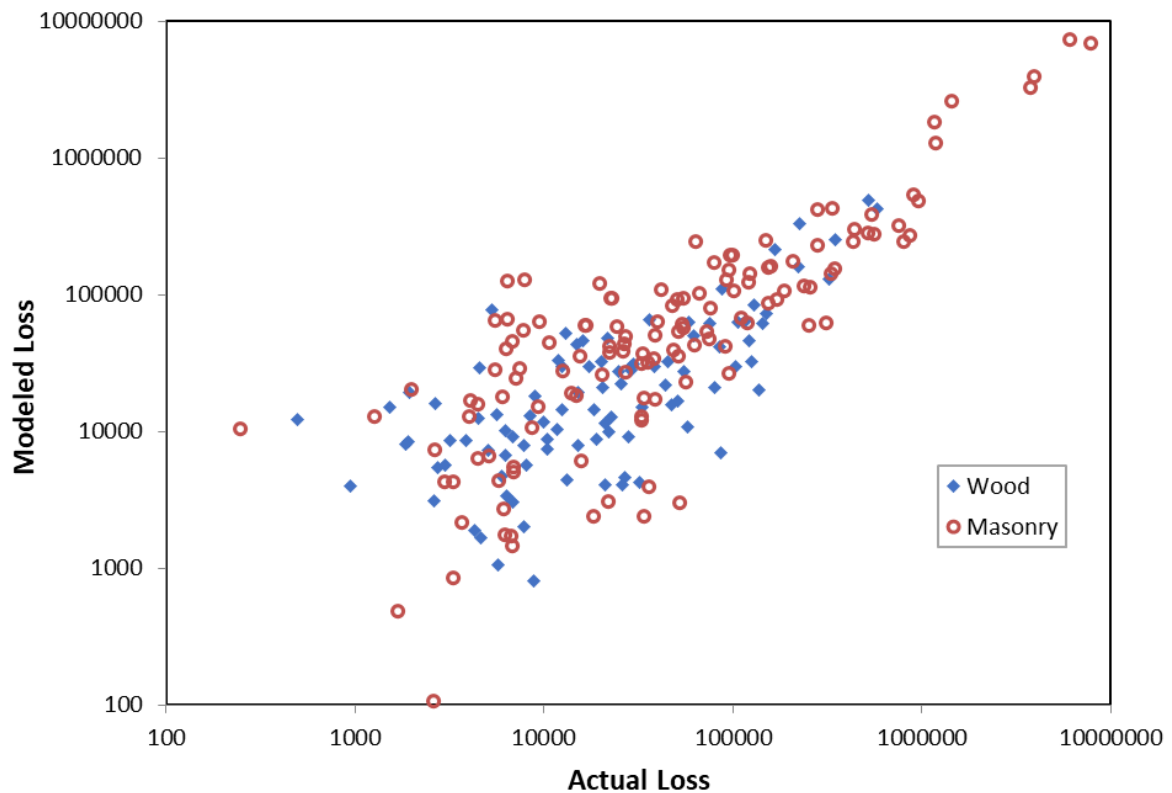
Hurricane = Charley (2004)

Exposure = Single-Family Residential – Total exposure (modeled and actual losses include demand surge)

Table 28: Example A2 portfolio comparison of modeled and actual hurricane loss

Construction	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
Wood Frame	1.73%	1.50%	0.24%
Masonry	2.77%	2.69%	0.08%
Total	2.59%	2.48%	0.11%

Figure 59: Example A2 comparison of modeled and actual hurricane losses by ZIP Code



Example A3: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

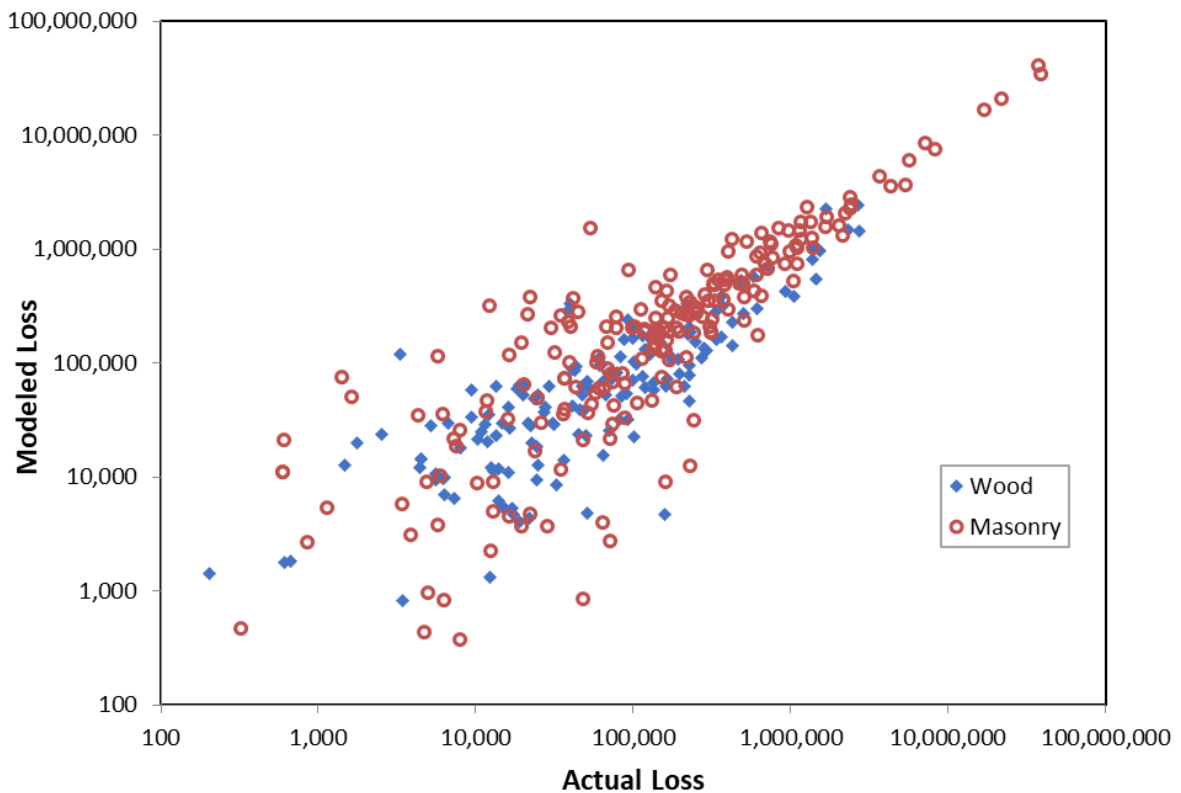
Hurricane = Charley (2004)

Exposure = Single-Family Residential – Total exposure (modeled and actual losses include demand surge)

Table 29: Example A3 portfolio comparison of modeled and actual hurricane loss

Construction	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
Wood Frame	1.65%	1.29%	0.35%
Masonry	1.63%	1.68%	-0.05%
Total	1.64%	1.63%	0.01%

Figure 60: Example A3 comparison of modeled and actual hurricane losses by ZIP Code



Example A4: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

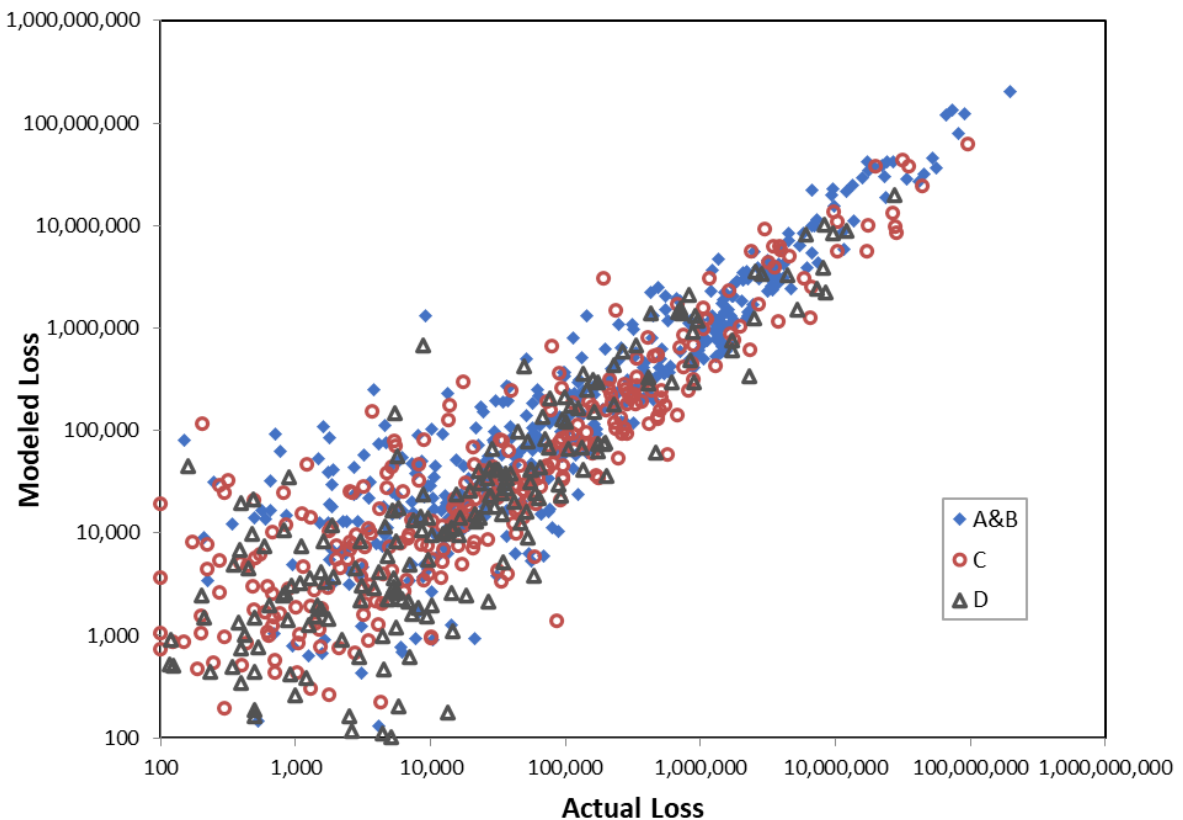
Hurricane = Andrew (1992)

Exposure = Total exposure (modeled and actual losses include demand surge)

Table 30: Example A4 portfolio comparison of modeled and actual hurricane loss

Coverage	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
A & B	6.91%	8.58%	-1.67%
C	4.46%	3.54%	0.91%
D	3.40%	2.71%	0.69%
Total	5.72%	6.27%	-0.56%

Figure 61: Example A4 comparison of modeled and actual hurricane losses by ZIP Code



Example A5: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

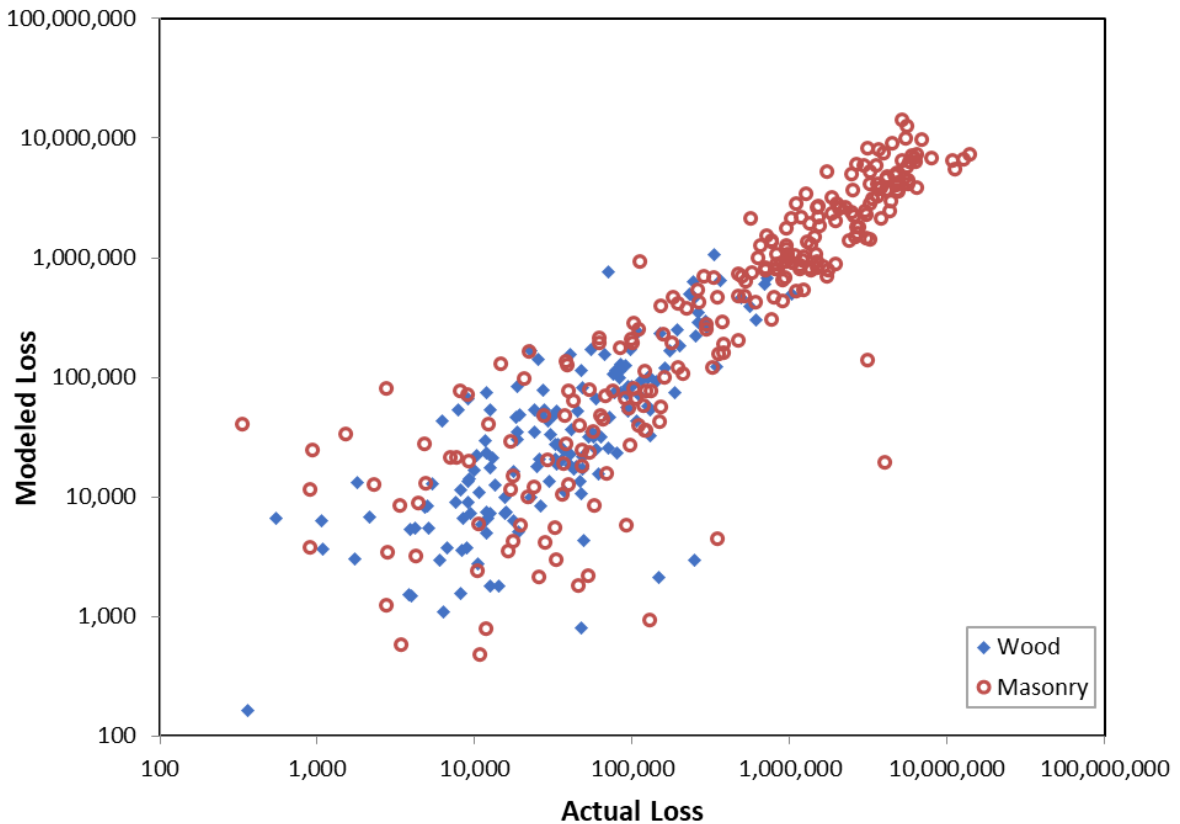
Hurricane = Wilma (2005)

Exposure = Single-Family Residential – Total exposure (modeled and actual losses include demand surge)

Table 31: Example A5 portfolio comparison of modeled and actual hurricane loss

Construction	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
Wood	0.70%	0.83%	-0.13%
Masonry	0.98%	1.02%	-0.04%
Total	0.97%	1.01%	-0.04%

Figure 62: Example A5 comparison of modeled and actual hurricane losses by ZIP Code



Example A6: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

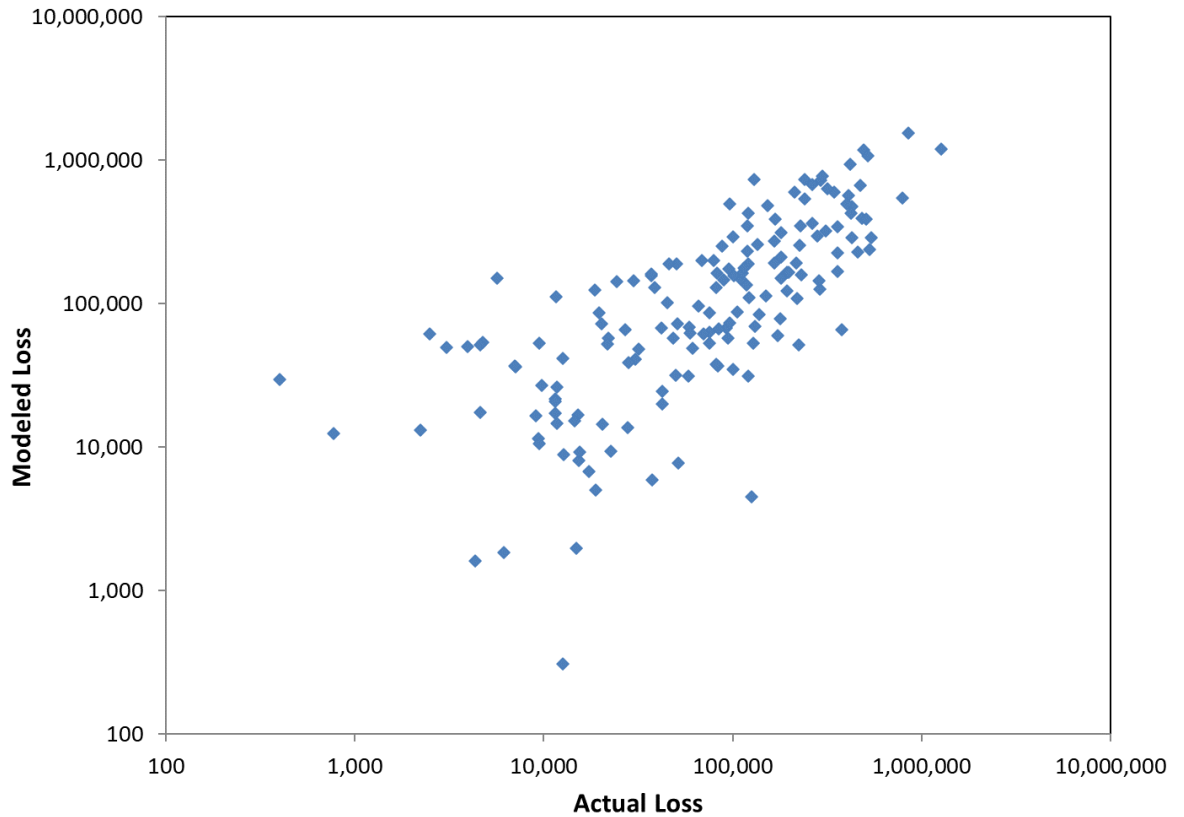
Hurricane = Irma (2017)

Exposure = Single-Family Residential – Total exposure (modeled and actual losses include demand surge)

Table 32: Example A6 portfolio comparison of modeled and actual hurricane loss

Construction	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
Wood	0.25%	0.33%	-0.08%

Figure 63: Example A6 comparison of modeled and actual hurricane losses by ZIP Code



Example A7: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

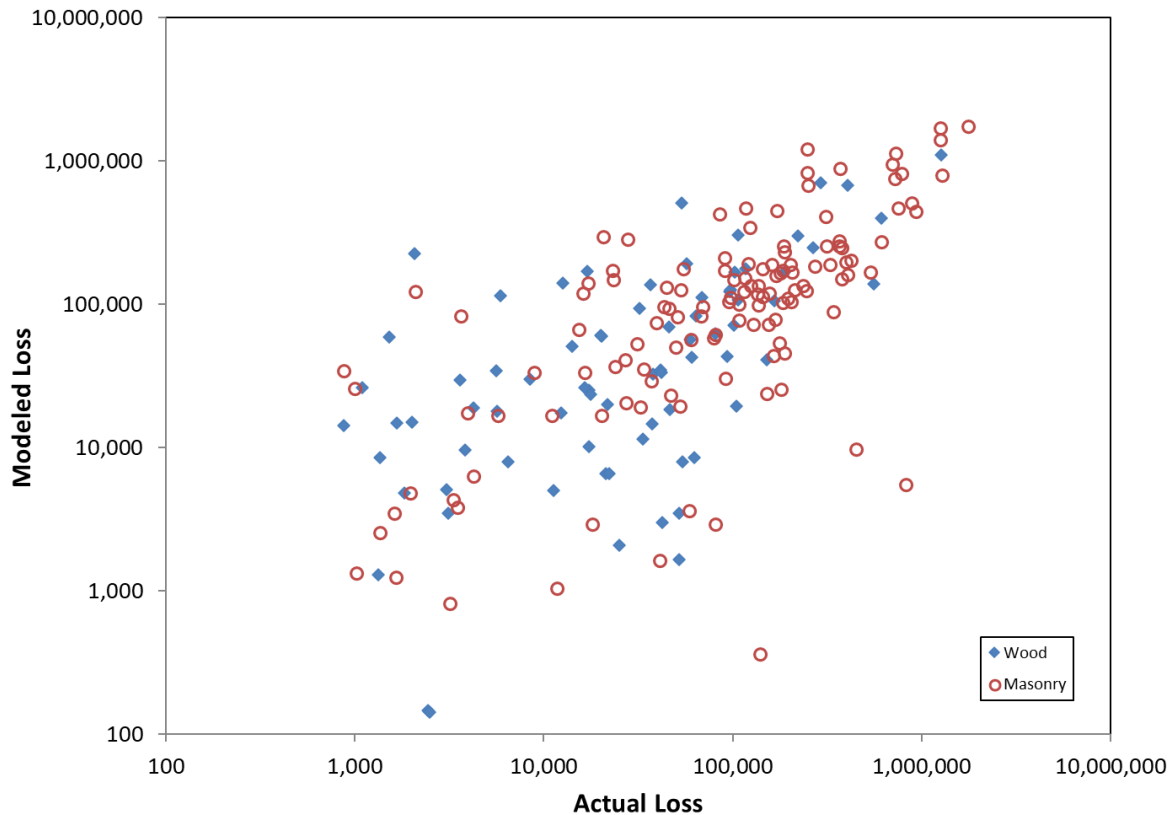
Hurricane = Ian (2022)

Exposure = Single-Family Residential – Total exposure (modeled and actual losses include demand surge)

Table 33: Example A7 portfolio comparison of modeled and actual hurricane loss

Line of Business	Company Actual Hurricane Los / Exposure	Modeled Hurricane Loss / Exposure	Difference
Wood Frame	0.40%	0.35%	0.04%
Masonry	0.81%	0.74%	0.07%
Total	0.73%	0.67%	0.06%

Figure 64: Example A7 comparison of modeled and actual hurricane losses by ZIP Code



Example B1: Comparison of a Company's Personal Residential Modeled and Actual Hurricane Loss as a Percent of Total Exposure

Hurricane = Wilma (2005)

Exposure = Condominium – Total exposure (modeled and actual losses include demand surge)

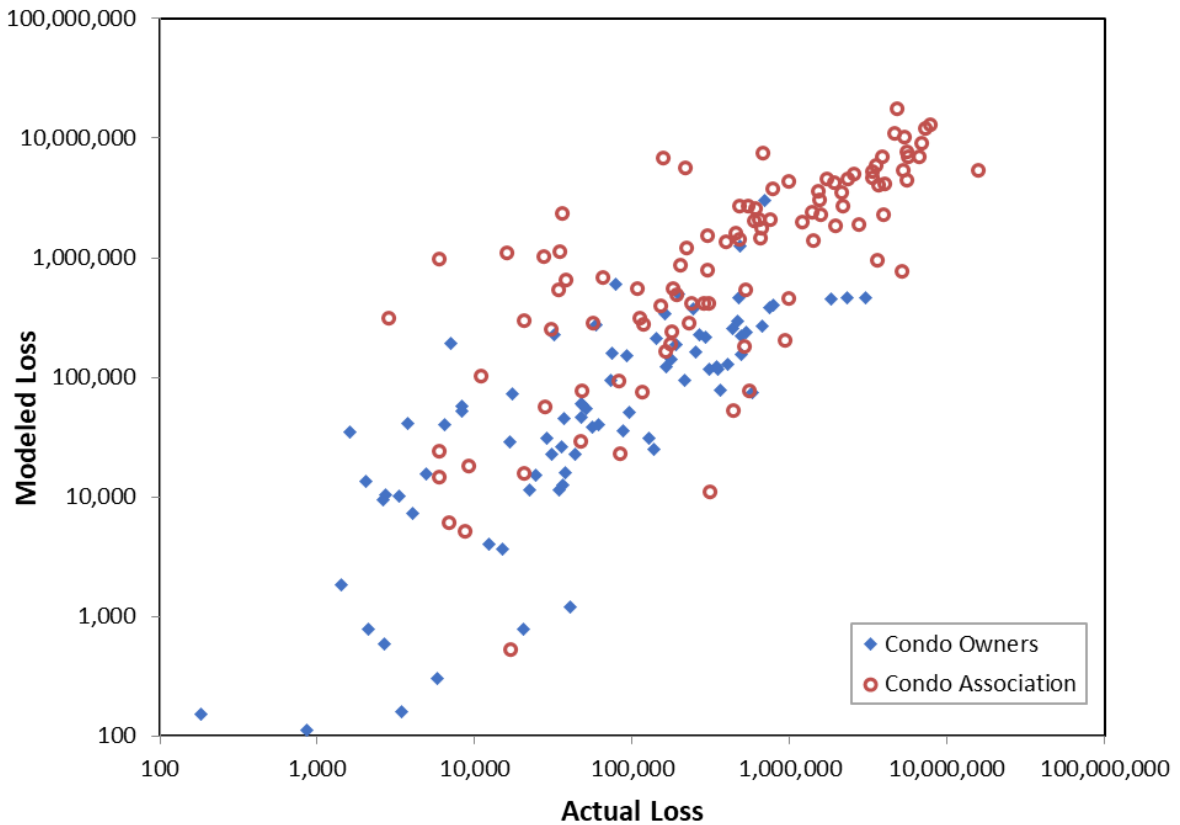
Model commercial residential classifications used:

- Condo Unit Owner: ATC 43 (Multi-Family Dwelling – Condominium Unit Owner)
- Condo Association: ATC 42 (Multi-Family Dwelling – Homeowners Association)

Table 34: Example B1 portfolio comparison of modeled and actual hurricane loss

Line of Business	Company Actual Hurricane Loss / Exposure	Modeled Hurricane Loss / Exposure	Difference
Condo Unit Owner	0.57%	0.44%	0.13%
Condo Association	1.13%	1.82%	-0.68%
Total	1.02%	1.54%	-0.52%

Figure 65: Example B1 comparison of modeled and actual hurricane losses by ZIP Code



Form S-5: Average Annual Zero Deductible Statewide Hurricane Loss Costs

Part A – 2017 FHFC Exposure Data

A. Provide the average annual zero deductible statewide personal and commercial residential hurricane loss costs produced using the Model Base Hurricane Set

For the row related to the Current Accepted Hurricane Model and the two rows related to the Second Previously Accepted Hurricane Model, the table is to be completed with the same data as previously given in Form S-5 under the 2021 Hurricane Standards.

Average Annual Zero Deductible Statewide Personal and Commercial Residential Hurricane Loss Costs

Table 35: Average annual zero deductible statewide personal and commercial residential hurricane loss costs produced by RiskLink 25.0 and Risk Modeler 2.38.0 (2017 FHCF exposure data)

Time Period	Reference Hurricane Set (Previously Historical)	Model Base Hurricane Set	Produced by Hurricane Model
Current Submission	N/A	\$3.11	\$4.02
Currently Accepted Hurricane Model* (2021 Hurricane Standards)	\$2.98	N/A	\$3.97
Second Previously-Accepted Hurricane Model* (2019 Hurricane Standards)	\$3.27	N/A	\$4.46
Percent Change Current Submission/Second Previously Accepted Hurricane Model*	-8.82%	N/A	-9.87%

*Enter N/A if no current or previous-accepted hurricane model

B. Provide a comparison with the statewide personal and commercial residential hurricane loss costs produced by the hurricane model.

The Moody's hurricane model calculated historical Model Base Hurricane Set average zero deductible loss for the 2017 Florida Hurricane Catastrophe Funds' (FHCF) personal and commercial residential aggregate exposure database is \$3.11 billion per year. The Moody's hurricane model simulated annual average zero deductible loss for the same exposure database is \$4.02 billion per year.

C. Provide the 95% confidence interval on the differences between the means of the Model Base Hurricane Set and modeled personal and commercial residential hurricane loss costs.

The 95% confidence interval on the difference between the mean of the historical and the modeled loss is -\$2.6 billion to +\$800 million.

The data has not been partitioned or modified.

Part B – 2023 FHCF Exposure Data

- D. Provide the average annual zero deductible statewide personal and commercial residential hurricane loss costs produced using the Model Base Hurricane Set.**

**Average Annual Zero Deductible Statewide Personal and Commercial Residential
Hurricane Loss Costs Time Period Model Base Hurricane Set Produced by Hurricane
Model Current Submission**

Table 36: Average annual zero deductible statewide personal and commercial residential hurricane loss costs produced by RiskLink 25.0 and Risk Modeler 2.38.0 (2023 FHCF exposure data)

Time Period	Model Base Hurricane Set	Produced by Hurricane Model
Current Submission	\$4.29	\$5.59

- E. Provide a comparison with the statewide personal and commercial residential hurricane loss costs produced by the hurricane model.**

The Moody's RMS hurricane model calculated Model Base Hurricane Set annual average zero deductible loss for the 2023 Florida Hurricane Catastrophe Funds' (FHCF) personal and commercial residential aggregate exposure database is \$4.29 billion per year. The Moody's RMS hurricane model simulated annual average zero deductible loss for the same exposure database is \$5.59 billion per year.

- F. Provide the 95% confidence interval on the differences between the means of the Model Base Hurricane Set and modeled personal and commercial residential hurricane loss costs.**

The 95% confidence interval on the difference between the mean of the historical and the modeled loss is -\$3.7 billion to +\$1.1 billion.

The data has not been partitioned or modified.

- G. Include Form S-5 in a submission appendix.**

Form S-6: Hypothetical Events for Sensitivity and Uncertainty Analysis

The form was provided and found acceptable in the RiskLink 11.0.SP2c model submission in compliance with the 2009 Standards. The form will not be provided in the current submission unless requested as outlined in [Disclosure S-2.5](#).

Form V-1: One Hypothetical Event

- A. Windspeeds for 96 ZIP Codes and sample personal and commercial residential exposure data are provided in the file named “FormV1Input23.xlsx.” The windspeeds and ZIP Codes represent a hypothetical hurricane track. Model the sample personal and commercial residential exposure data provided in the file against these windspeeds at the specified ZIP Codes, and provide the building and contents damage ratios and time element loss ratios summarized by windspeed (mph) and construction type.**

The windspeeds provided are one-minute sustained 10-meter windspeeds. The sample personal and commercial residential exposure data provided consists of four structures (one of each construction type – wood frame, masonry, manufactured home, and concrete) individually placed at the population centroid of each of the ZIP Codes provided. Each ZIP Code is subjected to a specific windspeed.

For completing Part A, Estimated Damage for each individual windspeed range is the sum of ground up hurricane loss to all structures in the ZIP Codes subjected to that individual windspeed range, excluding demand surge and flood (including hurricane storm surge). Subject Exposure is all exposures in the ZIP Codes subjected to that individual windspeed range.

For completing Part B, Estimated Damage is the sum of the ground up hurricane loss to all structures of a specific type (wood frame, masonry, manufactured home, or concrete) in all of the windspeed ranges, excluding demand surge and flood (including hurricane storm surge). Subject Exposure is all exposures of that specific construction type in all of the ZIP Codes.

One reference structure for each of the construction types is to be placed at the population centroid of the ZIP Codes. Do not include appurtenant structure, contents, or time element coverages in the building damage ratios. Do not include building, appurtenant structure, or time element coverages in the contents damage ratios. Do not include building, appurtenant structure, or contents coverages in the time element loss ratios.

<u>Reference Frame Structure:</u>	<u>Reference Masonry Structure:</u>
One story Unbraced gable end roof American Society for Testing and Materials (ASTM) D3161 Class D or ASTM D7158 Class D shingles ½” plywood deck 6d nails, deck to roof members Toe nail truss to wall anchor Wood framed exterior walls 5/8” diameter anchors at 48” centers for wall/floor/foundation connections No shutters Standard glass windows No door covers No skylight covers Constructed in 1995	One story Unbraced gable end roof ASTM D3161 Class D or ASTM D7158 Class D shingles ½” plywood deck 6d nails, deck to roof members Weak truss to wall connection Masonry exterior walls No vertical wall reinforcing No shutters Standard glass windows No door covers No skylight covers Constructed in 1995

<u>Reference Manufactured Home Structure:</u> Tie downs Single unit Manufactured in 1980	<u>Reference Concrete Structure:</u> Twenty stories Eight apartment units per story No shutters Standard glass windows Constructed in 1980

- B. Confirm that the structures used in completing the form are identical to those in the above table for the reference structures. List assumptions necessary to complete Form V-1 (example e.g., regarding structural characteristics, duration, or surface roughness). Provide the rationale and a detailed description of how the assumptions are implemented.**

The structures used to complete this form are identical to the structures listed in the table above.

Because the model uses 3-second wind gusts as the hazard metric passed to the vulnerability module, Moody's has converted the 1-minute sustained windspeeds in the provided footprint into 3-second wind gusts.

Part A

Table 37: Damage ratios summarized by wind speed (mph)

Windspeed (mph, one-minute sustained 10-meter)	Estimated Building Damage/Subject Building Exposure	Estimated Contents Damage/Subject Contents Exposure	Estimated Time Element Loss/ Subject Time Element Exposure
41 – 50	0.14%	0.02%	0.00%
51 – 60	0.34%	0.05%	0.02%
61 – 70	1.51%	0.27%	0.09%
71 – 80	3.29%	0.67%	0.30%
81 – 90	6.57%	1.60%	0.86%
91 – 100	12.92%	3.87%	2.43%
101 – 110	22.99%	8.80%	6.49%
111 – 120	46.30%	27.79%	29.42%
121 – 130	61.74%	45.59%	46.37%
131 – 140	81.91%	75.54%	64.07%
141 – 150	89.91%	89.40%	72.43%
151 – 160	94.19%	94.18%	75.64%
161 – 170	98.46%	99.06%	78.84%

Part B**Table 38: Damage ratios summarized by construction type**

Construction Type	Estimated Building Damage/Subject Building Exposure	Estimated Contents Damage/Subject Contents Exposure	Estimated Time Element Loss/Subject Time Element Exposure
Wood Frame	35.86%	31.77%	26.68%
Masonry	35.60%	31.57%	26.52%
Manufactured Home	36.07%	33.16%	25.65%
Concrete	24.94%	22.91%	18.68%

C. Provide separate plots of the Estimated Damage/Subject Exposure (y-axis) versus Windspeed (x-axis) for the Building, Contents, and Time Element data in Part A.

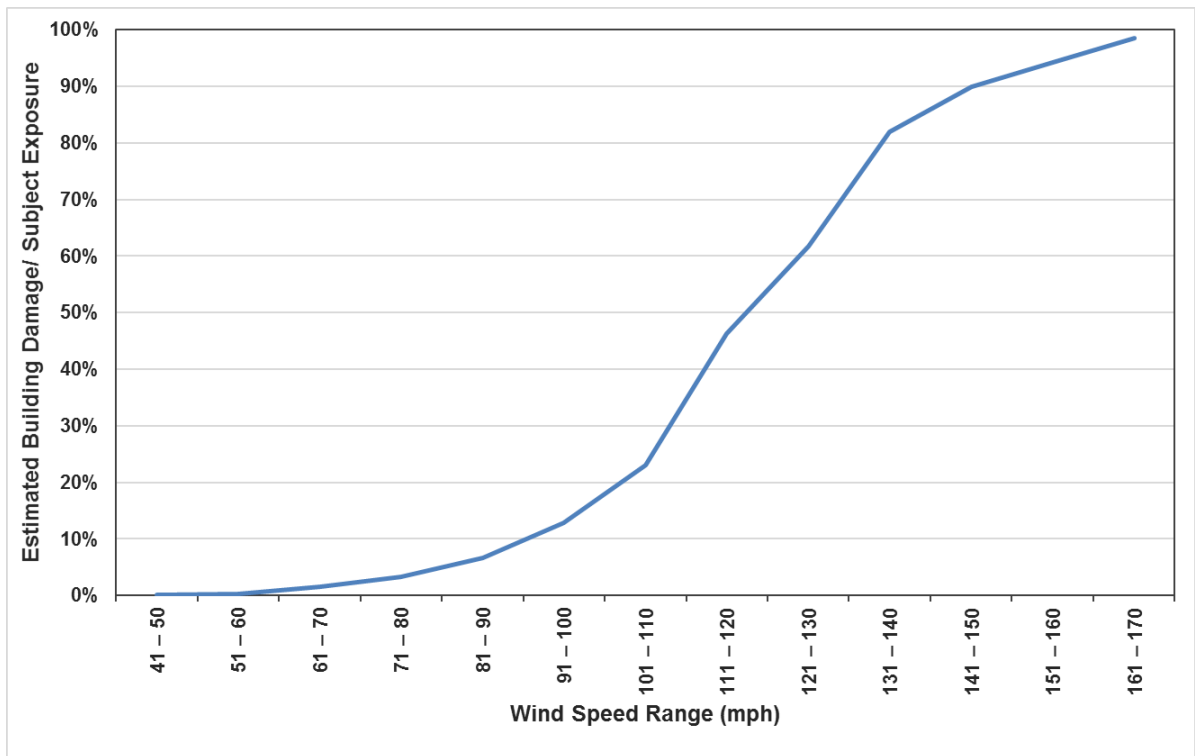
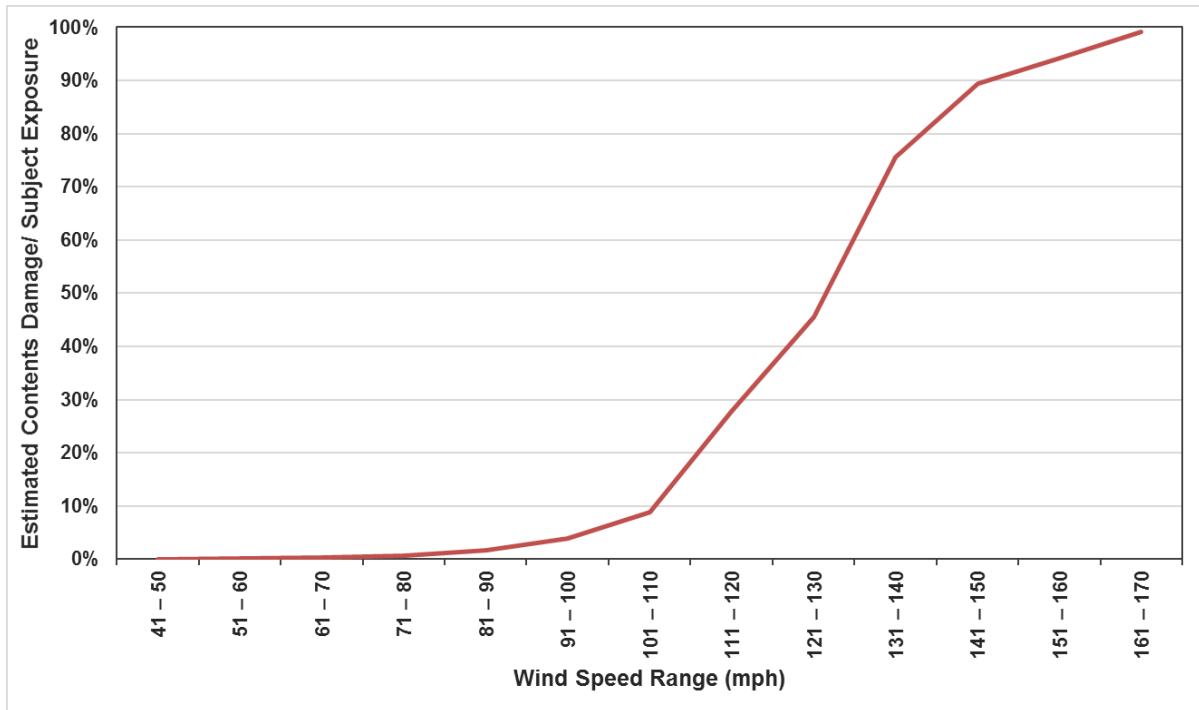
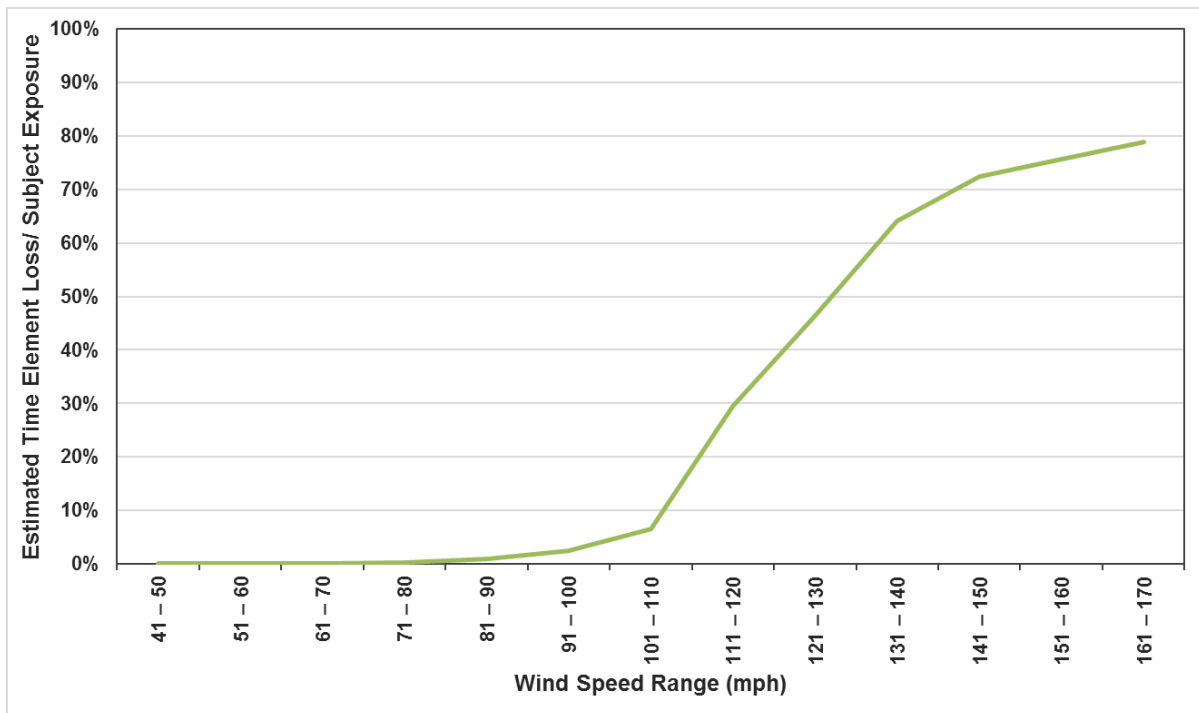
Figure 66: Ratio of estimated building damage and subject exposure versus 1-minute wind speed

Figure 67: Ratio of estimated contents damage and subject exposure versus 1-minute wind speed**Figure 68: Ratio of estimated time element loss and subject exposure versus 1-minute wind speed**

D. Include Form V-1 in a submission appendix.

Form V-2: Hurricane Mitigation Measures and Secondary Characteristics, Range of Changes in Damage

- A. Explain how the hurricane vulnerability functions for the two reference structures are developed. Demonstrate that the hurricane vulnerability function for each reference structure is related to one of the hurricane model's standard building structure vulnerability functions for frame and masonry constructions.**

The vulnerability functions for the two reference structures are developed with the same methodology used for other structures in the model. This methodology is detailed in [Disclosure V-1.5](#). The fact that the hurricane vulnerability function for each reference structure is related to one of the hurricane model's standard building structure vulnerability functions for frame and masonry constructions can be demonstrated at the on-site audit if necessary.

- B. Place the reference building at the population centroid for ZIP Code 33921 in Lee County.**
- C. Provide the change in the zero deductible personal residential reference building damage ratio (not hurricane loss cost) for each individual hurricane mitigation measure and secondary characteristic listed in Form V-2, as well as for the combination of the four hurricane mitigation measures and secondary characteristics provided for the Mitigated Frame Building and the Mitigated Masonry Building below.**
- D. List assumptions necessary to complete Form V-2, including those for membrane and metal roof covering, roof age, duration, and surface roughness. Provide the rationale and a detailed description of how the assumptions are implemented.**

The model uses 3-second wind gusts as the hazard metric passed to the vulnerability module. Thus, to prepare this form, Moody's has used the following gust wind speeds in its models for each of the requested 1-minute wind speeds in this form: (shown as 1-minute wind speed -> 3-sec gust) 60 -> 75; 85 -> 105; 110 -> 135; 135 -> 165; 160 -> 195.

No additional assumptions are necessary for the completion of the form.

- E. Provide an explanation for cells filled with "0" or blank cells.**

Mitigation measures in the form are captured via secondary modifiers. As described in [Disclosure V-4.7](#), The amount of increase or decrease in building damage for each modifier option varies by wind speed and building attributes. For some combinations of building attribute and wind speed, secondary modifiers do not increase or decrease the base vulnerability functions at all, hence the presence of some cells filled with a 0 in the form.

- F. Provide this form in Excel format without truncation. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form V-2 in a submission appendix.**

<u>Reference Frame Building:</u>	<u>Reference Masonry Building:</u>
One story	One story
Unbraced gable end roof	Unbraced gable end roof
ASTM D3161 Class D or	ASTM D3161 Class D or
ASTM D7158 Class D shingles	ASTM D7158 Class D shingles
½" plywood deck	½" plywood deck
6d nails deck to roof members	6d nails deck to roof members
Toe nail truss to wall anchor	Weak truss to wall connection
Wood framed exterior walls	Masonry exterior walls

<i>5/8" diameter anchors at 48" centers for wall-floor-foundation connections</i> <i>No shutters</i> <i>Standard glass windows</i> <i>No door covers</i> <i>No skylight covers</i> <i>Constructed in 1995</i>	<i>No vertical wall reinforcing</i> <i>No shutters</i> <i>Standard glass windows</i> <i>No door covers</i> <i>No skylight covers</i> <i>Constructed in 1995</i>
<u>Mitigated Frame Building:</u> <i>ASTM D7158 Class H shingles</i> <i>8d nails deck to roof members</i> <i>Truss straps at roof</i> <i>Structural wood panel shutters</i>	<u>Mitigated Masonry Building:</u> <i>ASTM D7158 Class H shingles</i> <i>8d nails deck to roof members</i> <i>Truss straps at roof</i> <i>Structural wood panel shutters</i>

The required information is provided in the file Moodys23FormV2.xlsx at the link provided to the FCHLPM and appears below.

Figure 69: Percent change in damage for various hurricane mitigation measures and secondary characteristics

INDIVIDUAL HURRICANE MITIGATION MEASURES AND SECONDARY CHARACTERISTICS			PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATIO - MITIGATED DAMAGE RATIO) / REFERENCE DAMAGE RATIO) * 100									
			FRAME BUILDING					MASONRY BUILDING				
			WINDSPEED (MPH)*					WINDSPEED (MPH)*				
			60	85	110	135	160	60	85	110	135	160
	Reference Building											
Roof Strength	Braced Gable		1.8%	0.0%	0.9%	0.0%	0.0%	1.8%	0.0%	0.9%	0.0%	0.0%
	Hip		30.9%	39.4%	36.9%	16.2%	0.0%	30.9%	39.4%	36.9%	16.2%	0.0%
Roof Covering	Metal		21.2%	13.1%	10.9%	0.0%	0.0%	21.2%	13.1%	10.9%	0.0%	0.0%
	ASTM D7158 Class H Shingles		37.4%	20.3%	2.0%	0.0%	0.0%	37.4%	20.3%	2.0%	0.0%	0.0%
	Membrane		17.3%	6.0%	4.0%	0.0%	0.0%	17.3%	6.0%	4.0%	0.0%	0.0%
Roof Sheathing	Nailing of Deck	8d Nails	22.5%	53.9%	44.4%	17.0%	7.5%	22.5%	53.9%	44.4%	17.0%	7.5%
Roof-Wall Strength	Clips		13.0%	21.0%	23.3%	20.0%	16.7%	13.0%	21.0%	23.3%	20.0%	16.7%
	Straps		17.4%	43.4%	43.3%	29.6%	16.7%	17.4%	43.4%	43.3%	29.6%	16.7%
Wall-Floor Strength	Ties or Clips		0.0%	0.0%	15.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Straps		0.0%	0.0%	15.0%	15.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Wall-Foundation Strength	Larger Anchor or Closer Spacing		0.0%	0.0%	15.0%	15.0%	0.0%	-	-	-	-	-
	Straps		0.0%	0.0%	15.0%	15.0%	0.0%	-	-	-	-	-
	Vertical Reinforcing		-	-	-	-	-	0.0%	0.0%	0.0%	0.0%	0.0%
Opening Protection	Window Shutters	Structural Wood Panel	2.0%	9.6%	25.9%	15.1%	0.0%	2.0%	9.6%	25.9%	15.1%	0.0%
		Metal	5.9%	20.5%	39.8%	19.8%	0.0%	5.9%	20.5%	39.8%	19.8%	0.0%
	Door and Skylight Cover		21.6%	35.4%	44.4%	24.5%	0.0%	21.6%	35.4%	44.4%	24.5%	0.0%
Window, Door, Skylight Strength	Windows	Impact Rated	11.8%	28.5%	44.4%	24.5%	0.0%	11.8%	28.5%	44.4%	24.5%	0.0%
	Entry Doors	Meets Windborne Debris Requirements	2.0%	6.6%	16.7%	8.5%	0.0%	2.0%	6.6%	16.7%	8.5%	0.0%
	Garage Doors		2.0%	6.6%	16.7%	8.5%	0.0%	2.0%	6.6%	16.7%	8.5%	0.0%
	Sliding Glass Doors		2.0%	4.7%	21.3%	10.4%	0.0%	2.0%	4.7%	21.3%	10.4%	0.0%
	Skylight	Impact Rated	2.0%	4.7%	21.3%	10.4%	0.0%	2.0%	4.7%	21.3%	10.4%	0.0%
HURRICANE MITIGATION MEASURES AND SECONDARY CHARACTERISTICS IN COMBINATION			PERCENTAGE CHANGES IN DAMAGE ((REFERENCE DAMAGE RATIO - MITIGATED DAMAGE RATIO) / REFERENCE DAMAGE RATIO) * 100									
			FRAME BUILDING					MASONRY BUILDING				
			WINDSPEED (MPH)*					WINDSPEED (MPH)*				
			60	85	110	135	160	60	85	110	135	160
Building	Mitigated Building		60.7%	83.9%	77.1%	50.4%	23.0%	60.7%	83.9%	77.1%	50.4%	23.0%

*Windspeeds are one-minute sustained 10-meter.

***Form V-3: Hurricane Mitigation Measures and Secondary Characteristics,
Mean Damage Ratios and Hurricane Loss Costs (Trade Secret Item)***

This form will be provided during the professional team on-site review as well as the closed meeting portion of the commission meeting.

Form V-4: Differences in Hurricane Mitigation Measures and Secondary Characteristics

- A. *Provide the differences between the values reported in Form V-2, relative to the equivalent data compiled from the current accepted hurricane model.***

See [Figure 70](#) below.

- B. *List assumptions necessary to complete Form V-4, including those for membrane and metal roof covering roof age, duration, and surface roughness.***

The model uses 3-second wind gusts as the hazard metric passed to the vulnerability module. Thus, to prepare this form, Moody's has used the following gust wind speeds in its models for each of the requested 1-minute wind speeds in this form: (shown as 1-minute wind speed -> 3-sec gust) 60 -> 75; 85 -> 105; 110 -> 135; 135 -> 165; 160 -> 195. No additional assumptions were necessary.

- C. *Provide a summary description of the differences.***

There are no differences shown in Form V-4.

- D. *Provide this form in Excel format without truncation. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form V-4 in a submission appendix.***

The required information is provided in the file Moodys23FormV4.xlsx at the link provided to the FCHLPM and appears below.

Figure 70: Differences between values reported in Form V-2 relative to the equivalent data compiled from the currently-accepted hurricane model

INDIVIDUAL HURRICANE MITIGATION MEASURES AND SECONDARY CHARACTERISTICS			DIFFERENCES FROM FORM V-2 RELATIVE TO PREVIOUSLY-ACCEPTED HURRICANE MODEL									
			FRAME BUILDING					MASONRY BUILDING				
			WINDSPEED (MPH)*					WINDSPEED (MPH)*				
			60	85	110	135	160	60	85	110	135	160
	Reference Building											
Roof Strength	Braced Gable		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Hip		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Roof Covering	Metal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	ASTM D7158 Class H Shingles		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Membrane		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Roof Sheathing	Nailing of Deck	8d Nails	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Roof-Wall Strength	Clips		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Straps		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Wall-Floor Strength	Ties or Clips		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Straps		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Wall-Foundation Strength	Larger Anchor or Closer Spacing		0.0%	0.0%	0.0%	0.0%	0.0%					
	Straps		0.0%	0.0%	0.0%	0.0%	0.0%					
	Vertical Reinforcing							0.0%	0.0%	0.0%	0.0%	0.0%
Opening Protection	Window Shutters	Structural Wood Panel	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
		Metal	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Door and Skylight Cover		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Window, Door, Skylight Strength	Windows	Impact Rated	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Entry Doors	Meets Windborne Debris Requirements	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Garage Doors		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Sliding Glass Doors		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Skylight	Impact Rated	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
HURRICANE MITIGATION MEASURES AND SECONDARY CHARACTERISTICS IN COMBINATION			DIFFERENCES FROM FORM V-2 RELATIVE TO PREVIOUSLY-ACCEPTED HURRICANE MODEL									
			FRAME BUILDING					MASONRY BUILDING				
			WINDSPEED (MPH)*					WINDSPEED (MPH)*				
			60	85	110	135	160	60	85	110	135	160
Building	Mitigated Building		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

*Windspeeds are one-minute sustained 10-meter.

***Form V-5: Differences in Hurricane Mitigation Measures and Secondary Characteristics, Mean Damage Ratios and Hurricane Loss Costs
(Trade Secret Item)***

This form will be provided during the professional team on-site review as well as the closed meeting portion of the commission meeting.

Form A-1: Zero Deductible Personal Residential Hurricane Loss Costs by ZIP Code

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form A-1.**
- B. Provide three maps, color-coded by ZIP Code (with a minimum of seven value ranges), displaying zero deductible personal residential hurricane loss costs per \$1,000 of exposure for frame owners, masonry owners, and manufactured homes.**
- C. Provide, in the format given in the file named “2023FormA1.xlsx,” in both Excel and PDF format, the underlying hurricane loss cost data, rounded to three decimal places, used for B. above. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name.**
- D. Create exposure sets for these exhibits by modeling the frame owners, masonry owners, and manufactured homes from Notional Set 3, described in the file “NotionalInput23.xlsx” geocoded to each ZIP Code centroid in the state, as provided in the hurricane model. Provide the predominant County name and the Federal Information Processing Standards (FIPS) code (Figure 12) associated with each ZIP Code centroid. Refer to the Notional Hurricane Policy Specifications below for additional modeling information. Explain any assumptions, deviations, and differences from the prescribed exposure information.**
- E. Describe how Law and Ordinance is included in the hurricane loss cost data.**

The impacts of law and ordinance coverage, such as the roof replacement rule in the Florida Building Code, is implicitly included in the base vulnerability functions for personal residential properties. In addition, the impact of the statutory required 25 percent and 50 percent coverage options for personal residential properties is factored into the post-event loss amplification (PLA).

- F. List assumptions necessary to complete Form A-1. Provide the rationale and a detailed description of how the assumptions are implemented.**

No additional assumption was necessary to complete this form.

This information is provided in Excel format in the file MoodysFormA1.xlsx and in PDF format in the file MoodysFormA1.pdf at the link provided to the FCHLPM. The three maps color-coded by ZIP Code appear below.

Notional Hurricane Policy Specifications

<u>Policy Type</u>	<u>Assumptions</u>
Owners	Coverage A = Building - Replacement Cost included subject to Coverage A limit - Law and Ordinance included Coverage B = Appurtenant Structure - Replacement Cost included subject to Coverage B limit - Law and Ordinance included Coverage C = Contents - Replacement Cost included subject to Coverage C limit Coverage D = Time Element - Time limit = 12 months - Per diem = \$300.00/day per policy, if used ✧ Hurricane loss costs per \$1,000 should be related to the Coverage A limit

Manufactured Homes Coverage A = Building

- Replacement Cost included subject to Coverage A limit

Coverage B = Appurtenant Structure

- Replacement Cost included subject to Coverage B limit

Coverage C = Contents

- Replacement Cost included subject to Coverage C limit

Coverage D = Time Element

- Time limit = 12 months
- Per diem = \$300.00/day per policy, if used
 - ✧ Hurricane loss costs per \$1,000 should be related to the Coverage A limit

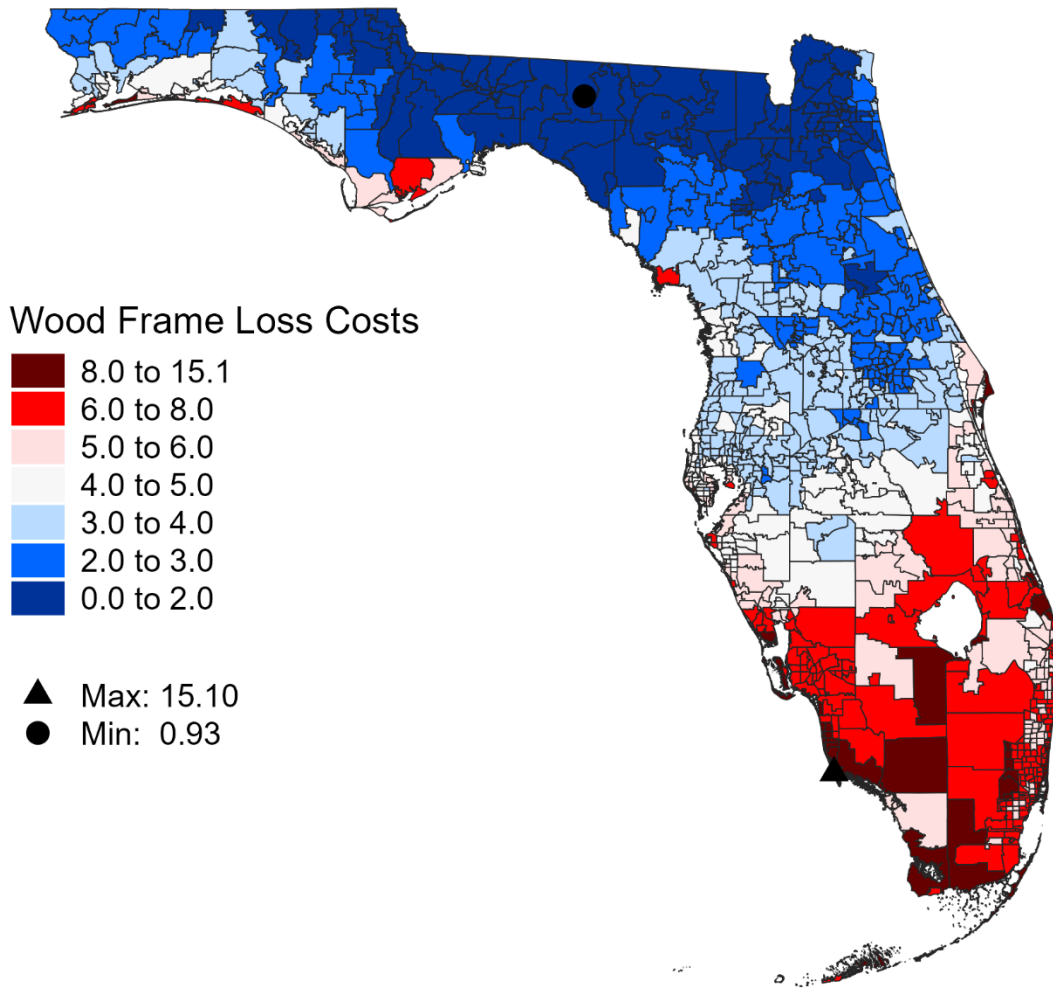
Figure 71: Zero deductible hurricane loss costs by 5-digit ZIP Code for frame

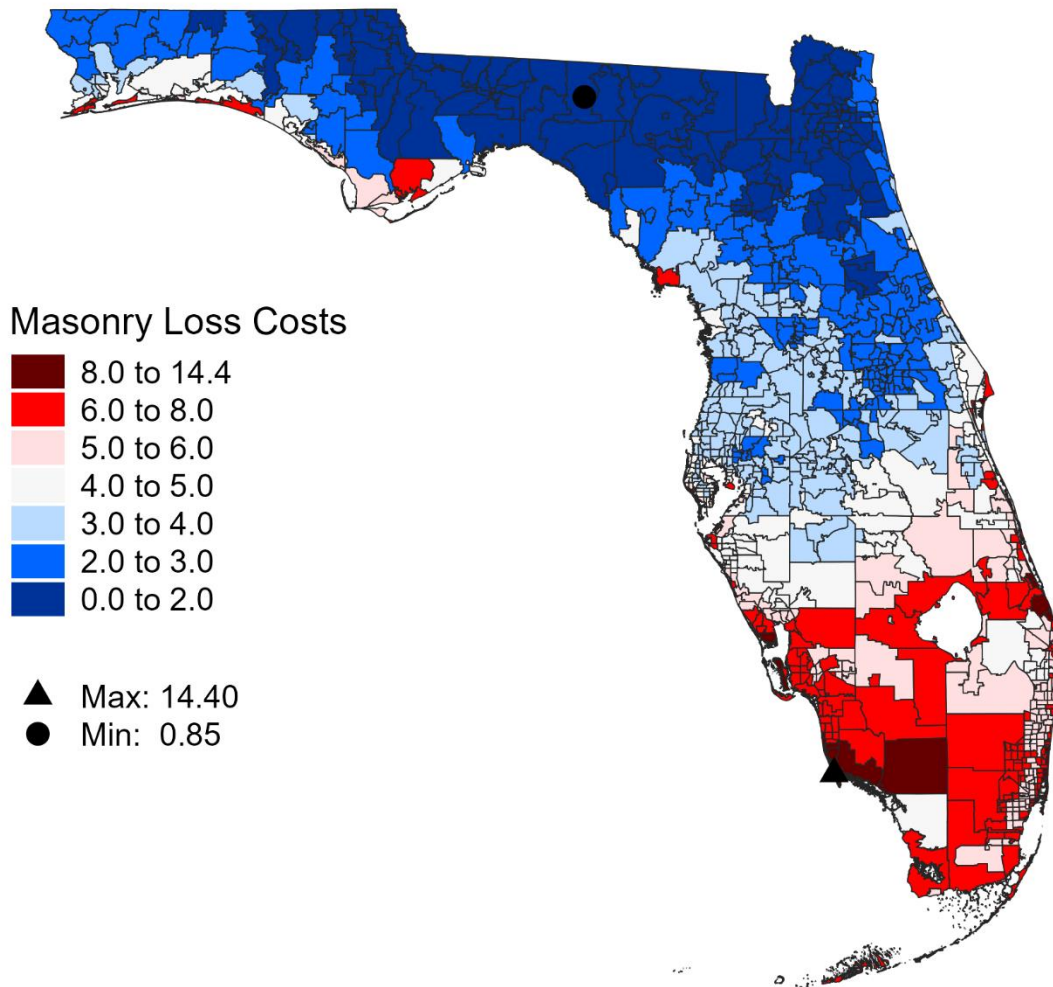
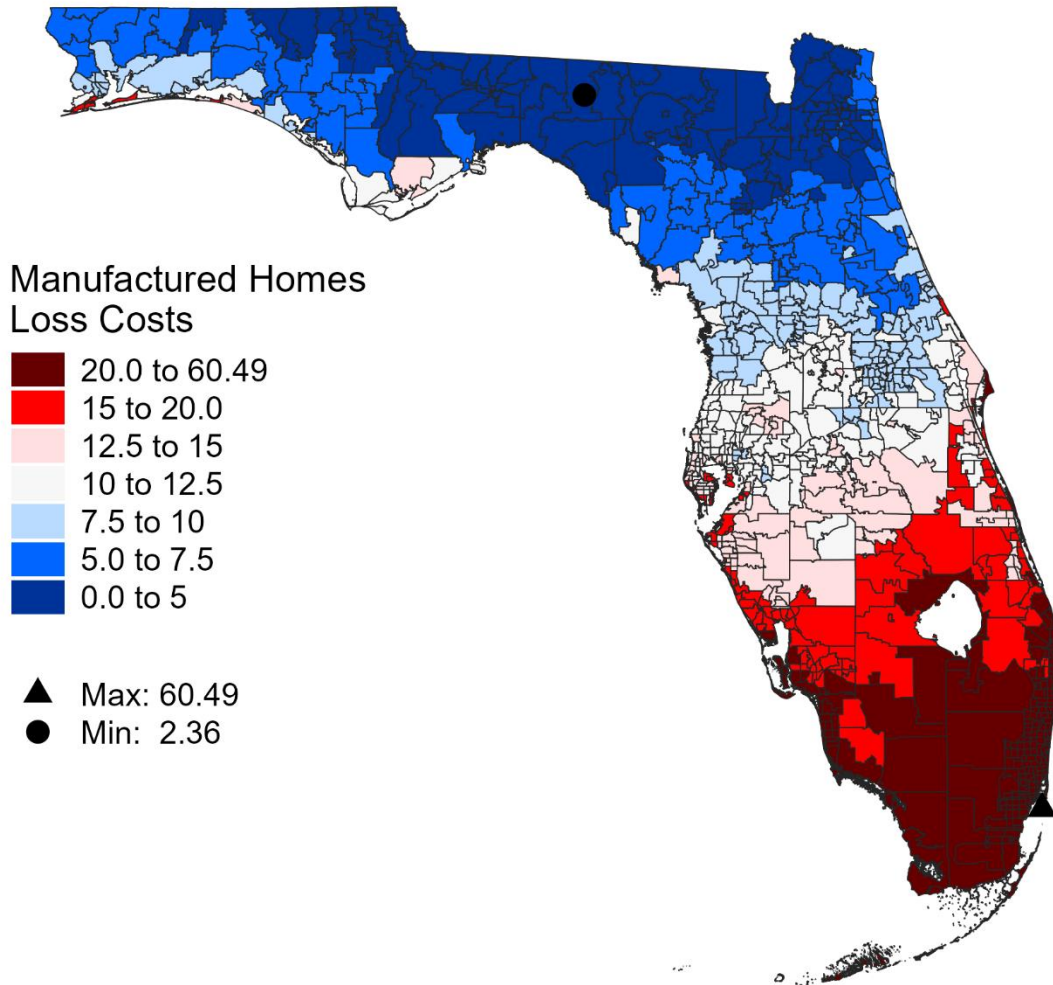
Figure 72: Zero deductible hurricane loss costs by 5-digit ZIP Code for masonry

Figure 73: Zero deductible hurricane loss costs by 5-digit ZIP Code for manufactured home

Form A-2: Base Hurricane Storm Set Statewide Hurricane Losses

- A. Provide the total insured hurricane loss assuming zero deductible policies for individual historical hurricanes using the 2017 FHCF exposure data and the 2023 FHCF exposure data. The list of hurricanes in this form shall include all Florida and by-passing hurricanes in the Model Base Hurricane Set.**

The table below contains the hurricanes from the Reference Hurricane Set. The modeling organization shall populate the table with its Model Base Hurricane Set. Each hurricane from the Reference Hurricane Set has been assigned an ID number. Additional hurricanes included in the Model Base Hurricane Set, if any, shall be added to the table in order of year and assigned an intermediate ID number within the bounding ID numbers. For hurricanes resulting in zero loss, the table entry shall be left blank.

As defined, a by-passing hurricane (ByP) is a hurricane which does not make landfall on Florida, but produces minimum damaging windspeeds or greater on Florida. For the by-passing hurricanes included in the table only, the hurricane intensity entered is the maximum windspeed at closest approach to Florida as a hurricane, not the windspeed over Florida.

- B. List assumptions necessary to complete Form A-2. Provide the rationale and a detailed description of how the assumptions are implemented.**

No additional assumption was necessary to complete this form.

- C. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form A-2 in a submission appendix.**

The total insured loss for each storm in the Base Hurricane Storm Set is provided for personal residential and commercial residential policies from the 2017 and 2023 FHCF aggregate exposure data in the file Moodys23FormA2.xlsx at the link provided to the FCHLPM and appears below.

Table 39: Base hurricane storm set average annual zero deductible – statewide hurricane loss costs

ID	Hurricane Landfall/ Closest Approach Date	Year	Name	Region as defined in Figure 1- Category	Personal and Commercial Residential Insured Hurricane Losses (\$) 2017 FHCF Exposure Data	Personal and Commercial Residential Insured Hurricane Losses (\$) 2023 FHCF Exposure Data
001	9/6/1900	1900	NotNamed-1900	ByP-1	68,616,754	97,988,405
005	8/15/1901	1901	NoName04-1901	F-1/ByP-1	36,545,623	53,022,916
010	9/11/1903	1903	NoName03-1903	C-1/A-1	1,305,168,544	1,784,602,666
015	10/17/1904	1904	NoName04-1904	C-1	583,581,346	782,509,451
020	6/17/1906	1906	NoName02-1906	B-1/C-1	233,813,359	316,895,756
025	9/27/1906	1906	NoName06-1906	F-2/ByP-2	2,833,744,374	4,098,452,682
030	10/18/1906	1906	NoName08-1906	B-3/C-3	6,111,607,851	8,299,195,714
035	10/11/1909	1909	NoName11-1909	B-3	104,582,356	146,013,878
040	10/18/1910	1910	NoName05-1910	B-2	13,988,579,860	19,323,642,353
045	8/11/1911	1911	NoName02-1911	A-1	114,995,250	163,817,393
046	8/29/1911	1911	NotNamed-1911	ByP-2	33,114,370	48,123,484
050	9/14/1912	1912	NoName04-1912	F-1/ByP-1	87,915,017	126,106,992

ID	Hurricane Landfall/ Closest Approach Date	Year	Name	Region as defined in Figure 1-Category	Personal and Commercial Residential Insured Hurricane Losses (\$) 2017 FHCF Exposure Data	Personal and Commercial Residential Insured Hurricane Losses (\$) 2023 FHCF Exposure Data
055	8/1/1915	1915	NoName01-1915	D-1	379,103,716	527,326,197
056	8/16/1915	1915	NotNamed-1915	ByP-4	20,114,869	29,109,775
060	9/4/1915	1915	NoName04-1915	A-1	95,498,345	132,454,384
065	7/5/1916	1916	NoName02-1916	F-3/ByP-3	472,214,360	678,173,892
070	10/18/1916	1916	NoName14-1916	A-2	1,213,382,796	1,737,178,287
075	9/29/1917	1917	NoName04-1917	A-3	2,049,796,218	2,977,986,583
080	9/10/1919	1919	NoName02-1919	B-4	1,339,463	2,245,333
085	10/25/1921	1921	TampaBay06-1921	B-3	8,584,212,098	12,076,752,540
086	10/17/1923	1923	NotNamed-1923	ByP-1	30,714,203	46,018,940
090	9/15/1924	1924	NoName05-1924	A-1	74,923,587	106,794,500
095	10/21/1924	1924	NoName10-1924	B-1	780,095,871	1,062,213,204
100	7/28/1926	1926	NoName01-1926	D-2	2,609,716,475	3,624,356,975
105	9/18/1926	1926	GreatMiami07-1926	C-4/A-3	62,158,827,560	85,874,670,356
110	10/21/1926	1926	NoName10-1926	ByP-3	450,108,153	610,370,776
115	8/8/1928	1928	NoName01-1928	C-2	1,866,839,533	2,538,500,838
120	9/17/1928	1928	LakeOkeechobee 04-1928	C-4	45,186,070,179	62,353,092,943
125	9/28/1929	1929	NoName02-1929	C-3/A-1	1,593,561,821	2,195,873,939
130	9/1/1932	1932	NoName03-1932	F-1/ByP-1	136,638,169	197,915,310
135	7/30/1933	1933	NoName05-1933	C-1	200,832,042	277,209,405
140	9/4/1933	1933	NoName11-1933	C-3	4,897,275,862	6,720,073,336
141	10/6/1933	1933	NotNamed-1933	ByP-2	26,952,959	38,623,025
145	9/3/1935	1935	LaborDay03-1935	C-5/A-2	25,195,059,637	36,146,851,684
146	9/29/1935	1935	NotNamed-1935	ByP-4	427,745,102	576,946,246
150	11/4/1935	1935	NoName07-1935	C-2	1,708,277,647	2,266,455,459
155	7/31/1936	1936	NoName05-1936	A-2	697,188,449	1,043,147,294
160	8/11/1939	1939	NoName02-1939	C-1/A-1	398,661,584	571,750,661
165	10/6/1941	1941	NoName05-1941	C-2/A-1	2,907,948,624	3,957,066,300
170	10/19/1944	1944	NoName13-1944	B-3	18,626,485,089	25,797,973,810
175	6/24/1945	1945	NoName01-1945	A-1	336,632,964	486,184,280
180	9/15/1945	1945	NoName09-1945	C-4	8,832,094,821	11,953,580,049
185	10/8/1946	1946	NoName06-1946	B-1	1,953,010,258	2,718,365,701
190	9/17/1947	1947	NoName04-1947	C-4	12,124,934,893	16,199,127,145
195	10/12/1947	1947	NoName09-1947	B-1/E-2	719,963,364	966,431,299
200	9/22/1948	1948	NoName08-1948	B-4	2,873,173,705	3,898,356,047
205	10/5/1948	1948	NoName09-1948	B-2	650,142,702	880,143,681
210	8/26/1949	1949	NoName02-1949	C-4	13,221,153,936	18,127,826,843
215	8/31/1950	1950	Baker-1950	F-1/ByP-1	80,520,833	117,711,480
220	9/5/1950	1950	Easy-1950	A-3	1,133,905,888	1,615,154,022

ID	Hurricane Landfall/ Closest Approach Date	Year	Name	Region as defined in Figure 1-Category	Personal and Commercial Residential Insured Hurricane Losses (\$) 2017 FHCF Exposure Data	Personal and Commercial Residential Insured Hurricane Losses (\$) 2023 FHCF Exposure Data
225	10/18/1950	1950	King-1950	C-4	6,863,047,772	9,299,656,647
230	9/26/1953	1953	Florence-1953	A-1	379,309,406	565,132,048
235	10/9/1953	1953	Hazel-1953	B-1	217,865,581	291,942,428
240	9/25/1956	1956	Flossy-1956	A-1	410,335,167	597,463,506
245	9/10/1960	1960	Donna-1960	B-4	9,628,588,694	13,336,245,361
250	9/15/1960	1960	Ethel-1960	F-1		
255	8/27/1964	1964	Cleo-1964	C-2	5,195,635,957	6,992,765,101
260	9/10/1964	1964	Dora-1964	D-2	833,749,745	1,189,279,368
261	10/3/1964	1964	Hilda-1964	ByP-2	2,236,380	3,305,216
265	10/14/1964	1964	Isbell-1964	B-2	270,897,606	362,551,448
270	9/8/1965	1965	Betsy-1965	C-3	2,055,676,881	2,801,538,281
275	6/9/1966	1966	Alma-1966	A-1	888,223,899	1,257,726,978
280	10/4/1966	1966	Inez-1966	C-2	126,213,430	175,821,709
281	6/6/1968	1968	Abby-1968	ByP-1	70,171,176	100,191,091
285	10/19/1968	1968	Gladys-1968	A-2	835,913,397	1,198,679,969
290	8/18/1969	1969	Camille-1969	F-5		
295	6/19/1972	1972	Agnes-1972	A-1	3,842,300	5,509,539
300	9/23/1975	1975	Eloise-1975	A-3	1,433,362,357	2,292,014,417
305	9/4/1979	1979	David-1979	C-2/E-2	497,467,304	683,012,066
310	9/13/1979	1979	Frederic-1979	F-3/ByP-4	388,373,251	556,983,696
315	9/2/1985	1985	Elena-1985	F-3/ByP-3	577,196,543	831,867,066
320	11/21/1985	1985	Kate-1985	A-2	230,059,551	313,847,703
325	10/12/1987	1987	Floyd-1987	B-1	15,292,495	21,930,831
330	8/24/1992	1992	Andrew-1992	C-5	31,829,487,683	43,411,904,489
335	8/3/1995	1995	Erin-1995	C-1/A-1	770,146,474	1,097,310,336
340	10/4/1995	1995	Opal-1995	A-3	1,634,378,689	2,321,418,201
345	7/19/1997	1997	Danny-1997	F-1/ByP-1	6,286,241	9,151,681
350	9/3/1998	1998	Earl-1998	A-1	187,552,633	268,632,301
355	9/25/1998	1998	Georges-1998	B-2/F-2	210,999,299	310,969,676
356	8/29/1999	1999	Dennis-1999	ByP-2		
357	9/17/1999	1999	Floyd-1999	ByP-3	29,390,390	42,029,091
360	10/15/1999	1999	Irene-1999	B-1	556,233,874	763,302,489
361	9/19/2000	2000	Gordon-2000	ByP-1	5,585,694	7,771,083
362	11/5/2001	2001	Michelle-2001	ByP-1	3,112,340	4,263,495
365	8/13/2004	2004	Charley-2004	B-4	8,596,246,839	11,704,923,516
370	9/5/2004	2004	Frances-2004	C-2	3,785,405,080	5,217,937,444
375	9/16/2004	2004	Ivan-2004	F-3/ByP-3	1,641,395,410	2,364,635,544
380	9/26/2004	2004	Jeanne-2004	C-3	6,978,683,740	9,674,136,279
385	7/10/2005	2005	Dennis-2005	A-3	717,643,069	1,032,104,752

ID	Hurricane Landfall/ Closest Approach Date	Year	Name	Region as defined in Figure 1-Category	Personal and Commercial Residential Insured Hurricane Losses (\$) 2017 FHCF Exposure Data	Personal and Commercial Residential Insured Hurricane Losses (\$) 2023 FHCF Exposure Data
390	8/25/2005	2005	Katrina-2005	C-1	744,086,672	1,013,506,499
395	9/20/2005	2005	Rita-2005	ByP-2	15,204,551	23,025,193
400	10/24/2005	2005	Wilma-2005	B-3	10,507,544,077	13,926,434,945
401	9/11/2008	2008	Ike-2008	ByP-1	2,211,693	3,312,525
405	9/2/2016	2016	Hermine-2016	A-1	11,112,339	14,283,679
410	10/7/2016	2016	Matthew-2016	ByP-3	566,798,573	799,697,693
415	9/10/2017	2017	Irma-2017	B-4	7,590,756,390	10,453,928,908
420	10/8/2017	2017	Nate-2017	F-1/ByP-1	611,785	841,815
425	10/10/2018	2018	Michael-2018	A-5	3,221,200,558	4,733,601,223
430	9/4/2019	2019	Dorian-2019	ByP-2	1,908,528	2,658,918
435	9/16/2020	2020	Sally-2020	F-2/ByP-2	595,278,022	854,687,852
440	10/28/2020	2020	Zeta-2020	ByP-2	22,414,975	33,387,109
450	7/7/2021	2021	Elsa-2021	ByP-1	2,018,305	2,663,494
455	9/28/2022	2022	Ian-2022	B-4	20,166,475,102	27,890,396,982
460	11/10/2022	2022	Nicole-2022	C-1	513,433,339	718,422,440
			Total		382,054,443,736	527,949,188,346

Form A-3: Hurricane Losses

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form A-3, Hurricane Losses.**
- B. Provide the percentage of personal and commercial residential zero deductible hurricane total loss, rounded to four decimal places, and the modeled loss from, Hurricane Matthew (2016), Hurricane Irma (2017), Hurricane Michael (2018), and Hurricane Ian (2022) for each affected ZIP Code.**

For Part A, use the 2017 FHCF exposure data, and for Part B, use the 2023 FHCF exposure data.

Rather than using directly a specified published windfield, the winds underlying the hurricane loss cost calculations shall be produced by the hurricane model under review and shall be the same hurricane parameters as used in completing Form A-2.

- C. Provide maps color-coded by ZIP Code depicting the percentage of total personal and commercial residential hurricane loss from each hurricane: Hurricane Matthew (2016), Hurricane Irma (2017), and Hurricane Michael (2018), and Hurricane Ian (2022) using the following interval coding:**

Red	≥5%
Light Red	≥2% to 5%
Pink	≥1% to 2%
Light Pink	≥0.5% to 1%
Light Blue	≥0.2% to 0.5%
Medium Blue	≥0.1% to 0.2%
Blue Below	>0% to 0.1%
Grey	0%

- D. Plot the relevant storm track on each map.**
- E. Provide this form in both Excel and PDF format. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name.**

The contribution and percentage of losses from the prescribed set of storms for each ZIP Code for personal residential and commercial residential policies from the 2017 FHCF aggregate exposure data (Part A) and the 2023 FHCF aggregate exposure data (Part B) are in Moodys23FormA3.xlsx at the link provided to the FCHLPM and appear below.

Part A – 2017 FHCF Exposure Data

Table 40: Hurricane Matthew (2016), Hurricane Irma (2017), Hurricane Michael (2018), and Hurricane Ian (2022) percent of hurricane losses for the 2017 FHCF exposure data

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32003	1,671,484	0.2949%	17,535,967	0.2310%	0	0.0000%	0	0.0000%
32004	4,981	0.0009%	9,594	0.0001%	0	0.0000%	2,068	0.0000%
32006	206	0.0000%	3,132	0.0000%	0	0.0000%	0	0.0000%
32007	3,923	0.0007%	33,516	0.0004%	0	0.0000%	2,583	0.0000%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32008	0	0.0000%	862,501	0.0114%	0	0.0000%	0	0.0000%
32009	0	0.0000%	836,212	0.0110%	0	0.0000%	0	0.0000%
32011	0	0.0000%	3,539,193	0.0466%	0	0.0000%	0	0.0000%
32013	0	0.0000%	1,551	0.0000%	0	0.0000%	0	0.0000%
32024	0	0.0000%	3,001,137	0.0395%	0	0.0000%	0	0.0000%
32025	0	0.0000%	2,452,800	0.0323%	0	0.0000%	0	0.0000%
32026	0	0.0000%	2,888	0.0000%	0	0.0000%	0	0.0000%
32030	0	0.0000%	252	0.0000%	0	0.0000%	0	0.0000%
32033	680,620	0.1201%	1,752,258	0.0231%	0	0.0000%	336,324	0.0017%
32034	7,427,723	1.3105%	28,159,262	0.3710%	0	0.0000%	3,693,363	0.0183%
32035	1,741	0.0003%	6,150	0.0001%	0	0.0000%	998	0.0000%
32038	0	0.0000%	1,462,553	0.0193%	0	0.0000%	0	0.0000%
32040	0	0.0000%	1,547,448	0.0204%	0	0.0000%	0	0.0000%
32041	1,305	0.0002%	8,226	0.0001%	0	0.0000%	0	0.0000%
32042	0	0.0000%	43,124	0.0006%	0	0.0000%	0	0.0000%
32043	956,365	0.1687%	11,274,051	0.1485%	0	0.0000%	0	0.0000%
32044	0	0.0000%	432,211	0.0057%	0	0.0000%	0	0.0000%
32046	0	0.0000%	1,975,376	0.0260%	0	0.0000%	0	0.0000%
32050	0	0.0000%	4,005	0.0001%	0	0.0000%	0	0.0000%
32052	0	0.0000%	652,691	0.0086%	0	0.0000%	0	0.0000%
32053	0	0.0000%	318,494	0.0042%	0	0.0000%	0	0.0000%
32054	0	0.0000%	1,492,762	0.0197%	0	0.0000%	0	0.0000%
32055	0	0.0000%	1,530,538	0.0202%	0	0.0000%	0	0.0000%
32056	0	0.0000%	10,689	0.0001%	0	0.0000%	0	0.0000%
32058	0	0.0000%	797,113	0.0105%	0	0.0000%	0	0.0000%
32059	0	0.0000%	353,764	0.0047%	0	0.0000%	0	0.0000%
32060	0	0.0000%	2,767,987	0.0365%	0	0.0000%	0	0.0000%
32061	0	0.0000%	30,832	0.0004%	0	0.0000%	0	0.0000%
32062	0	0.0000%	359,480	0.0047%	0	0.0000%	0	0.0000%
32063	0	0.0000%	2,840,412	0.0374%	0	0.0000%	0	0.0000%
32064	0	0.0000%	710,292	0.0094%	0	0.0000%	0	0.0000%
32065	0	0.0000%	11,610,472	0.1530%	0	0.0000%	0	0.0000%
32066	0	0.0000%	508,487	0.0067%	0	0.0000%	0	0.0000%
32067	6	0.0000%	76	0.0000%	0	0.0000%	0	0.0000%
32068	0	0.0000%	15,096,356	0.1989%	0	0.0000%	0	0.0000%
32071	0	0.0000%	578,924	0.0076%	0	0.0000%	0	0.0000%
32072	0	0.0000%	22,085	0.0003%	0	0.0000%	0	0.0000%
32073	1,499,940	0.2646%	24,336,864	0.3206%	0	0.0000%	0	0.0000%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32079	0	0.0000%	72,767	0.0010%	0	0.0000%	0	0.0000%
32080	14,715,652	2.5963%	16,185,118	0.2132%	0	0.0000%	5,261,588	0.0261%
32081	1,156,507	0.2040%	2,794,047	0.0368%	0	0.0000%	654,253	0.0032%
32082	18,529,636	3.2692%	37,371,060	0.4923%	0	0.0000%	6,724,547	0.0333%
32083	0	0.0000%	187,786	0.0025%	0	0.0000%	0	0.0000%
32084	6,721,881	1.1859%	10,611,856	0.1398%	0	0.0000%	2,784,186	0.0138%
32085	2,993	0.0005%	4,683	0.0001%	0	0.0000%	1,160	0.0000%
32086	7,616,524	1.3438%	9,599,612	0.1265%	0	0.0000%	3,076,501	0.0153%
32087	0	0.0000%	490,366	0.0065%	0	0.0000%	0	0.0000%
32091	0	0.0000%	4,523,804	0.0596%	0	0.0000%	0	0.0000%
32092	2,070,309	0.3653%	8,829,811	0.1163%	0	0.0000%	1,407,237	0.0070%
32094	0	0.0000%	395,691	0.0052%	0	0.0000%	0	0.0000%
32095	1,310,181	0.2312%	2,715,441	0.0358%	0	0.0000%	626,334	0.0031%
32096	0	0.0000%	284,497	0.0037%	0	0.0000%	0	0.0000%
32097	842,020	0.1486%	4,422,843	0.0583%	0	0.0000%	0	0.0000%
32099	0	0.0000%	2,396	0.0000%	0	0.0000%	0	0.0000%
32102	200,061	0.0353%	1,221,379	0.0161%	0	0.0000%	289,035	0.0014%
32105	2,401	0.0004%	9,053	0.0001%	0	0.0000%	4,414	0.0000%
32110	995,055	0.1756%	1,267,040	0.0167%	0	0.0000%	784,792	0.0039%
32111	0	0.0000%	48,057	0.0006%	0	0.0000%	4,291	0.0000%
32112	590,978	0.1043%	3,417,739	0.0450%	0	0.0000%	557,178	0.0028%
32113	0	0.0000%	2,242,964	0.0295%	0	0.0000%	0	0.0000%
32114	3,732,905	0.6586%	3,408,014	0.0449%	0	0.0000%	11,269,874	0.0559%
32115	1,737	0.0003%	1,641	0.0000%	0	0.0000%	5,374	0.0000%
32116	142	0.0000%	135	0.0000%	0	0.0000%	655	0.0000%
32117	4,798,371	0.8466%	4,212,206	0.0555%	0	0.0000%	12,507,788	0.0620%
32118	7,686,196	1.3561%	7,932,973	0.1045%	0	0.0000%	23,800,549	0.1180%
32119	6,515,839	1.1496%	6,320,106	0.0833%	0	0.0000%	22,906,342	0.1136%
32120	15	0.0000%	12	0.0000%	0	0.0000%	40	0.0000%
32121	8	0.0000%	7	0.0000%	0	0.0000%	31	0.0000%
32123	849	0.0001%	768	0.0000%	0	0.0000%	2,527	0.0000%
32124	518,965	0.0916%	551,789	0.0073%	0	0.0000%	1,421,147	0.0070%
32127	12,305,528	2.1711%	11,670,971	0.1538%	0	0.0000%	47,592,005	0.2360%
32128	4,922,112	0.8684%	5,218,109	0.0687%	0	0.0000%	19,329,274	0.0958%
32129	4,941,572	0.8718%	4,808,221	0.0633%	0	0.0000%	18,154,087	0.0900%
32130	529,201	0.0934%	1,324,883	0.0175%	0	0.0000%	1,064,497	0.0053%
32131	441,561	0.0779%	2,923,713	0.0385%	0	0.0000%	322,640	0.0016%
32132	2,724,150	0.4806%	2,464,293	0.0325%	0	0.0000%	11,375,172	0.0564%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32133	5,177	0.0009%	151,076	0.0020%	0	0.0000%	12,508	0.0001%
32134	0	0.0000%	4,189,646	0.0552%	0	0.0000%	307,043	0.0015%
32135	2,691	0.0005%	2,297	0.0000%	0	0.0000%	1,644	0.0000%
32136	9,955,798	1.7565%	5,630,157	0.0742%	0	0.0000%	7,678,087	0.0381%
32137	24,285,633	4.2847%	17,913,220	0.2360%	0	0.0000%	14,061,758	0.0697%
32138	1,573	0.0003%	33,880	0.0004%	0	0.0000%	0	0.0000%
32139	103,868	0.0183%	1,107,066	0.0146%	0	0.0000%	106,823	0.0005%
32140	41,266	0.0073%	724,762	0.0095%	0	0.0000%	0	0.0000%
32141	7,841,276	1.3834%	7,182,982	0.0946%	0	0.0000%	27,667,515	0.1372%
32143	348	0.0001%	184	0.0000%	0	0.0000%	239	0.0000%
32145	432,153	0.0762%	1,311,442	0.0173%	0	0.0000%	239,656	0.0012%
32147	12,128	0.0021%	173,016	0.0023%	0	0.0000%	0	0.0000%
32148	201,170	0.0355%	3,885,412	0.0512%	0	0.0000%	0	0.0000%
32157	13,217	0.0023%	102,420	0.0013%	0	0.0000%	12,915	0.0001%
32158	0	0.0000%	18,290	0.0002%	0	0.0000%	2,081	0.0000%
32159	0	0.0000%	30,638,341	0.4036%	0	0.0000%	3,604,676	0.0179%
32160	0	0.0000%	21,166	0.0003%	0	0.0000%	0	0.0000%
32162	0	0.0000%	22,682,155	0.2988%	0	0.0000%	4,134,674	0.0205%
32163	0	0.0000%	7,824,071	0.1031%	0	0.0000%	1,562,530	0.0077%
32164	9,145,255	1.6135%	7,678,910	0.1012%	0	0.0000%	6,681,894	0.0331%
32168	6,788,993	1.1978%	7,015,113	0.0924%	0	0.0000%	30,583,709	0.1517%
32169	15,430,957	2.7225%	11,167,905	0.1471%	0	0.0000%	47,995,620	0.2380%
32170	526	0.0001%	534	0.0000%	0	0.0000%	2,452	0.0000%
32173	2,017	0.0004%	1,709	0.0000%	0	0.0000%	4,163	0.0000%
32174	20,718,420	3.6554%	16,738,952	0.2205%	0	0.0000%	38,066,505	0.1888%
32175	1,627	0.0003%	1,463	0.0000%	0	0.0000%	3,654	0.0000%
32176	12,314,028	2.1726%	11,143,313	0.1468%	0	0.0000%	25,836,926	0.1281%
32177	1,267,492	0.2236%	11,470,034	0.1511%	0	0.0000%	921,691	0.0046%
32178	2,210	0.0004%	17,873	0.0002%	0	0.0000%	1,661	0.0000%
32179	0	0.0000%	5,620,074	0.0740%	0	0.0000%	502,999	0.0025%
32180	222,054	0.0392%	797,994	0.0105%	0	0.0000%	329,119	0.0016%
32181	207,545	0.0366%	1,636,620	0.0216%	0	0.0000%	199,301	0.0010%
32182	5,635	0.0010%	121,889	0.0016%	0	0.0000%	6,699	0.0000%
32183	958	0.0002%	28,059	0.0004%	0	0.0000%	2,460	0.0000%
32185	0	0.0000%	9,928	0.0001%	0	0.0000%	0	0.0000%
32187	153,014	0.0270%	886,757	0.0117%	0	0.0000%	115,972	0.0006%
32189	310,900	0.0549%	3,019,495	0.0398%	0	0.0000%	261,259	0.0013%
32190	65,714	0.0116%	269,949	0.0036%	0	0.0000%	67,383	0.0003%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32192	0	0.0000%	99,426	0.0013%	0	0.0000%	7,476	0.0000%
32193	105,500	0.0186%	1,128,604	0.0149%	0	0.0000%	100,947	0.0005%
32195	0	0.0000%	2,988,657	0.0394%	0	0.0000%	300,843	0.0015%
32201	1,816	0.0003%	16,778	0.0002%	0	0.0000%	0	0.0000%
32202	86,747	0.0153%	579,294	0.0076%	0	0.0000%	0	0.0000%
32203	74	0.0000%	560	0.0000%	0	0.0000%	0	0.0000%
32204	345,530	0.0610%	3,464,985	0.0456%	0	0.0000%	0	0.0000%
32205	1,543,660	0.2723%	18,541,597	0.2443%	0	0.0000%	0	0.0000%
32206	609,960	0.1076%	4,517,773	0.0595%	0	0.0000%	0	0.0000%
32207	2,947,923	0.5201%	20,031,065	0.2639%	0	0.0000%	0	0.0000%
32208	1,215,089	0.2144%	9,103,950	0.1199%	0	0.0000%	0	0.0000%
32209	655,444	0.1156%	5,473,755	0.0721%	0	0.0000%	0	0.0000%
32210	0	0.0000%	27,287,043	0.3595%	0	0.0000%	0	0.0000%
32211	1,999,174	0.3527%	10,058,370	0.1325%	0	0.0000%	1,113,491	0.0055%
32212	798	0.0001%	8,444	0.0001%	0	0.0000%	504	0.0000%
32214	185	0.0000%	2,454	0.0000%	0	0.0000%	112	0.0000%
32216	2,071,910	0.3655%	10,091,923	0.1330%	0	0.0000%	0	0.0000%
32217	1,724,982	0.3043%	10,703,617	0.1410%	0	0.0000%	0	0.0000%
32218	2,042,717	0.3604%	13,370,676	0.1761%	0	0.0000%	0	0.0000%
32219	0	0.0000%	2,510,485	0.0331%	0	0.0000%	0	0.0000%
32220	0	0.0000%	3,339,764	0.0440%	0	0.0000%	0	0.0000%
32221	0	0.0000%	7,752,586	0.1021%	0	0.0000%	0	0.0000%
32222	0	0.0000%	2,389,749	0.0315%	0	0.0000%	0	0.0000%
32223	3,379,430	0.5962%	24,018,645	0.3164%	0	0.0000%	1,902,064	0.0094%
32224	4,373,409	0.7716%	13,188,814	0.1737%	0	0.0000%	1,937,130	0.0096%
32225	8,117,265	1.4321%	26,546,072	0.3497%	0	0.0000%	3,746,781	0.0186%
32226	1,827,710	0.3225%	7,597,169	0.1001%	0	0.0000%	842,062	0.0042%
32227	7,731	0.0014%	16,721	0.0002%	0	0.0000%	2,221	0.0000%
32228	276	0.0000%	617	0.0000%	0	0.0000%	76	0.0000%
32231	258	0.0000%	1,820	0.0000%	0	0.0000%	113	0.0000%
32232	342	0.0001%	3,174	0.0000%	0	0.0000%	0	0.0000%
32233	6,049,252	1.0673%	15,000,637	0.1976%	0	0.0000%	2,027,830	0.0101%
32234	0	0.0000%	1,828,001	0.0241%	0	0.0000%	0	0.0000%
32235	4,618	0.0008%	16,363	0.0002%	0	0.0000%	2,231	0.0000%
32236	117	0.0000%	1,560	0.0000%	0	0.0000%	0	0.0000%
32239	1,105	0.0002%	5,409	0.0001%	0	0.0000%	660	0.0000%
32240	256	0.0000%	529	0.0000%	0	0.0000%	113	0.0000%
32241	170	0.0000%	731	0.0000%	0	0.0000%	0	0.0000%

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32244	0	0.0000%	17,171,733	0.2262%	0	0.0000%	0	0.0000%
32245	46	0.0000%	203	0.0000%	0	0.0000%	0	0.0000%
32246	3,085,496	0.5444%	11,596,934	0.1528%	0	0.0000%	0	0.0000%
32247	3,421	0.0006%	18,534	0.0002%	0	0.0000%	2,116	0.0000%
32250	7,694,573	1.3576%	19,040,219	0.2508%	0	0.0000%	2,598,574	0.0129%
32254	226,237	0.0399%	2,279,597	0.0300%	0	0.0000%	0	0.0000%
32255	816	0.0001%	3,696	0.0000%	0	0.0000%	0	0.0000%
32256	2,209,515	0.3898%	9,406,789	0.1239%	0	0.0000%	0	0.0000%
32257	3,025,822	0.5338%	17,061,210	0.2248%	0	0.0000%	0	0.0000%
32258	1,836,116	0.3239%	7,917,653	0.1043%	0	0.0000%	0	0.0000%
32259	3,137,556	0.5536%	16,556,796	0.2181%	0	0.0000%	0	0.0000%
32260	0	0.0000%	2	0.0000%	0	0.0000%	0	0.0000%
32266	2,910,724	0.5135%	7,639,332	0.1006%	0	0.0000%	979,082	0.0049%
32277	2,492,153	0.4397%	13,837,015	0.1823%	0	0.0000%	1,538,907	0.0076%
32301	0	0.0000%	0	0.0000%	2,092,903	0.0650%	0	0.0000%
32302	0	0.0000%	0	0.0000%	1,865	0.0001%	0	0.0000%
32303	0	0.0000%	0	0.0000%	7,082,364	0.2199%	0	0.0000%
32304	0	0.0000%	0	0.0000%	1,693,045	0.0526%	0	0.0000%
32305	0	0.0000%	0	0.0000%	1,299,459	0.0403%	0	0.0000%
32306	0	0.0000%	0	0.0000%	24	0.0000%	0	0.0000%
32307	0	0.0000%	0	0.0000%	1,066	0.0000%	0	0.0000%
32308	0	0.0000%	0	0.0000%	2,972,704	0.0923%	0	0.0000%
32309	0	0.0000%	0	0.0000%	5,690,556	0.1767%	0	0.0000%
32310	0	0.0000%	0	0.0000%	1,693,558	0.0526%	0	0.0000%
32311	0	0.0000%	0	0.0000%	1,584,039	0.0492%	0	0.0000%
32312	0	0.0000%	0	0.0000%	9,036,326	0.2805%	0	0.0000%
32313	0	0.0000%	0	0.0000%	505	0.0000%	0	0.0000%
32314	0	0.0000%	0	0.0000%	339	0.0000%	0	0.0000%
32317	0	0.0000%	0	0.0000%	1,668,118	0.0518%	0	0.0000%
32320	0	0.0000%	0	0.0000%	4,601,588	0.1429%	0	0.0000%
32321	0	0.0000%	0	0.0000%	13,402,633	0.4161%	0	0.0000%
32322	0	0.0000%	0	0.0000%	1,044,467	0.0324%	0	0.0000%
32323	0	0.0000%	8,486	0.0001%	85,298	0.0026%	0	0.0000%
32324	0	0.0000%	0	0.0000%	14,342,547	0.4453%	0	0.0000%
32326	0	0.0000%	0	0.0000%	4,642	0.0001%	0	0.0000%
32327	0	0.0000%	0	0.0000%	1,808,421	0.0561%	0	0.0000%
32328	0	0.0000%	0	0.0000%	7,633,472	0.2370%	0	0.0000%
32330	0	0.0000%	0	0.0000%	260,927	0.0081%	0	0.0000%

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32331	0	0.0000%	224,642	0.0030%	0	0.0000%	0	0.0000%
32332	0	0.0000%	0	0.0000%	598,022	0.0186%	0	0.0000%
32333	0	0.0000%	0	0.0000%	3,796,658	0.1179%	0	0.0000%
32334	0	0.0000%	0	0.0000%	1,324,350	0.0411%	0	0.0000%
32336	0	0.0000%	69,361	0.0009%	0	0.0000%	0	0.0000%
32337	0	0.0000%	5,493	0.0001%	5,901	0.0002%	0	0.0000%
32340	0	0.0000%	1,067,861	0.0141%	0	0.0000%	0	0.0000%
32341	0	0.0000%	5,379	0.0001%	0	0.0000%	0	0.0000%
32343	0	0.0000%	0	0.0000%	325,475	0.0101%	0	0.0000%
32344	0	0.0000%	813,902	0.0107%	604,200	0.0188%	0	0.0000%
32345	0	0.0000%	3,812	0.0001%	2,762	0.0001%	0	0.0000%
32346	0	0.0000%	176,452	0.0023%	796,796	0.0247%	0	0.0000%
32347	0	0.0000%	608,176	0.0080%	0	0.0000%	0	0.0000%
32348	0	0.0000%	617,563	0.0081%	0	0.0000%	0	0.0000%
32350	0	0.0000%	145,769	0.0019%	0	0.0000%	0	0.0000%
32351	0	0.0000%	0	0.0000%	10,667,845	0.3312%	0	0.0000%
32352	0	0.0000%	0	0.0000%	3,442,462	0.1069%	0	0.0000%
32353	0	0.0000%	0	0.0000%	16,270	0.0005%	0	0.0000%
32355	0	0.0000%	14,240	0.0002%	23,315	0.0007%	0	0.0000%
32356	0	0.0000%	4,266	0.0001%	0	0.0000%	0	0.0000%
32357	0	0.0000%	3,183	0.0000%	0	0.0000%	0	0.0000%
32358	0	0.0000%	0	0.0000%	450,338	0.0140%	0	0.0000%
32359	0	0.0000%	199,985	0.0026%	0	0.0000%	0	0.0000%
32360	0	0.0000%	0	0.0000%	53,436	0.0017%	0	0.0000%
32361	0	0.0000%	8,461	0.0001%	6,034	0.0002%	0	0.0000%
32362	0	0.0000%	3,034	0.0000%	5,633	0.0002%	0	0.0000%
32401	0	0.0000%	0	0.0000%	285,687,690	8.8690%	0	0.0000%
32402	0	0.0000%	0	0.0000%	47,269	0.0015%	0	0.0000%
32403	0	0.0000%	0	0.0000%	9,560,538	0.2968%	0	0.0000%
32404	0	0.0000%	0	0.0000%	952,574,756	29.5720%	0	0.0000%
32405	0	0.0000%	0	0.0000%	317,911,150	9.8693%	0	0.0000%
32407	0	0.0000%	0	0.0000%	35,521,668	1.1027%	0	0.0000%
32408	0	0.0000%	0	0.0000%	139,610,724	4.3341%	0	0.0000%
32409	0	0.0000%	0	0.0000%	34,762,419	1.0792%	0	0.0000%
32410	0	0.0000%	0	0.0000%	18,713,433	0.5809%	0	0.0000%
32411	0	0.0000%	0	0.0000%	710,248	0.0220%	0	0.0000%
32413	0	0.0000%	0	0.0000%	32,240,505	1.0009%	0	0.0000%
32417	0	0.0000%	0	0.0000%	30,814	0.0010%	0	0.0000%

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32420	0	0.0000%	0	0.0000%	17,375,463	0.5394%	0	0.0000%
32421	0	0.0000%	0	0.0000%	32,225,729	1.0004%	0	0.0000%
32422	0	0.0000%	0	0.0000%	558	0.0000%	0	0.0000%
32423	0	0.0000%	0	0.0000%	6,684,775	0.2075%	0	0.0000%
32424	0	0.0000%	0	0.0000%	57,392,824	1.7817%	0	0.0000%
32425	0	0.0000%	0	0.0000%	3,832,809	0.1190%	0	0.0000%
32426	0	0.0000%	0	0.0000%	1,884,232	0.0585%	0	0.0000%
32427	0	0.0000%	0	0.0000%	207,486	0.0064%	0	0.0000%
32428	0	0.0000%	0	0.0000%	37,762,550	1.1723%	0	0.0000%
32430	0	0.0000%	0	0.0000%	15,026,689	0.4665%	0	0.0000%
32431	0	0.0000%	0	0.0000%	16,503,193	0.5123%	0	0.0000%
32432	0	0.0000%	0	0.0000%	334,852	0.0104%	0	0.0000%
32433	0	0.0000%	0	0.0000%	631,963	0.0196%	0	0.0000%
32434	0	0.0000%	0	0.0000%	624	0.0000%	0	0.0000%
32435	0	0.0000%	0	0.0000%	450,299	0.0140%	0	0.0000%
32437	0	0.0000%	0	0.0000%	149,885	0.0047%	0	0.0000%
32438	0	0.0000%	0	0.0000%	12,827,701	0.3982%	0	0.0000%
32439	0	0.0000%	0	0.0000%	1,671,501	0.0519%	0	0.0000%
32440	0	0.0000%	0	0.0000%	3,968,817	0.1232%	0	0.0000%
32442	0	0.0000%	0	0.0000%	26,639,372	0.8270%	0	0.0000%
32443	0	0.0000%	0	0.0000%	14,014,339	0.4351%	0	0.0000%
32444	0	0.0000%	0	0.0000%	295,577,074	9.1760%	0	0.0000%
32445	0	0.0000%	0	0.0000%	5,554,014	0.1724%	0	0.0000%
32446	0	0.0000%	0	0.0000%	65,396,044	2.0302%	0	0.0000%
32447	0	0.0000%	0	0.0000%	71,867	0.0022%	0	0.0000%
32448	0	0.0000%	0	0.0000%	33,125,726	1.0284%	0	0.0000%
32449	0	0.0000%	0	0.0000%	6,438,447	0.1999%	0	0.0000%
32452	0	0.0000%	0	0.0000%	4,931	0.0002%	0	0.0000%
32455	0	0.0000%	0	0.0000%	424,991	0.0132%	0	0.0000%
32456	0	0.0000%	0	0.0000%	455,454,442	14.1393%	0	0.0000%
32457	0	0.0000%	0	0.0000%	101,070	0.0031%	0	0.0000%
32459	0	0.0000%	0	0.0000%	12,112,189	0.3760%	0	0.0000%
32460	0	0.0000%	0	0.0000%	39,079,875	1.2132%	0	0.0000%
32461	0	0.0000%	0	0.0000%	1,416,792	0.0440%	0	0.0000%
32462	0	0.0000%	0	0.0000%	1,444,797	0.0449%	0	0.0000%
32463	0	0.0000%	0	0.0000%	226,817	0.0070%	0	0.0000%
32464	0	0.0000%	0	0.0000%	208,825	0.0065%	0	0.0000%
32465	0	0.0000%	0	0.0000%	59,393,166	1.8438%	0	0.0000%

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32466	0	0.0000%	0	0.0000%	53,278,994	1.6540%	0	0.0000%
32540	0	0.0000%	0	0.0000%	4,597	0.0001%	0	0.0000%
32541	0	0.0000%	0	0.0000%	4,532,016	0.1407%	0	0.0000%
32542	0	0.0000%	0	0.0000%	957	0.0000%	0	0.0000%
32548	0	0.0000%	0	0.0000%	1,053,012	0.0327%	0	0.0000%
32549	0	0.0000%	0	0.0000%	1,763	0.0001%	0	0.0000%
32550	0	0.0000%	0	0.0000%	4,392,467	0.1364%	0	0.0000%
32578	0	0.0000%	0	0.0000%	3,582,940	0.1112%	0	0.0000%
32579	0	0.0000%	0	0.0000%	994,153	0.0309%	0	0.0000%
32580	0	0.0000%	0	0.0000%	250,896	0.0078%	0	0.0000%
32588	0	0.0000%	0	0.0000%	194	0.0000%	0	0.0000%
32601	0	0.0000%	2,659,274	0.0350%	0	0.0000%	0	0.0000%
32602	0	0.0000%	2,254	0.0000%	0	0.0000%	0	0.0000%
32603	0	0.0000%	633,273	0.0083%	0	0.0000%	0	0.0000%
32604	0	0.0000%	3,977	0.0001%	0	0.0000%	0	0.0000%
32605	0	0.0000%	7,855,406	0.1035%	0	0.0000%	0	0.0000%
32606	0	0.0000%	5,032,627	0.0663%	0	0.0000%	0	0.0000%
32607	0	0.0000%	4,770,641	0.0628%	0	0.0000%	0	0.0000%
32608	0	0.0000%	7,209,936	0.0950%	0	0.0000%	0	0.0000%
32609	0	0.0000%	2,695,103	0.0355%	0	0.0000%	0	0.0000%
32610	0	0.0000%	3,859	0.0001%	0	0.0000%	0	0.0000%
32611	0	0.0000%	35	0.0000%	0	0.0000%	0	0.0000%
32612	0	0.0000%	131	0.0000%	0	0.0000%	0	0.0000%
32614	0	0.0000%	6	0.0000%	0	0.0000%	0	0.0000%
32615	0	0.0000%	3,467,848	0.0457%	0	0.0000%	0	0.0000%
32616	0	0.0000%	15,002	0.0002%	0	0.0000%	0	0.0000%
32617	0	0.0000%	2,033,464	0.0268%	0	0.0000%	157,212	0.0008%
32618	0	0.0000%	1,663,665	0.0219%	0	0.0000%	0	0.0000%
32619	0	0.0000%	696,245	0.0092%	0	0.0000%	0	0.0000%
32621	0	0.0000%	843,949	0.0111%	0	0.0000%	0	0.0000%
32622	0	0.0000%	294,403	0.0039%	0	0.0000%	0	0.0000%
32625	0	0.0000%	539,811	0.0071%	0	0.0000%	0	0.0000%
32626	0	0.0000%	1,325,331	0.0175%	0	0.0000%	0	0.0000%
32627	0	0.0000%	2,967	0.0000%	0	0.0000%	0	0.0000%
32628	0	0.0000%	293,126	0.0039%	0	0.0000%	0	0.0000%
32631	0	0.0000%	369,186	0.0049%	0	0.0000%	0	0.0000%
32633	0	0.0000%	43,721	0.0006%	0	0.0000%	3,136	0.0000%
32634	0	0.0000%	29,549	0.0004%	0	0.0000%	2,694	0.0000%

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32635	0	0.0000%	1,746	0.0000%	0	0.0000%	0	0.0000%
32639	0	0.0000%	12,083	0.0002%	0	0.0000%	0	0.0000%
32640	0	0.0000%	5,218,473	0.0687%	0	0.0000%	0	0.0000%
32641	0	0.0000%	2,000,534	0.0264%	0	0.0000%	0	0.0000%
32643	0	0.0000%	1,998,446	0.0263%	0	0.0000%	0	0.0000%
32644	0	0.0000%	7,680	0.0001%	0	0.0000%	0	0.0000%
32648	0	0.0000%	75,739	0.0010%	0	0.0000%	0	0.0000%
32653	0	0.0000%	3,852,350	0.0508%	0	0.0000%	0	0.0000%
32654	0	0.0000%	13,767	0.0002%	0	0.0000%	0	0.0000%
32655	0	0.0000%	6,349	0.0001%	0	0.0000%	0	0.0000%
32656	0	0.0000%	8,231,565	0.1084%	0	0.0000%	0	0.0000%
32658	0	0.0000%	40,868	0.0005%	0	0.0000%	0	0.0000%
32662	0	0.0000%	2,793	0.0000%	0	0.0000%	0	0.0000%
32663	0	0.0000%	23,271	0.0003%	0	0.0000%	1,857	0.0000%
32664	0	0.0000%	413,595	0.0054%	0	0.0000%	32,557	0.0002%
32666	0	0.0000%	4,760,898	0.0627%	0	0.0000%	0	0.0000%
32667	0	0.0000%	1,655,388	0.0218%	0	0.0000%	0	0.0000%
32668	0	0.0000%	1,450,159	0.0191%	0	0.0000%	160,067	0.0008%
32669	0	0.0000%	2,759,509	0.0364%	0	0.0000%	0	0.0000%
32680	0	0.0000%	902,171	0.0119%	0	0.0000%	0	0.0000%
32681	0	0.0000%	96,758	0.0013%	0	0.0000%	7,071	0.0000%
32683	0	0.0000%	5,743	0.0001%	0	0.0000%	0	0.0000%
32686	0	0.0000%	2,024,724	0.0267%	0	0.0000%	176,293	0.0009%
32692	0	0.0000%	134,625	0.0018%	0	0.0000%	0	0.0000%
32693	0	0.0000%	1,610,049	0.0212%	0	0.0000%	0	0.0000%
32694	0	0.0000%	552,092	0.0073%	0	0.0000%	0	0.0000%
32696	0	0.0000%	2,801,471	0.0369%	0	0.0000%	0	0.0000%
32697	0	0.0000%	13,738	0.0002%	0	0.0000%	0	0.0000%
32701	818,761	0.1445%	5,955,214	0.0785%	0	0.0000%	4,521,265	0.0224%
32702	102,712	0.0181%	1,194,516	0.0157%	0	0.0000%	195,314	0.0010%
32703	1,433,725	0.2530%	14,017,245	0.1847%	0	0.0000%	6,567,161	0.0326%
32704	1,835	0.0003%	18,395	0.0002%	0	0.0000%	7,697	0.0000%
32706	6,202	0.0011%	15,308	0.0002%	0	0.0000%	25,130	0.0001%
32707	1,639,476	0.2893%	9,836,684	0.1296%	0	0.0000%	9,867,610	0.0489%
32708	2,959,504	0.5221%	15,821,690	0.2084%	0	0.0000%	19,000,811	0.0942%
32709	128,219	0.0226%	598,360	0.0079%	0	0.0000%	1,147,781	0.0057%
32710	65	0.0000%	961	0.0000%	0	0.0000%	509	0.0000%
32712	1,915,699	0.3380%	18,298,246	0.2411%	0	0.0000%	7,131,758	0.0354%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32713	1,716,878	0.3029%	7,484,934	0.0986%	0	0.0000%	6,762,951	0.0335%
32714	1,202,385	0.2121%	9,807,043	0.1292%	0	0.0000%	6,386,186	0.0317%
32716	1	0.0000%	16	0.0000%	0	0.0000%	10	0.0000%
32718	0	0.0000%	2	0.0000%	0	0.0000%	2	0.0000%
32719	3,090	0.0005%	14,260	0.0002%	0	0.0000%	17,494	0.0001%
32720	2,252,459	0.3974%	7,603,754	0.1002%	0	0.0000%	6,545,518	0.0325%
32721	317	0.0001%	876	0.0000%	0	0.0000%	1,041	0.0000%
32722	724	0.0001%	2,271	0.0000%	0	0.0000%	2,149	0.0000%
32723	551	0.0001%	2,033	0.0000%	0	0.0000%	1,910	0.0000%
32724	3,000,619	0.5294%	7,789,702	0.1026%	0	0.0000%	8,955,923	0.0444%
32725	3,945,941	0.6962%	12,995,873	0.1712%	0	0.0000%	18,719,553	0.0928%
32726	933,403	0.1647%	14,323,552	0.1887%	0	0.0000%	2,462,806	0.0122%
32727	560	0.0001%	9,259	0.0001%	0	0.0000%	1,356	0.0000%
32728	2,094	0.0004%	9,475	0.0001%	0	0.0000%	9,699	0.0000%
32730	227,267	0.0401%	1,407,297	0.0185%	0	0.0000%	1,308,898	0.0065%
32732	568,136	0.1002%	2,016,688	0.0266%	0	0.0000%	4,676,342	0.0232%
32733	1,119	0.0002%	6,838	0.0001%	0	0.0000%	8,209	0.0000%
32735	245,877	0.0434%	4,955,469	0.0653%	0	0.0000%	729,746	0.0036%
32736	551,696	0.0973%	4,393,332	0.0579%	0	0.0000%	1,468,756	0.0073%
32738	3,671,877	0.6478%	9,565,427	0.1260%	0	0.0000%	18,745,386	0.0930%
32739	365	0.0001%	1,041	0.0000%	0	0.0000%	2,161	0.0000%
32744	348,495	0.0615%	848,325	0.0112%	0	0.0000%	1,400,155	0.0069%
32746	2,764,823	0.4878%	14,730,335	0.1941%	0	0.0000%	12,541,292	0.0622%
32747	1,257	0.0002%	6,255	0.0001%	0	0.0000%	5,554	0.0000%
32750	1,556,582	0.2746%	9,057,992	0.1193%	0	0.0000%	8,186,085	0.0406%
32751	1,592,454	0.2810%	12,222,874	0.1610%	0	0.0000%	9,577,347	0.0475%
32752	0	0.0000%	6	0.0000%	0	0.0000%	4	0.0000%
32754	1,892,902	0.3340%	3,139,357	0.0414%	0	0.0000%	7,348,458	0.0364%
32756	635	0.0001%	9,312	0.0001%	0	0.0000%	1,970	0.0000%
32757	1,329,740	0.2346%	16,887,437	0.2225%	0	0.0000%	3,954,475	0.0196%
32759	789,760	0.1393%	835,959	0.0110%	0	0.0000%	2,445,528	0.0121%
32762	574	0.0001%	2,470	0.0000%	0	0.0000%	3,859	0.0000%
32763	1,196,761	0.2111%	4,270,874	0.0563%	0	0.0000%	4,552,972	0.0226%
32764	259,794	0.0458%	765,221	0.0101%	0	0.0000%	1,709,530	0.0085%
32765	3,336,869	0.5887%	16,791,045	0.2212%	0	0.0000%	26,104,097	0.1294%
32766	927,288	0.1636%	4,015,318	0.0529%	0	0.0000%	7,741,138	0.0384%
32767	101,813	0.0180%	767,496	0.0101%	0	0.0000%	245,146	0.0012%
32768	2,553	0.0005%	32,664	0.0004%	0	0.0000%	10,737	0.0001%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
32771	3,054,904	0.5390%	12,608,127	0.1661%	0	0.0000%	13,234,400	0.0656%
32772	979	0.0002%	3,872	0.0001%	0	0.0000%	4,646	0.0000%
32773	1,171,246	0.2066%	5,475,588	0.0721%	0	0.0000%	6,823,094	0.0338%
32774	839	0.0001%	2,859	0.0000%	0	0.0000%	3,468	0.0000%
32775	9,999	0.0018%	15,045	0.0002%	0	0.0000%	38,533	0.0002%
32776	507,223	0.0895%	4,336,515	0.0571%	0	0.0000%	1,512,464	0.0075%
32777	9,065	0.0016%	116,275	0.0015%	0	0.0000%	28,695	0.0001%
32778	962,559	0.1698%	20,063,224	0.2643%	0	0.0000%	3,688,999	0.0183%
32779	2,672,498	0.4715%	19,533,861	0.2573%	0	0.0000%	12,944,492	0.0642%
32780	6,678,132	1.1782%	12,681,110	0.1671%	0	0.0000%	20,652,156	0.1024%
32781	4	0.0000%	8	0.0000%	0	0.0000%	11	0.0000%
32783	212	0.0000%	433	0.0000%	0	0.0000%	644	0.0000%
32784	458,300	0.0809%	6,383,540	0.0841%	0	0.0000%	981,727	0.0049%
32789	2,661,090	0.4695%	21,115,718	0.2782%	0	0.0000%	16,865,827	0.0836%
32790	4,701	0.0008%	40,159	0.0005%	0	0.0000%	30,719	0.0002%
32791	535	0.0001%	3,504	0.0000%	0	0.0000%	2,141	0.0000%
32792	1,911,208	0.3372%	13,128,798	0.1730%	0	0.0000%	13,705,918	0.0680%
32793	829	0.0001%	4,753	0.0001%	0	0.0000%	4,484	0.0000%
32794	9	0.0000%	87	0.0000%	0	0.0000%	60	0.0000%
32795	6	0.0000%	35	0.0000%	0	0.0000%	31	0.0000%
32796	4,078,309	0.7195%	7,272,884	0.0958%	0	0.0000%	13,383,580	0.0664%
32798	181,258	0.0320%	2,901,705	0.0382%	0	0.0000%	879,751	0.0044%
32801	316,413	0.0558%	3,098,906	0.0408%	0	0.0000%	2,241,784	0.0111%
32802	587	0.0001%	6,259	0.0001%	0	0.0000%	4,476	0.0000%
32803	1,152,899	0.2034%	10,136,276	0.1335%	0	0.0000%	8,323,935	0.0413%
32804	1,211,283	0.2137%	11,348,597	0.1495%	0	0.0000%	8,087,230	0.0401%
32805	323,324	0.0570%	3,566,172	0.0470%	0	0.0000%	2,415,118	0.0120%
32806	1,373,081	0.2423%	14,538,609	0.1915%	0	0.0000%	10,743,403	0.0533%
32807	811,532	0.1432%	6,600,051	0.0869%	0	0.0000%	6,908,053	0.0343%
32808	843,038	0.1487%	8,918,409	0.1175%	0	0.0000%	5,567,726	0.0276%
32809	0	0.0000%	7,695,333	0.1014%	0	0.0000%	5,339,660	0.0265%
32810	855,276	0.1509%	7,866,424	0.1036%	0	0.0000%	4,906,818	0.0243%
32811	310,135	0.0547%	3,839,185	0.0506%	0	0.0000%	2,317,431	0.0115%
32812	1,287,295	0.2271%	13,421,225	0.1768%	0	0.0000%	12,161,185	0.0603%
32814	198,496	0.0350%	1,163,766	0.0153%	0	0.0000%	1,097,203	0.0054%
32815	2,241	0.0004%	1,671	0.0000%	0	0.0000%	1,987	0.0000%
32816	17,009	0.0030%	84,218	0.0011%	0	0.0000%	132,786	0.0007%
32817	1,309,804	0.2311%	8,333,518	0.1098%	0	0.0000%	11,203,780	0.0556%

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32818	1,074,651	0.1896%	11,572,532	0.1525%	0	0.0000%	6,347,485	0.0315%
32819	0	0.0000%	20,704,044	0.2728%	0	0.0000%	11,891,532	0.0590%
32820	344,968	0.0609%	1,681,796	0.0222%	0	0.0000%	3,109,277	0.0154%
32821	0	0.0000%	5,843,621	0.0770%	0	0.0000%	3,706,465	0.0184%
32822	925,582	0.1633%	9,779,247	0.1288%	0	0.0000%	9,996,545	0.0496%
32824	0	0.0000%	10,442,597	0.1376%	0	0.0000%	8,412,249	0.0417%
32825	1,757,035	0.3100%	12,490,135	0.1645%	0	0.0000%	16,305,350	0.0809%
32826	653,040	0.1152%	4,040,788	0.0532%	0	0.0000%	6,497,904	0.0322%
32827	499,197	0.0881%	4,844,369	0.0638%	0	0.0000%	5,174,397	0.0257%
32828	1,745,115	0.3079%	10,368,072	0.1366%	0	0.0000%	16,338,503	0.0810%
32829	457,785	0.0808%	3,831,563	0.0505%	0	0.0000%	4,428,599	0.0220%
32830	0	0.0000%	135,196	0.0018%	0	0.0000%	77,026	0.0004%
32831	731	0.0001%	8,299	0.0001%	0	0.0000%	12,281	0.0001%
32832	620,751	0.1095%	5,342,467	0.0704%	0	0.0000%	6,565,679	0.0326%
32833	435,895	0.0769%	2,499,455	0.0329%	0	0.0000%	4,340,433	0.0215%
32835	1,004,537	0.1772%	13,109,211	0.1727%	0	0.0000%	6,999,068	0.0347%
32836	0	0.0000%	13,702,951	0.1805%	0	0.0000%	8,369,312	0.0415%
32837	0	0.0000%	16,898,655	0.2226%	0	0.0000%	11,304,610	0.0561%
32839	467,736	0.0825%	6,038,418	0.0795%	0	0.0000%	4,060,978	0.0201%
32853	12	0.0000%	117	0.0000%	0	0.0000%	84	0.0000%
32854	26	0.0000%	263	0.0000%	0	0.0000%	195	0.0000%
32855	0	0.0000%	5	0.0000%	0	0.0000%	4	0.0000%
32856	550	0.0001%	6,794	0.0001%	0	0.0000%	4,909	0.0000%
32857	277	0.0000%	2,622	0.0000%	0	0.0000%	2,384	0.0000%
32859	18	0.0000%	231	0.0000%	0	0.0000%	167	0.0000%
32862	0	0.0000%	8	0.0000%	0	0.0000%	8	0.0000%
32867	2	0.0000%	14	0.0000%	0	0.0000%	17	0.0000%
32869	0	0.0000%	9	0.0000%	0	0.0000%	5	0.0000%
32872	1	0.0000%	11	0.0000%	0	0.0000%	12	0.0000%
32877	0	0.0000%	14	0.0000%	0	0.0000%	10	0.0000%
32878	180	0.0000%	976	0.0000%	0	0.0000%	1,361	0.0000%
32886	2	0.0000%	25	0.0000%	0	0.0000%	16	0.0000%
32901	2,692,415	0.4750%	6,819,949	0.0898%	0	0.0000%	3,416,547	0.0169%
32902	335	0.0001%	804	0.0000%	0	0.0000%	404	0.0000%
32903	4,267,900	0.7530%	10,177,069	0.1341%	0	0.0000%	5,023,258	0.0249%
32904	3,290,389	0.5805%	9,083,001	0.1197%	0	0.0000%	5,350,756	0.0265%
32905	3,053,504	0.5387%	7,966,853	0.1050%	0	0.0000%	3,681,899	0.0183%
32907	4,416,211	0.7792%	14,787,964	0.1948%	0	0.0000%	8,373,227	0.0415%

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32908	712,450	0.1257%	2,998,539	0.0395%	0	0.0000%	1,585,086	0.0079%
32909	2,619,747	0.4622%	9,256,221	0.1219%	0	0.0000%	4,652,403	0.0231%
32910	5	0.0000%	17	0.0000%	0	0.0000%	7	0.0000%
32912	16	0.0000%	45	0.0000%	0	0.0000%	25	0.0000%
32919	749	0.0001%	1,893	0.0000%	0	0.0000%	1,008	0.0000%
32920	5,497,049	0.9698%	5,027,292	0.0662%	0	0.0000%	4,782,587	0.0237%
32922	1,127,665	0.1990%	2,796,564	0.0368%	0	0.0000%	2,998,319	0.0149%
32925	18,624	0.0033%	14,533	0.0002%	0	0.0000%	12,275	0.0001%
32926	3,119,067	0.5503%	7,907,522	0.1042%	0	0.0000%	9,637,285	0.0478%
32927	3,787,772	0.6683%	8,314,060	0.1095%	0	0.0000%	11,360,396	0.0563%
32931	8,626,239	1.5219%	12,866,250	0.1695%	0	0.0000%	11,309,505	0.0561%
32932	236	0.0000%	415	0.0000%	0	0.0000%	343	0.0000%
32934	3,407,238	0.6011%	8,880,779	0.1170%	0	0.0000%	6,017,793	0.0298%
32935	6,252,892	1.1032%	15,737,993	0.2073%	0	0.0000%	9,328,557	0.0463%
32936	535	0.0001%	1,333	0.0000%	0	0.0000%	782	0.0000%
32937	8,397,927	1.4817%	17,231,077	0.2270%	0	0.0000%	10,453,431	0.0518%
32940	7,002,803	1.2355%	17,970,327	0.2367%	0	0.0000%	15,069,647	0.0747%
32941	48	0.0000%	135	0.0000%	0	0.0000%	99	0.0000%
32948	236,785	0.0418%	979,250	0.0129%	0	0.0000%	446,855	0.0022%
32949	770,175	0.1359%	1,709,537	0.0225%	0	0.0000%	659,909	0.0033%
32950	1,189,924	0.2099%	3,134,502	0.0413%	0	0.0000%	1,389,561	0.0069%
32951	5,897,057	1.0404%	12,740,963	0.1678%	0	0.0000%	5,338,658	0.0265%
32952	7,464,518	1.3170%	16,707,279	0.2201%	0	0.0000%	16,203,093	0.0803%
32953	6,197,758	1.0935%	11,438,770	0.1507%	0	0.0000%	12,076,824	0.0599%
32954	474	0.0001%	933	0.0000%	0	0.0000%	985	0.0000%
32955	5,880,489	1.0375%	15,297,556	0.2015%	0	0.0000%	14,780,810	0.0733%
32956	3	0.0000%	9	0.0000%	0	0.0000%	8	0.0000%
32957	9,435	0.0017%	22,367	0.0003%	0	0.0000%	8,026	0.0000%
32958	5,960,572	1.0516%	14,738,707	0.1942%	0	0.0000%	5,031,840	0.0250%
32959	21	0.0000%	52	0.0000%	0	0.0000%	65	0.0000%
32960	2,731,868	0.4820%	7,210,133	0.0950%	0	0.0000%	2,206,154	0.0109%
32961	4,902	0.0009%	14,201	0.0002%	0	0.0000%	3,892	0.0000%
32962	2,837,805	0.5007%	8,570,426	0.1129%	0	0.0000%	2,799,846	0.0139%
32963	10,918,890	1.9264%	23,552,123	0.3103%	0	0.0000%	7,385,896	0.0366%
32964	1,740	0.0003%	4,271	0.0001%	0	0.0000%	1,264	0.0000%
32965	555	0.0001%	1,565	0.0000%	0	0.0000%	490	0.0000%
32966	1,921,852	0.3391%	6,880,144	0.0906%	0	0.0000%	2,745,064	0.0136%
32967	2,776,814	0.4899%	6,973,717	0.0919%	0	0.0000%	2,582,848	0.0128%

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32968	1,737,387	0.3065%	5,800,168	0.0764%	0	0.0000%	2,193,022	0.0109%
32969	1,116	0.0002%	5,767	0.0001%	0	0.0000%	2,405	0.0000%
32970	2,337	0.0004%	5,526	0.0001%	0	0.0000%	1,790	0.0000%
32976	3,908,296	0.6895%	9,299,769	0.1225%	0	0.0000%	3,340,986	0.0166%
32978	273	0.0000%	622	0.0000%	0	0.0000%	213	0.0000%
33001	0	0.0000%	1,465,401	0.0193%	0	0.0000%	23,777	0.0001%
33002	0	0.0000%	43	0.0000%	0	0.0000%	0	0.0000%
33004	0	0.0000%	3,749,249	0.0494%	0	0.0000%	0	0.0000%
33008	0	0.0000%	621	0.0000%	0	0.0000%	0	0.0000%
33009	0	0.0000%	9,938,838	0.1309%	0	0.0000%	0	0.0000%
33010	0	0.0000%	3,741,483	0.0493%	0	0.0000%	0	0.0000%
33012	0	0.0000%	8,138,594	0.1072%	0	0.0000%	0	0.0000%
33013	0	0.0000%	4,016,854	0.0529%	0	0.0000%	0	0.0000%
33014	0	0.0000%	8,382,403	0.1104%	0	0.0000%	0	0.0000%
33015	0	0.0000%	13,214,779	0.1741%	0	0.0000%	0	0.0000%
33016	0	0.0000%	7,457,508	0.0982%	0	0.0000%	0	0.0000%
33017	0	0.0000%	590	0.0000%	0	0.0000%	0	0.0000%
33018	0	0.0000%	10,817,325	0.1425%	0	0.0000%	0	0.0000%
33019	0	0.0000%	10,132,196	0.1335%	0	0.0000%	0	0.0000%
33020	0	0.0000%	6,897,073	0.0909%	0	0.0000%	0	0.0000%
33021	0	0.0000%	14,526,188	0.1914%	0	0.0000%	0	0.0000%
33022	0	0.0000%	436	0.0000%	0	0.0000%	0	0.0000%
33023	0	0.0000%	14,246,382	0.1877%	0	0.0000%	0	0.0000%
33024	0	0.0000%	17,106,411	0.2254%	0	0.0000%	0	0.0000%
33025	0	0.0000%	12,656,091	0.1667%	0	0.0000%	0	0.0000%
33026	0	0.0000%	15,598,272	0.2055%	0	0.0000%	0	0.0000%
33027	0	0.0000%	18,720,220	0.2466%	0	0.0000%	0	0.0000%
33028	0	0.0000%	7,500,095	0.0988%	0	0.0000%	0	0.0000%
33029	0	0.0000%	27,010,341	0.3558%	0	0.0000%	1,735,645	0.0086%
33030	0	0.0000%	7,811,653	0.1029%	0	0.0000%	0	0.0000%
33031	0	0.0000%	4,961,238	0.0654%	0	0.0000%	0	0.0000%
33032	0	0.0000%	9,787,615	0.1289%	0	0.0000%	0	0.0000%
33033	0	0.0000%	11,153,525	0.1469%	0	0.0000%	0	0.0000%
33034	0	0.0000%	3,233,663	0.0426%	0	0.0000%	0	0.0000%
33035	0	0.0000%	3,064,003	0.0404%	0	0.0000%	0	0.0000%
33036	0	0.0000%	17,393,873	0.2291%	0	0.0000%	304,979	0.0015%
33037	0	0.0000%	26,745,994	0.3523%	0	0.0000%	0	0.0000%
33039	0	0.0000%	1,635	0.0000%	0	0.0000%	0	0.0000%

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	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
33040	0	0.0000%	55,890,607	0.7363%	0	0.0000%	6,048,054	0.0300%
33041	0	0.0000%	3,902	0.0001%	0	0.0000%	267	0.0000%
33042	0	0.0000%	54,640,808	0.7198%	0	0.0000%	1,652,537	0.0082%
33043	0	0.0000%	44,799,524	0.5902%	0	0.0000%	735,896	0.0036%
33045	0	0.0000%	7,601	0.0001%	0	0.0000%	377	0.0000%
33050	0	0.0000%	57,841,081	0.7620%	0	0.0000%	796,312	0.0039%
33051	0	0.0000%	12,703,200	0.1674%	0	0.0000%	137,248	0.0007%
33052	0	0.0000%	418,327	0.0055%	0	0.0000%	3,389	0.0000%
33054	0	0.0000%	2,989,418	0.0394%	0	0.0000%	0	0.0000%
33055	0	0.0000%	7,624,536	0.1004%	0	0.0000%	0	0.0000%
33056	0	0.0000%	5,876,743	0.0774%	0	0.0000%	0	0.0000%
33060	0	0.0000%	8,077,000	0.1064%	0	0.0000%	0	0.0000%
33061	0	0.0000%	5,242	0.0001%	0	0.0000%	0	0.0000%
33062	0	0.0000%	15,189,502	0.2001%	0	0.0000%	0	0.0000%
33063	0	0.0000%	15,865,137	0.2090%	0	0.0000%	0	0.0000%
33064	0	0.0000%	15,937,117	0.2100%	0	0.0000%	0	0.0000%
33065	0	0.0000%	16,692,907	0.2199%	0	0.0000%	0	0.0000%
33066	0	0.0000%	5,559,211	0.0732%	0	0.0000%	0	0.0000%
33067	0	0.0000%	14,969,830	0.1972%	0	0.0000%	0	0.0000%
33068	0	0.0000%	10,316,865	0.1359%	0	0.0000%	0	0.0000%
33069	0	0.0000%	5,514,037	0.0726%	0	0.0000%	0	0.0000%
33070	0	0.0000%	12,463,642	0.1642%	0	0.0000%	0	0.0000%
33071	0	0.0000%	19,465,574	0.2564%	0	0.0000%	0	0.0000%
33072	0	0.0000%	3,958	0.0001%	0	0.0000%	0	0.0000%
33073	0	0.0000%	7,472,087	0.0984%	0	0.0000%	0	0.0000%
33074	0	0.0000%	423	0.0000%	0	0.0000%	0	0.0000%
33075	0	0.0000%	5,184	0.0001%	0	0.0000%	0	0.0000%
33076	0	0.0000%	15,729,812	0.2072%	0	0.0000%	1,702,681	0.0084%
33077	0	0.0000%	796	0.0000%	0	0.0000%	0	0.0000%
33081	0	0.0000%	3,304	0.0000%	0	0.0000%	0	0.0000%
33082	0	0.0000%	1,170	0.0000%	0	0.0000%	84	0.0000%
33084	0	0.0000%	1,743	0.0000%	0	0.0000%	0	0.0000%
33090	0	0.0000%	1,201	0.0000%	0	0.0000%	0	0.0000%
33092	0	0.0000%	902	0.0000%	0	0.0000%	0	0.0000%
33101	0	0.0000%	2,852	0.0000%	0	0.0000%	0	0.0000%
33102	0	0.0000%	98	0.0000%	0	0.0000%	0	0.0000%
33109	0	0.0000%	2,854,823	0.0376%	0	0.0000%	0	0.0000%
33112	0	0.0000%	6,676	0.0001%	0	0.0000%	0	0.0000%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
33114	0	0.0000%	25,750	0.0003%	0	0.0000%	0	0.0000%
33116	0	0.0000%	401	0.0000%	0	0.0000%	0	0.0000%
33119	0	0.0000%	3,117	0.0000%	0	0.0000%	0	0.0000%
33122	0	0.0000%	41,676	0.0005%	0	0.0000%	0	0.0000%
33125	0	0.0000%	3,960,199	0.0522%	0	0.0000%	0	0.0000%
33126	0	0.0000%	4,494,973	0.0592%	0	0.0000%	0	0.0000%
33127	0	0.0000%	1,974,020	0.0260%	0	0.0000%	0	0.0000%
33128	0	0.0000%	212,080	0.0028%	0	0.0000%	0	0.0000%
33129	0	0.0000%	5,231,503	0.0689%	0	0.0000%	0	0.0000%
33130	0	0.0000%	2,174,422	0.0286%	0	0.0000%	0	0.0000%
33131	0	0.0000%	4,318,519	0.0569%	0	0.0000%	0	0.0000%
33132	0	0.0000%	2,306,387	0.0304%	0	0.0000%	0	0.0000%
33133	0	0.0000%	13,329,869	0.1756%	0	0.0000%	0	0.0000%
33134	0	0.0000%	11,500,293	0.1515%	0	0.0000%	0	0.0000%
33135	0	0.0000%	2,588,048	0.0341%	0	0.0000%	0	0.0000%
33136	0	0.0000%	663,552	0.0087%	0	0.0000%	0	0.0000%
33137	0	0.0000%	3,869,870	0.0510%	0	0.0000%	0	0.0000%
33138	0	0.0000%	7,805,201	0.1028%	0	0.0000%	0	0.0000%
33139	0	0.0000%	14,820,156	0.1952%	0	0.0000%	0	0.0000%
33140	0	0.0000%	15,337,453	0.2021%	0	0.0000%	0	0.0000%
33141	0	0.0000%	9,416,817	0.1241%	0	0.0000%	0	0.0000%
33142	0	0.0000%	3,194,900	0.0421%	0	0.0000%	0	0.0000%
33143	0	0.0000%	16,269,017	0.2143%	0	0.0000%	0	0.0000%
33144	0	0.0000%	4,746,084	0.0625%	0	0.0000%	0	0.0000%
33145	0	0.0000%	5,435,574	0.0716%	0	0.0000%	0	0.0000%
33146	0	0.0000%	7,773,427	0.1024%	0	0.0000%	0	0.0000%
33147	0	0.0000%	3,757,901	0.0495%	0	0.0000%	0	0.0000%
33149	0	0.0000%	15,464,228	0.2037%	0	0.0000%	0	0.0000%
33150	0	0.0000%	2,456,815	0.0324%	0	0.0000%	0	0.0000%
33152	0	0.0000%	103	0.0000%	0	0.0000%	0	0.0000%
33154	0	0.0000%	10,910,707	0.1437%	0	0.0000%	0	0.0000%
33155	0	0.0000%	12,480,117	0.1644%	0	0.0000%	0	0.0000%
33156	0	0.0000%	28,254,360	0.3722%	0	0.0000%	0	0.0000%
33157	0	0.0000%	27,714,903	0.3651%	0	0.0000%	0	0.0000%
33158	0	0.0000%	6,689,260	0.0881%	0	0.0000%	0	0.0000%
33160	0	0.0000%	13,335,122	0.1757%	0	0.0000%	0	0.0000%
33161	0	0.0000%	7,776,899	0.1025%	0	0.0000%	0	0.0000%
33162	0	0.0000%	6,750,489	0.0889%	0	0.0000%	0	0.0000%

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33164	0	0.0000%	5,650	0.0001%	0	0.0000%	0	0.0000%
33165	0	0.0000%	15,128,023	0.1993%	0	0.0000%	0	0.0000%
33166	0	0.0000%	5,148,102	0.0678%	0	0.0000%	0	0.0000%
33167	0	0.0000%	2,260,868	0.0298%	0	0.0000%	0	0.0000%
33168	0	0.0000%	3,627,186	0.0478%	0	0.0000%	0	0.0000%
33169	0	0.0000%	6,031,382	0.0795%	0	0.0000%	0	0.0000%
33170	0	0.0000%	3,036,125	0.0400%	0	0.0000%	0	0.0000%
33172	0	0.0000%	4,716,845	0.0621%	0	0.0000%	0	0.0000%
33173	0	0.0000%	12,065,019	0.1589%	0	0.0000%	0	0.0000%
33174	0	0.0000%	5,615,055	0.0740%	0	0.0000%	0	0.0000%
33175	0	0.0000%	17,209,088	0.2267%	0	0.0000%	0	0.0000%
33176	0	0.0000%	24,748,732	0.3260%	0	0.0000%	0	0.0000%
33177	0	0.0000%	14,695,521	0.1936%	0	0.0000%	0	0.0000%
33178	0	0.0000%	10,441,646	0.1376%	0	0.0000%	0	0.0000%
33179	0	0.0000%	8,661,430	0.1141%	0	0.0000%	0	0.0000%
33180	0	0.0000%	9,152,749	0.1206%	0	0.0000%	0	0.0000%
33181	0	0.0000%	3,860,153	0.0509%	0	0.0000%	0	0.0000%
33182	0	0.0000%	4,772,873	0.0629%	0	0.0000%	0	0.0000%
33183	0	0.0000%	11,076,337	0.1459%	0	0.0000%	0	0.0000%
33184	0	0.0000%	5,934,162	0.0782%	0	0.0000%	0	0.0000%
33185	0	0.0000%	8,788,014	0.1158%	0	0.0000%	0	0.0000%
33186	0	0.0000%	27,969,083	0.3685%	0	0.0000%	0	0.0000%
33187	0	0.0000%	7,665,273	0.1010%	0	0.0000%	0	0.0000%
33188	0	0.0000%	4,682	0.0001%	0	0.0000%	0	0.0000%
33189	0	0.0000%	8,260,974	0.1088%	0	0.0000%	0	0.0000%
33190	0	0.0000%	2,696,015	0.0355%	0	0.0000%	0	0.0000%
33192	0	0.0000%	8	0.0000%	0	0.0000%	0	0.0000%
33193	0	0.0000%	12,400,872	0.1634%	0	0.0000%	0	0.0000%
33194	0	0.0000%	964,334	0.0127%	0	0.0000%	0	0.0000%
33195	0	0.0000%	263	0.0000%	0	0.0000%	0	0.0000%
33196	0	0.0000%	15,848,957	0.2088%	0	0.0000%	0	0.0000%
33197	0	0.0000%	1,813	0.0000%	0	0.0000%	0	0.0000%
33199	0	0.0000%	4	0.0000%	0	0.0000%	0	0.0000%
33231	0	0.0000%	675	0.0000%	0	0.0000%	0	0.0000%
33233	0	0.0000%	769	0.0000%	0	0.0000%	0	0.0000%
33234	0	0.0000%	2	0.0000%	0	0.0000%	0	0.0000%
33239	0	0.0000%	33	0.0000%	0	0.0000%	0	0.0000%
33245	0	0.0000%	5	0.0000%	0	0.0000%	0	0.0000%

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33256	0	0.0000%	205	0.0000%	0	0.0000%	0	0.0000%
33261	0	0.0000%	3,314	0.0000%	0	0.0000%	0	0.0000%
33266	0	0.0000%	10	0.0000%	0	0.0000%	0	0.0000%
33269	0	0.0000%	42	0.0000%	0	0.0000%	0	0.0000%
33301	0	0.0000%	7,347,109	0.0968%	0	0.0000%	0	0.0000%
33302	0	0.0000%	533	0.0000%	0	0.0000%	0	0.0000%
33303	0	0.0000%	7	0.0000%	0	0.0000%	0	0.0000%
33304	0	0.0000%	6,654,620	0.0877%	0	0.0000%	0	0.0000%
33305	0	0.0000%	5,808,295	0.0765%	0	0.0000%	0	0.0000%
33306	0	0.0000%	2,105,756	0.0277%	0	0.0000%	0	0.0000%
33307	0	0.0000%	124	0.0000%	0	0.0000%	0	0.0000%
33308	0	0.0000%	16,267,146	0.2143%	0	0.0000%	0	0.0000%
33309	0	0.0000%	9,092,536	0.1198%	0	0.0000%	0	0.0000%
33310	0	0.0000%	9,689	0.0001%	0	0.0000%	0	0.0000%
33311	0	0.0000%	8,237,935	0.1085%	0	0.0000%	0	0.0000%
33312	0	0.0000%	12,452,571	0.1640%	0	0.0000%	0	0.0000%
33313	0	0.0000%	8,936,188	0.1177%	0	0.0000%	0	0.0000%
33314	0	0.0000%	4,438,039	0.0585%	0	0.0000%	0	0.0000%
33315	0	0.0000%	4,260,982	0.0561%	0	0.0000%	0	0.0000%
33316	0	0.0000%	8,410,469	0.1108%	0	0.0000%	0	0.0000%
33317	0	0.0000%	14,789,587	0.1948%	0	0.0000%	0	0.0000%
33318	0	0.0000%	4,958	0.0001%	0	0.0000%	0	0.0000%
33319	0	0.0000%	12,936,285	0.1704%	0	0.0000%	0	0.0000%
33321	0	0.0000%	15,284,439	0.2014%	0	0.0000%	0	0.0000%
33322	0	0.0000%	14,807,994	0.1951%	0	0.0000%	0	0.0000%
33323	0	0.0000%	10,532,591	0.1388%	0	0.0000%	723,246	0.0036%
33324	0	0.0000%	17,129,269	0.2257%	0	0.0000%	0	0.0000%
33325	0	0.0000%	14,440,549	0.1902%	0	0.0000%	842,317	0.0042%
33326	0	0.0000%	21,596,135	0.2845%	0	0.0000%	1,422,288	0.0071%
33327	0	0.0000%	11,042,862	0.1455%	0	0.0000%	1,006,445	0.0050%
33328	0	0.0000%	13,494,329	0.1778%	0	0.0000%	0	0.0000%
33329	0	0.0000%	2,456	0.0000%	0	0.0000%	0	0.0000%
33330	0	0.0000%	9,977,752	0.1314%	0	0.0000%	0	0.0000%
33331	0	0.0000%	14,978,307	0.1973%	0	0.0000%	1,008,769	0.0050%
33332	0	0.0000%	8,749,136	0.1153%	0	0.0000%	630,997	0.0031%
33334	0	0.0000%	8,341,444	0.1099%	0	0.0000%	0	0.0000%
33335	0	0.0000%	1,968	0.0000%	0	0.0000%	0	0.0000%
33338	0	0.0000%	42	0.0000%	0	0.0000%	0	0.0000%

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33340	0	0.0000%	18	0.0000%	0	0.0000%	0	0.0000%
33345	0	0.0000%	60	0.0000%	0	0.0000%	0	0.0000%
33346	0	0.0000%	30	0.0000%	0	0.0000%	0	0.0000%
33351	0	0.0000%	9,588,995	0.1263%	0	0.0000%	0	0.0000%
33394	0	0.0000%	358	0.0000%	0	0.0000%	0	0.0000%
33401	469,877	0.0829%	6,060,085	0.0798%	0	0.0000%	578,259	0.0029%
33402	83	0.0000%	1,060	0.0000%	0	0.0000%	92	0.0000%
33403	227,866	0.0402%	2,245,036	0.0296%	0	0.0000%	247,125	0.0012%
33404	642,319	0.1133%	6,674,569	0.0879%	0	0.0000%	734,586	0.0036%
33405	357,514	0.0631%	6,280,379	0.0827%	0	0.0000%	548,074	0.0027%
33406	0	0.0000%	6,283,038	0.0828%	0	0.0000%	585,469	0.0029%
33407	442,662	0.0781%	5,037,083	0.0664%	0	0.0000%	564,405	0.0028%
33408	1,405,772	0.2480%	12,550,985	0.1653%	0	0.0000%	1,538,121	0.0076%
33409	0	0.0000%	5,485,514	0.0723%	0	0.0000%	566,946	0.0028%
33410	1,784,969	0.3149%	14,609,357	0.1925%	0	0.0000%	1,960,885	0.0097%
33411	0	0.0000%	21,380,334	0.2817%	0	0.0000%	3,107,484	0.0154%
33412	0	0.0000%	6,939,104	0.0914%	0	0.0000%	1,251,364	0.0062%
33413	0	0.0000%	2,992,206	0.0394%	0	0.0000%	403,577	0.0020%
33414	0	0.0000%	26,914,601	0.3546%	0	0.0000%	3,857,718	0.0191%
33415	0	0.0000%	7,519,423	0.0991%	0	0.0000%	742,886	0.0037%
33416	0	0.0000%	22,335	0.0003%	0	0.0000%	2,121	0.0000%
33417	0	0.0000%	7,339,084	0.0967%	0	0.0000%	786,712	0.0039%
33418	2,845,497	0.5020%	23,329,759	0.3073%	0	0.0000%	3,958,109	0.0196%
33419	907	0.0002%	9,229	0.0001%	0	0.0000%	1,052	0.0000%
33420	860	0.0002%	8,940	0.0001%	0	0.0000%	911	0.0000%
33422	218	0.0000%	2,919	0.0000%	0	0.0000%	337	0.0000%
33424	0	0.0000%	8,986	0.0001%	0	0.0000%	770	0.0000%
33425	0	0.0000%	100,141	0.0013%	0	0.0000%	5,119	0.0000%
33426	0	0.0000%	7,225,401	0.0952%	0	0.0000%	500,933	0.0025%
33427	0	0.0000%	591	0.0000%	0	0.0000%	0	0.0000%
33428	0	0.0000%	18,303,861	0.2411%	0	0.0000%	1,452,295	0.0072%
33429	0	0.0000%	2,160	0.0000%	0	0.0000%	0	0.0000%
33430	0	0.0000%	2,519,614	0.0332%	0	0.0000%	779,655	0.0039%
33431	0	0.0000%	9,887,705	0.1303%	0	0.0000%	0	0.0000%
33432	0	0.0000%	13,178,527	0.1736%	0	0.0000%	0	0.0000%
33433	0	0.0000%	23,604,901	0.3110%	0	0.0000%	0	0.0000%
33434	0	0.0000%	15,690,948	0.2067%	0	0.0000%	1,026,663	0.0051%
33435	0	0.0000%	11,074,410	0.1459%	0	0.0000%	678,002	0.0034%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
33436	0	0.0000%	18,009,200	0.2373%	0	0.0000%	1,333,098	0.0066%
33437	0	0.0000%	16,304,908	0.2148%	0	0.0000%	1,682,972	0.0083%
33438	0	0.0000%	149,376	0.0020%	0	0.0000%	55,420	0.0003%
33440	0	0.0000%	12,732,184	0.1677%	0	0.0000%	7,501,524	0.0372%
33441	0	0.0000%	8,290,312	0.1092%	0	0.0000%	0	0.0000%
33442	0	0.0000%	10,953,859	0.1443%	0	0.0000%	0	0.0000%
33443	0	0.0000%	2,445	0.0000%	0	0.0000%	0	0.0000%
33444	0	0.0000%	5,971,323	0.0787%	0	0.0000%	0	0.0000%
33445	0	0.0000%	13,392,036	0.1764%	0	0.0000%	0	0.0000%
33446	0	0.0000%	13,719,590	0.1807%	0	0.0000%	1,533,584	0.0076%
33448	0	0.0000%	13,389	0.0002%	0	0.0000%	1,816	0.0000%
33449	0	0.0000%	4,091,197	0.0539%	0	0.0000%	623,303	0.0031%
33454	0	0.0000%	67	0.0000%	0	0.0000%	4	0.0000%
33455	3,264,718	0.5760%	16,505,532	0.2174%	0	0.0000%	3,320,795	0.0165%
33458	2,556,615	0.4511%	16,297,141	0.2147%	0	0.0000%	2,803,321	0.0139%
33459	0	0.0000%	21,806	0.0003%	0	0.0000%	9,044	0.0000%
33460	0	0.0000%	6,583,404	0.0867%	0	0.0000%	530,285	0.0026%
33461	0	0.0000%	6,068,881	0.0800%	0	0.0000%	520,474	0.0026%
33462	0	0.0000%	12,307,986	0.1621%	0	0.0000%	964,200	0.0048%
33463	0	0.0000%	11,227,296	0.1479%	0	0.0000%	1,165,675	0.0058%
33464	0	0.0000%	4,503	0.0001%	0	0.0000%	352	0.0000%
33465	0	0.0000%	68	0.0000%	0	0.0000%	5	0.0000%
33466	0	0.0000%	2,926	0.0000%	0	0.0000%	266	0.0000%
33467	0	0.0000%	19,127,688	0.2520%	0	0.0000%	2,329,889	0.0116%
33468	2,083	0.0004%	11,409	0.0002%	0	0.0000%	2,183	0.0000%
33469	2,082,778	0.3675%	13,680,257	0.1802%	0	0.0000%	2,123,031	0.0105%
33470	0	0.0000%	9,358,674	0.1233%	0	0.0000%	1,831,877	0.0091%
33471	0	0.0000%	6,559,995	0.0864%	0	0.0000%	5,724,484	0.0284%
33472	0	0.0000%	8,551,049	0.1127%	0	0.0000%	979,500	0.0049%
33473	0	0.0000%	2,807,234	0.0370%	0	0.0000%	463,303	0.0023%
33474	0	0.0000%	5,246	0.0001%	0	0.0000%	386	0.0000%
33475	2,930	0.0005%	12,869	0.0002%	0	0.0000%	2,829	0.0000%
33476	0	0.0000%	976,631	0.0129%	0	0.0000%	383,745	0.0019%
33477	1,454,389	0.2566%	10,197,932	0.1343%	0	0.0000%	1,500,203	0.0074%
33478	731,960	0.1291%	6,184,638	0.0815%	0	0.0000%	1,298,938	0.0064%
33480	2,558,916	0.4515%	36,747,183	0.4841%	0	0.0000%	3,338,216	0.0166%
33481	0	0.0000%	369	0.0000%	0	0.0000%	0	0.0000%
33482	0	0.0000%	741	0.0000%	0	0.0000%	0	0.0000%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
33483	0	0.0000%	10,295,242	0.1356%	0	0.0000%	0	0.0000%
33484	0	0.0000%	11,024,262	0.1452%	0	0.0000%	787,943	0.0039%
33486	0	0.0000%	12,780,933	0.1684%	0	0.0000%	0	0.0000%
33487	0	0.0000%	12,035,728	0.1586%	0	0.0000%	0	0.0000%
33493	0	0.0000%	495,721	0.0065%	0	0.0000%	177,429	0.0009%
33496	0	0.0000%	26,328,768	0.3469%	0	0.0000%	2,092,591	0.0104%
33497	0	0.0000%	4,775	0.0001%	0	0.0000%	311	0.0000%
33498	0	0.0000%	12,591,742	0.1659%	0	0.0000%	1,173,870	0.0058%
33503	0	0.0000%	17,825	0.0002%	0	0.0000%	46,771	0.0002%
33508	0	0.0000%	773	0.0000%	0	0.0000%	1,571	0.0000%
33509	0	0.0000%	28	0.0000%	0	0.0000%	57	0.0000%
33510	0	0.0000%	7,313,111	0.0963%	0	0.0000%	12,510,514	0.0620%
33511	0	0.0000%	12,303,933	0.1621%	0	0.0000%	23,622,226	0.1171%
33513	0	0.0000%	4,578,045	0.0603%	0	0.0000%	1,068,459	0.0053%
33514	0	0.0000%	858,694	0.0113%	0	0.0000%	180,959	0.0009%
33521	0	0.0000%	271,328	0.0036%	0	0.0000%	41,906	0.0002%
33523	0	0.0000%	6,516,985	0.0859%	0	0.0000%	2,583,573	0.0128%
33524	0	0.0000%	15,096	0.0002%	0	0.0000%	11,729	0.0001%
33525	0	0.0000%	9,936,565	0.1309%	0	0.0000%	4,969,743	0.0246%
33526	0	0.0000%	24,772	0.0003%	0	0.0000%	10,552	0.0001%
33527	0	0.0000%	4,039,398	0.0532%	0	0.0000%	5,289,337	0.0262%
33530	0	0.0000%	26,672	0.0004%	0	0.0000%	40,746	0.0002%
33534	0	0.0000%	1,313,396	0.0173%	0	0.0000%	3,554,048	0.0176%
33537	0	0.0000%	26,940	0.0004%	0	0.0000%	9,465	0.0000%
33538	0	0.0000%	2,073,413	0.0273%	0	0.0000%	339,486	0.0017%
33539	0	0.0000%	12,910	0.0002%	0	0.0000%	8,751	0.0000%
33540	0	0.0000%	5,521,520	0.0727%	0	0.0000%	3,518,713	0.0174%
33541	0	0.0000%	11,562,838	0.1523%	0	0.0000%	7,733,498	0.0383%
33542	0	0.0000%	13,068,910	0.1722%	0	0.0000%	8,495,151	0.0421%
33543	0	0.0000%	7,623,735	0.1004%	0	0.0000%	5,911,171	0.0293%
33544	0	0.0000%	3,904,087	0.0514%	0	0.0000%	3,425,780	0.0170%
33545	0	0.0000%	3,375,425	0.0445%	0	0.0000%	2,279,125	0.0113%
33547	0	0.0000%	7,926,946	0.1044%	0	0.0000%	16,595,680	0.0823%
33548	0	0.0000%	2,140,560	0.0282%	0	0.0000%	2,558,574	0.0127%
33549	0	0.0000%	3,892,739	0.0513%	0	0.0000%	4,490,115	0.0223%
33550	0	0.0000%	17,950	0.0002%	0	0.0000%	27,782	0.0001%
33556	0	0.0000%	4,406,247	0.0580%	0	0.0000%	6,718,483	0.0333%
33558	0	0.0000%	3,720,864	0.0490%	0	0.0000%	4,603,008	0.0228%

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33559	0	0.0000%	2,533,104	0.0334%	0	0.0000%	2,599,858	0.0129%
33563	0	0.0000%	6,956,193	0.0916%	0	0.0000%	7,523,204	0.0373%
33564	0	0.0000%	16,007	0.0002%	0	0.0000%	18,496	0.0001%
33565	0	0.0000%	7,189,269	0.0947%	0	0.0000%	6,728,502	0.0334%
33566	0	0.0000%	8,597,478	0.1133%	0	0.0000%	10,029,856	0.0497%
33567	0	0.0000%	3,302,896	0.0435%	0	0.0000%	4,612,691	0.0229%
33568	0	0.0000%	7,041	0.0001%	0	0.0000%	15,483	0.0001%
33569	0	0.0000%	6,135,364	0.0808%	0	0.0000%	13,957,265	0.0692%
33570	0	0.0000%	3,603,949	0.0475%	0	0.0000%	16,963,785	0.0841%
33571	0	0.0000%	842	0.0000%	0	0.0000%	3,182	0.0000%
33572	0	0.0000%	5,995,555	0.0790%	0	0.0000%	21,814,310	0.1082%
33573	0	0.0000%	6,795,083	0.0895%	0	0.0000%	32,440,596	0.1609%
33574	0	0.0000%	5,176	0.0001%	0	0.0000%	2,734	0.0000%
33575	0	0.0000%	399	0.0000%	0	0.0000%	1,842	0.0000%
33576	0	0.0000%	1,611,453	0.0212%	0	0.0000%	941,268	0.0047%
33578	0	0.0000%	5,062,195	0.0667%	0	0.0000%	11,633,352	0.0577%
33579	0	0.0000%	3,968,283	0.0523%	0	0.0000%	10,495,712	0.0520%
33583	0	0.0000%	17	0.0000%	0	0.0000%	26	0.0000%
33584	0	0.0000%	7,100,236	0.0935%	0	0.0000%	9,935,685	0.0493%
33585	0	0.0000%	629,416	0.0083%	0	0.0000%	118,983	0.0006%
33586	0	0.0000%	925	0.0000%	0	0.0000%	5,299	0.0000%
33587	0	0.0000%	3,352	0.0000%	0	0.0000%	4,479	0.0000%
33592	0	0.0000%	2,113,463	0.0278%	0	0.0000%	2,504,401	0.0124%
33593	0	0.0000%	8,853	0.0001%	0	0.0000%	3,040	0.0000%
33594	0	0.0000%	9,668,930	0.1274%	0	0.0000%	15,688,110	0.0778%
33595	0	0.0000%	4,811	0.0001%	0	0.0000%	7,997	0.0000%
33596	0	0.0000%	10,489,640	0.1382%	0	0.0000%	19,906,506	0.0987%
33597	0	0.0000%	3,103,672	0.0409%	0	0.0000%	862,357	0.0043%
33598	0	0.0000%	2,429,706	0.0320%	0	0.0000%	9,654,818	0.0479%
33601	0	0.0000%	14,656	0.0002%	0	0.0000%	32,367	0.0002%
33602	0	0.0000%	1,536,644	0.0202%	0	0.0000%	3,383,890	0.0168%
33603	0	0.0000%	2,372,163	0.0313%	0	0.0000%	4,408,885	0.0219%
33604	0	0.0000%	3,725,577	0.0491%	0	0.0000%	6,141,032	0.0305%
33605	0	0.0000%	1,208,353	0.0159%	0	0.0000%	2,490,572	0.0124%
33606	0	0.0000%	4,419,520	0.0582%	0	0.0000%	10,210,092	0.0506%
33607	0	0.0000%	1,682,625	0.0222%	0	0.0000%	3,592,797	0.0178%
33608	0	0.0000%	72	0.0000%	0	0.0000%	316	0.0000%
33609	0	0.0000%	3,781,639	0.0498%	0	0.0000%	8,671,023	0.0430%

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33610	0	0.0000%	3,361,317	0.0443%	0	0.0000%	5,462,471	0.0271%
33611	0	0.0000%	6,054,635	0.0798%	0	0.0000%	17,110,864	0.0848%
33612	0	0.0000%	3,546,106	0.0467%	0	0.0000%	5,214,043	0.0259%
33613	0	0.0000%	3,712,437	0.0489%	0	0.0000%	4,950,949	0.0246%
33614	0	0.0000%	2,823,521	0.0372%	0	0.0000%	5,449,076	0.0270%
33615	0	0.0000%	4,416,494	0.0582%	0	0.0000%	9,169,002	0.0455%
33616	0	0.0000%	1,800,135	0.0237%	0	0.0000%	5,287,130	0.0262%
33617	0	0.0000%	6,019,597	0.0793%	0	0.0000%	8,066,656	0.0400%
33618	0	0.0000%	5,541,891	0.0730%	0	0.0000%	8,598,224	0.0426%
33619	0	0.0000%	3,407,081	0.0449%	0	0.0000%	6,863,492	0.0340%
33620	0	0.0000%	110	0.0000%	0	0.0000%	144	0.0000%
33621	0	0.0000%	5,570	0.0001%	0	0.0000%	22,903	0.0001%
33622	0	0.0000%	1,318	0.0000%	0	0.0000%	2,911	0.0000%
33623	0	0.0000%	25	0.0000%	0	0.0000%	54	0.0000%
33624	0	0.0000%	6,415,591	0.0845%	0	0.0000%	10,515,084	0.0521%
33625	0	0.0000%	2,445,019	0.0322%	0	0.0000%	4,509,133	0.0224%
33626	0	0.0000%	2,292,446	0.0302%	0	0.0000%	4,424,480	0.0219%
33629	0	0.0000%	8,171,154	0.1076%	0	0.0000%	20,501,911	0.1017%
33634	0	0.0000%	2,077,985	0.0274%	0	0.0000%	4,190,921	0.0208%
33635	0	0.0000%	1,285,513	0.0169%	0	0.0000%	2,820,290	0.0140%
33637	0	0.0000%	1,807,250	0.0238%	0	0.0000%	2,429,868	0.0120%
33646	0	0.0000%	10	0.0000%	0	0.0000%	10	0.0000%
33647	0	0.0000%	12,104,590	0.1595%	0	0.0000%	11,610,884	0.0576%
33655	0	0.0000%	490	0.0000%	0	0.0000%	1,113	0.0000%
33660	0	0.0000%	1,532	0.0000%	0	0.0000%	2,566	0.0000%
33672	0	0.0000%	432	0.0000%	0	0.0000%	956	0.0000%
33675	0	0.0000%	2,887	0.0000%	0	0.0000%	5,820	0.0000%
33679	0	0.0000%	2	0.0000%	0	0.0000%	5	0.0000%
33680	0	0.0000%	826	0.0000%	0	0.0000%	1,423	0.0000%
33682	0	0.0000%	2	0.0000%	0	0.0000%	2	0.0000%
33684	0	0.0000%	13	0.0000%	0	0.0000%	25	0.0000%
33685	0	0.0000%	1,049	0.0000%	0	0.0000%	2,300	0.0000%
33687	0	0.0000%	42	0.0000%	0	0.0000%	59	0.0000%
33688	0	0.0000%	9	0.0000%	0	0.0000%	14	0.0000%
33694	0	0.0000%	9	0.0000%	0	0.0000%	14	0.0000%
33701	0	0.0000%	1,299,453	0.0171%	0	0.0000%	5,890,893	0.0292%
33702	0	0.0000%	3,711,134	0.0489%	0	0.0000%	13,951,606	0.0692%
33703	0	0.0000%	4,349,959	0.0573%	0	0.0000%	17,792,948	0.0882%

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33704	0	0.0000%	3,279,519	0.0432%	0	0.0000%	14,176,138	0.0703%
33705	0	0.0000%	2,563,542	0.0338%	0	0.0000%	13,464,042	0.0668%
33706	0	0.0000%	3,980,017	0.0524%	0	0.0000%	18,336,864	0.0909%
33707	0	0.0000%	2,955,484	0.0389%	0	0.0000%	13,834,973	0.0686%
33708	0	0.0000%	2,263,596	0.0298%	0	0.0000%	9,465,383	0.0469%
33709	0	0.0000%	1,554,207	0.0205%	0	0.0000%	5,732,667	0.0284%
33710	0	0.0000%	3,342,667	0.0440%	0	0.0000%	13,874,010	0.0688%
33711	0	0.0000%	1,336,067	0.0176%	0	0.0000%	6,920,139	0.0343%
33712	0	0.0000%	1,574,077	0.0207%	0	0.0000%	8,174,398	0.0405%
33713	0	0.0000%	2,302,339	0.0303%	0	0.0000%	10,067,012	0.0499%
33714	0	0.0000%	832,547	0.0110%	0	0.0000%	3,273,457	0.0162%
33715	0	0.0000%	3,146,656	0.0415%	0	0.0000%	19,373,024	0.0961%
33716	0	0.0000%	373,898	0.0049%	0	0.0000%	1,270,989	0.0063%
33730	0	0.0000%	3	0.0000%	0	0.0000%	16	0.0000%
33731	0	0.0000%	1	0.0000%	0	0.0000%	4	0.0000%
33732	0	0.0000%	17	0.0000%	0	0.0000%	70	0.0000%
33733	0	0.0000%	283	0.0000%	0	0.0000%	1,332	0.0000%
33734	0	0.0000%	22	0.0000%	0	0.0000%	116	0.0000%
33738	0	0.0000%	1	0.0000%	0	0.0000%	5	0.0000%
33740	0	0.0000%	76	0.0000%	0	0.0000%	400	0.0000%
33741	0	0.0000%	79	0.0000%	0	0.0000%	378	0.0000%
33743	0	0.0000%	24	0.0000%	0	0.0000%	123	0.0000%
33744	0	0.0000%	5	0.0000%	0	0.0000%	22	0.0000%
33747	0	0.0000%	2	0.0000%	0	0.0000%	12	0.0000%
33755	0	0.0000%	1,987,822	0.0262%	0	0.0000%	4,781,700	0.0237%
33756	0	0.0000%	3,075,599	0.0405%	0	0.0000%	7,861,572	0.0390%
33758	0	0.0000%	44	0.0000%	0	0.0000%	138	0.0000%
33759	0	0.0000%	1,452,906	0.0191%	0	0.0000%	3,748,205	0.0186%
33760	0	0.0000%	968,588	0.0128%	0	0.0000%	3,125,280	0.0155%
33761	0	0.0000%	2,013,806	0.0265%	0	0.0000%	4,702,548	0.0233%
33762	0	0.0000%	1,215,635	0.0160%	0	0.0000%	4,136,611	0.0205%
33763	0	0.0000%	1,101,576	0.0145%	0	0.0000%	2,646,544	0.0131%
33764	0	0.0000%	2,415,325	0.0318%	0	0.0000%	7,040,061	0.0349%
33765	0	0.0000%	840,943	0.0111%	0	0.0000%	2,192,317	0.0109%
33766	0	0.0000%	18	0.0000%	0	0.0000%	46	0.0000%
33767	0	0.0000%	2,355,564	0.0310%	0	0.0000%	5,188,322	0.0257%
33769	0	0.0000%	49	0.0000%	0	0.0000%	134	0.0000%
33770	0	0.0000%	2,255,634	0.0297%	0	0.0000%	6,347,441	0.0315%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
33771	0	0.0000%	1,386,503	0.0183%	0	0.0000%	4,574,458	0.0227%
33772	0	0.0000%	2,379,131	0.0313%	0	0.0000%	8,747,780	0.0434%
33773	0	0.0000%	1,363,034	0.0180%	0	0.0000%	4,379,837	0.0217%
33774	0	0.0000%	1,913,670	0.0252%	0	0.0000%	5,857,309	0.0290%
33775	0	0.0000%	3,233	0.0000%	0	0.0000%	11,781	0.0001%
33776	0	0.0000%	1,766,142	0.0233%	0	0.0000%	5,554,690	0.0275%
33777	0	0.0000%	1,690,286	0.0223%	0	0.0000%	5,806,834	0.0288%
33778	0	0.0000%	1,125,900	0.0148%	0	0.0000%	3,614,328	0.0179%
33779	0	0.0000%	248	0.0000%	0	0.0000%	639	0.0000%
33780	0	0.0000%	1,083	0.0000%	0	0.0000%	3,532	0.0000%
33781	0	0.0000%	1,403,931	0.0185%	0	0.0000%	4,904,203	0.0243%
33782	0	0.0000%	1,781,355	0.0235%	0	0.0000%	6,120,888	0.0304%
33784	0	0.0000%	226	0.0000%	0	0.0000%	1,058	0.0000%
33785	0	0.0000%	1,166,520	0.0154%	0	0.0000%	2,968,038	0.0147%
33786	0	0.0000%	686,509	0.0090%	0	0.0000%	1,532,179	0.0076%
33801	0	0.0000%	21,169,638	0.2789%	0	0.0000%	16,096,721	0.0798%
33802	0	0.0000%	100,413	0.0013%	0	0.0000%	86,628	0.0004%
33803	0	0.0000%	27,463,065	0.3618%	0	0.0000%	23,339,684	0.1157%
33804	0	0.0000%	10,431	0.0001%	0	0.0000%	7,911	0.0000%
33805	0	0.0000%	9,906,730	0.1305%	0	0.0000%	6,928,444	0.0344%
33806	0	0.0000%	12,354	0.0002%	0	0.0000%	10,929	0.0001%
33807	0	0.0000%	7,061	0.0001%	0	0.0000%	7,349	0.0000%
33809	0	0.0000%	26,042,844	0.3431%	0	0.0000%	15,273,802	0.0757%
33810	0	0.0000%	28,653,680	0.3775%	0	0.0000%	21,176,447	0.1050%
33811	0	0.0000%	12,792,042	0.1685%	0	0.0000%	14,043,011	0.0696%
33812	0	0.0000%	11,866,668	0.1563%	0	0.0000%	10,657,209	0.0528%
33813	0	0.0000%	43,209,108	0.5692%	0	0.0000%	44,864,540	0.2225%
33815	0	0.0000%	3,808,770	0.0502%	0	0.0000%	3,315,281	0.0164%
33820	0	0.0000%	241,354	0.0032%	0	0.0000%	241,159	0.0012%
33823	0	0.0000%	33,662,191	0.4435%	0	0.0000%	21,513,897	0.1067%
33825	0	0.0000%	27,808,683	0.3663%	0	0.0000%	72,965,273	0.3618%
33826	0	0.0000%	293	0.0000%	0	0.0000%	1,043	0.0000%
33827	0	0.0000%	4,939,726	0.0651%	0	0.0000%	8,654,895	0.0429%
33830	0	0.0000%	28,430,735	0.3745%	0	0.0000%	31,086,881	0.1542%
33831	0	0.0000%	3,553	0.0000%	0	0.0000%	3,730	0.0000%
33834	0	0.0000%	2,575,264	0.0339%	0	0.0000%	9,576,195	0.0475%
33835	0	0.0000%	214,834	0.0028%	0	0.0000%	416,186	0.0021%
33836	0	0.0000%	37,702	0.0005%	0	0.0000%	33,215	0.0002%

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	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
33837	0	0.0000%	13,433,251	0.1770%	0	0.0000%	10,418,682	0.0517%
33838	0	0.0000%	2,549,140	0.0336%	0	0.0000%	2,609,393	0.0129%
33839	0	0.0000%	3,125,554	0.0412%	0	0.0000%	2,566,398	0.0127%
33840	0	0.0000%	66,170	0.0009%	0	0.0000%	52,272	0.0003%
33841	0	0.0000%	8,192,417	0.1079%	0	0.0000%	14,287,494	0.0708%
33843	0	0.0000%	12,814,924	0.1688%	0	0.0000%	27,232,567	0.1350%
33844	0	0.0000%	25,757,865	0.3393%	0	0.0000%	23,573,783	0.1169%
33845	0	0.0000%	88,858	0.0012%	0	0.0000%	77,468	0.0004%
33846	0	0.0000%	221,400	0.0029%	0	0.0000%	192,232	0.0010%
33847	0	0.0000%	298,533	0.0039%	0	0.0000%	404,863	0.0020%
33848	0	0.0000%	131,106	0.0017%	0	0.0000%	94,828	0.0005%
33849	0	0.0000%	375,568	0.0049%	0	0.0000%	222,408	0.0011%
33850	0	0.0000%	9,443,608	0.1244%	0	0.0000%	6,443,682	0.0320%
33851	0	0.0000%	694,771	0.0092%	0	0.0000%	695,791	0.0035%
33852	0	0.0000%	44,824,714	0.5905%	0	0.0000%	106,798,847	0.5296%
33853	0	0.0000%	10,806,616	0.1424%	0	0.0000%	14,318,182	0.0710%
33854	0	0.0000%	352,712	0.0046%	0	0.0000%	776,175	0.0038%
33855	0	0.0000%	1,571,253	0.0207%	0	0.0000%	3,527,730	0.0175%
33856	0	0.0000%	8,131	0.0001%	0	0.0000%	17,904	0.0001%
33857	0	0.0000%	1,980,769	0.0261%	0	0.0000%	3,700,746	0.0184%
33858	0	0.0000%	45,318	0.0006%	0	0.0000%	35,331	0.0002%
33859	0	0.0000%	10,167,327	0.1339%	0	0.0000%	13,240,178	0.0657%
33860	0	0.0000%	13,026,251	0.1716%	0	0.0000%	18,617,085	0.0923%
33862	0	0.0000%	6,699	0.0001%	0	0.0000%	20,092	0.0001%
33863	0	0.0000%	22,290	0.0003%	0	0.0000%	32,339	0.0002%
33865	0	0.0000%	434,566	0.0057%	0	0.0000%	3,165,832	0.0157%
33867	0	0.0000%	187,189	0.0025%	0	0.0000%	320,629	0.0016%
33868	0	0.0000%	10,510,725	0.1385%	0	0.0000%	5,275,749	0.0262%
33870	0	0.0000%	26,650,884	0.3511%	0	0.0000%	72,159,629	0.3578%
33871	0	0.0000%	10,283	0.0001%	0	0.0000%	26,388	0.0001%
33872	0	0.0000%	30,092,818	0.3964%	0	0.0000%	78,261,314	0.3881%
33873	0	0.0000%	8,667,595	0.1142%	0	0.0000%	41,979,963	0.2082%
33875	0	0.0000%	19,676,492	0.2592%	0	0.0000%	52,587,518	0.2608%
33876	0	0.0000%	9,664,849	0.1273%	0	0.0000%	25,478,804	0.1263%
33877	0	0.0000%	238,853	0.0031%	0	0.0000%	259,095	0.0013%
33880	0	0.0000%	37,035,454	0.4879%	0	0.0000%	28,886,623	0.1432%
33881	0	0.0000%	38,975,573	0.5135%	0	0.0000%	30,066,221	0.1491%
33882	0	0.0000%	26,822	0.0004%	0	0.0000%	20,775	0.0001%

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33883	0	0.0000%	14,015	0.0002%	0	0.0000%	10,916	0.0001%
33884	0	0.0000%	46,348,333	0.6106%	0	0.0000%	44,443,700	0.2204%
33885	0	0.0000%	1,367	0.0000%	0	0.0000%	1,067	0.0000%
33888	0	0.0000%	1,185	0.0000%	0	0.0000%	1,152	0.0000%
33890	0	0.0000%	4,570,693	0.0602%	0	0.0000%	15,933,267	0.0790%
33896	0	0.0000%	3,921,976	0.0517%	0	0.0000%	2,739,039	0.0136%
33897	0	0.0000%	9,829,973	0.1295%	0	0.0000%	5,912,683	0.0293%
33898	0	0.0000%	19,443,730	0.2562%	0	0.0000%	31,570,830	0.1566%
33901	0	0.0000%	13,243,343	0.1745%	0	0.0000%	164,892,541	0.8177%
33902	0	0.0000%	7,760	0.0001%	0	0.0000%	83,569	0.0004%
33903	0	0.0000%	19,617,307	0.2584%	0	0.0000%	237,660,992	1.1785%
33904	0	0.0000%	37,348,849	0.4920%	0	0.0000%	709,978,556	3.5206%
33905	0	0.0000%	29,309,783	0.3861%	0	0.0000%	246,910,595	1.2244%
33906	0	0.0000%	286	0.0000%	0	0.0000%	8,091	0.0000%
33907	0	0.0000%	13,099,547	0.1726%	0	0.0000%	202,642,559	1.0048%
33908	0	0.0000%	43,629,446	0.5748%	0	0.0000%	617,895,232	3.0640%
33909	0	0.0000%	10,096,905	0.1330%	0	0.0000%	188,278,215	0.9336%
33910	0	0.0000%	179	0.0000%	0	0.0000%	7,344	0.0000%
33911	0	0.0000%	109	0.0000%	0	0.0000%	2,504	0.0000%
33912	0	0.0000%	29,619,657	0.3902%	0	0.0000%	261,946,720	1.2989%
33913	0	0.0000%	30,922,580	0.4074%	0	0.0000%	150,604,739	0.7468%
33914	0	0.0000%	25,767,055	0.3395%	0	0.0000%	734,240,322	3.6409%
33915	0	0.0000%	5,995	0.0001%	0	0.0000%	207,989	0.0010%
33916	0	0.0000%	5,235,548	0.0690%	0	0.0000%	72,234,151	0.3582%
33917	0	0.0000%	29,896,866	0.3939%	0	0.0000%	300,037,907	1.4878%
33918	0	0.0000%	6,699	0.0001%	0	0.0000%	113,516	0.0006%
33919	0	0.0000%	35,426,819	0.4667%	0	0.0000%	610,948,351	3.0295%
33920	0	0.0000%	11,854,684	0.1562%	0	0.0000%	31,588,463	0.1566%
33921	0	0.0000%	4,839,557	0.0638%	0	0.0000%	360,558,936	1.7879%
33922	0	0.0000%	2,670,767	0.0352%	0	0.0000%	114,292,601	0.5667%
33924	0	0.0000%	2,900,119	0.0382%	0	0.0000%	160,541,981	0.7961%
33927	0	0.0000%	259	0.0000%	0	0.0000%	78,863	0.0004%
33928	0	0.0000%	34,621,871	0.4561%	0	0.0000%	141,671,928	0.7025%
33929	0	0.0000%	32,580	0.0004%	0	0.0000%	120,918	0.0006%
33930	0	0.0000%	928,431	0.0122%	0	0.0000%	575,984	0.0029%
33931	0	0.0000%	20,202,204	0.2661%	0	0.0000%	221,384,122	1.0978%
33932	0	0.0000%	38,222	0.0005%	0	0.0000%	721,177	0.0036%
33935	0	0.0000%	25,270,452	0.3329%	0	0.0000%	23,790,981	0.1180%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33936	0	0.0000%	38,390,775	0.5058%	0	0.0000%	85,780,632	0.4254%
33944	0	0.0000%	262,412	0.0035%	0	0.0000%	267,338	0.0013%
33945	0	0.0000%	5,846	0.0001%	0	0.0000%	261,399	0.0013%
33946	0	0.0000%	1,879,569	0.0248%	0	0.0000%	201,984,156	1.0016%
33947	0	0.0000%	2,339,526	0.0308%	0	0.0000%	263,526,886	1.3068%
33948	0	0.0000%	6,151,557	0.0810%	0	0.0000%	370,534,373	1.8374%
33950	0	0.0000%	25,950,945	0.3419%	0	0.0000%	626,362,657	3.1060%
33951	0	0.0000%	3,244	0.0000%	0	0.0000%	39,366	0.0002%
33952	0	0.0000%	13,266,025	0.1748%	0	0.0000%	549,330,677	2.7240%
33953	0	0.0000%	1,859,008	0.0245%	0	0.0000%	189,480,961	0.9396%
33954	0	0.0000%	3,559,458	0.0469%	0	0.0000%	186,614,908	0.9254%
33955	0	0.0000%	6,982,201	0.0920%	0	0.0000%	194,791,402	0.9659%
33956	0	0.0000%	3,725,537	0.0491%	0	0.0000%	120,309,238	0.5966%
33957	0	0.0000%	13,902,967	0.1832%	0	0.0000%	336,081,266	1.6665%
33960	0	0.0000%	1,062,125	0.0140%	0	0.0000%	1,899,420	0.0094%
33965	0	0.0000%	865	0.0000%	0	0.0000%	5,665	0.0000%
33966	0	0.0000%	8,768,318	0.1155%	0	0.0000%	115,376,708	0.5721%
33967	0	0.0000%	27,538,861	0.3628%	0	0.0000%	139,346,357	0.6910%
33970	0	0.0000%	19,316	0.0003%	0	0.0000%	68,362	0.0003%
33971	0	0.0000%	12,600,155	0.1660%	0	0.0000%	66,806,135	0.3313%
33972	0	0.0000%	15,266,496	0.2011%	0	0.0000%	35,780,740	0.1774%
33973	0	0.0000%	2,962,749	0.0390%	0	0.0000%	18,702,849	0.0927%
33974	0	0.0000%	10,080,644	0.1328%	0	0.0000%	17,810,885	0.0883%
33975	0	0.0000%	102,463	0.0013%	0	0.0000%	88,412	0.0004%
33976	0	0.0000%	6,135,120	0.0808%	0	0.0000%	22,690,197	0.1125%
33980	0	0.0000%	7,421,318	0.0978%	0	0.0000%	203,725,203	1.0102%
33981	0	0.0000%	3,265,315	0.0430%	0	0.0000%	294,020,427	1.4580%
33982	0	0.0000%	11,048,439	0.1456%	0	0.0000%	144,036,562	0.7142%
33983	0	0.0000%	11,996,545	0.1580%	0	0.0000%	355,659,200	1.7636%
33990	0	0.0000%	20,931,891	0.2758%	0	0.0000%	367,616,256	1.8229%
33991	0	0.0000%	8,788,226	0.1158%	0	0.0000%	235,943,025	1.1700%
33993	0	0.0000%	7,428,339	0.0979%	0	0.0000%	212,402,097	1.0532%
33994	0	0.0000%	3,529	0.0000%	0	0.0000%	21,046	0.0001%
34101	0	0.0000%	35,204	0.0005%	0	0.0000%	57,135	0.0003%
34102	0	0.0000%	41,412,352	0.5456%	0	0.0000%	64,503,752	0.3199%
34103	0	0.0000%	29,067,218	0.3829%	0	0.0000%	57,118,058	0.2832%
34104	0	0.0000%	32,256,300	0.4249%	0	0.0000%	34,161,821	0.1694%
34105	0	0.0000%	36,742,737	0.4840%	0	0.0000%	52,198,494	0.2588%

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34106	0	0.0000%	411	0.0000%	0	0.0000%	705	0.0000%
34107	0	0.0000%	23	0.0000%	0	0.0000%	64	0.0000%
34108	0	0.0000%	53,260,802	0.7017%	0	0.0000%	128,763,812	0.6385%
34109	0	0.0000%	35,683,430	0.4701%	0	0.0000%	65,542,041	0.3250%
34110	0	0.0000%	46,687,534	0.6151%	0	0.0000%	120,120,083	0.5956%
34112	0	0.0000%	41,148,245	0.5421%	0	0.0000%	42,520,000	0.2108%
34113	0	0.0000%	41,024,600	0.5405%	0	0.0000%	29,693,032	0.1472%
34114	0	0.0000%	33,371,315	0.4396%	0	0.0000%	16,143,483	0.0801%
34116	0	0.0000%	31,470,443	0.4146%	0	0.0000%	28,922,963	0.1434%
34117	0	0.0000%	25,658,075	0.3380%	0	0.0000%	13,670,609	0.0678%
34119	0	0.0000%	61,966,230	0.8163%	0	0.0000%	82,092,122	0.4071%
34120	0	0.0000%	60,521,585	0.7973%	0	0.0000%	31,952,736	0.1584%
34133	0	0.0000%	4,912	0.0001%	0	0.0000%	15,035	0.0001%
34134	0	0.0000%	46,026,860	0.6064%	0	0.0000%	178,964,892	0.8874%
34135	0	0.0000%	61,078,253	0.8046%	0	0.0000%	163,970,487	0.8131%
34136	0	0.0000%	7,234	0.0001%	0	0.0000%	15,323	0.0001%
34137	0	0.0000%	123,945	0.0016%	0	0.0000%	21,844	0.0001%
34138	0	0.0000%	909,662	0.0120%	0	0.0000%	100,209	0.0005%
34139	0	0.0000%	1,626,438	0.0214%	0	0.0000%	194,579	0.0010%
34140	0	0.0000%	1,137,503	0.0150%	0	0.0000%	324,244	0.0016%
34141	0	0.0000%	165,293	0.0022%	0	0.0000%	29,284	0.0001%
34142	0	0.0000%	12,776,071	0.1683%	0	0.0000%	5,307,601	0.0263%
34143	0	0.0000%	80,973	0.0011%	0	0.0000%	35,334	0.0002%
34145	0	0.0000%	88,937,266	1.1717%	0	0.0000%	42,344,606	0.2100%
34146	0	0.0000%	246,043	0.0032%	0	0.0000%	111,084	0.0006%
34201	0	0.0000%	1,026,270	0.0135%	0	0.0000%	16,577,195	0.0822%
34202	0	0.0000%	4,898,851	0.0645%	0	0.0000%	75,773,353	0.3757%
34203	0	0.0000%	3,459,098	0.0456%	0	0.0000%	49,151,758	0.2437%
34204	0	0.0000%	560	0.0000%	0	0.0000%	7,577	0.0000%
34205	0	0.0000%	2,769,967	0.0365%	0	0.0000%	33,969,752	0.1684%
34206	0	0.0000%	1,424	0.0000%	0	0.0000%	12,254	0.0001%
34207	0	0.0000%	1,765,650	0.0233%	0	0.0000%	26,889,478	0.1333%
34208	0	0.0000%	2,895,282	0.0381%	0	0.0000%	32,911,481	0.1632%
34209	0	0.0000%	8,395,633	0.1106%	0	0.0000%	92,238,662	0.4574%
34210	0	0.0000%	1,785,875	0.0235%	0	0.0000%	26,970,424	0.1337%
34211	0	0.0000%	1,515,518	0.0200%	0	0.0000%	18,576,523	0.0921%
34212	0	0.0000%	3,166,942	0.0417%	0	0.0000%	32,451,000	0.1609%
34215	0	0.0000%	224,405	0.0030%	0	0.0000%	3,035,267	0.0151%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
34216	0	0.0000%	769,357	0.0101%	0	0.0000%	5,920,060	0.0294%
34217	0	0.0000%	2,464,787	0.0325%	0	0.0000%	23,701,979	0.1175%
34218	0	0.0000%	3,936	0.0001%	0	0.0000%	46,288	0.0002%
34219	0	0.0000%	4,335,923	0.0571%	0	0.0000%	31,890,906	0.1581%
34220	0	0.0000%	592	0.0000%	0	0.0000%	4,715	0.0000%
34221	0	0.0000%	5,158,592	0.0680%	0	0.0000%	41,983,598	0.2082%
34222	0	0.0000%	1,702,200	0.0224%	0	0.0000%	14,713,263	0.0730%
34223	0	0.0000%	4,965,746	0.0654%	0	0.0000%	487,189,332	2.4158%
34224	0	0.0000%	3,653,025	0.0481%	0	0.0000%	430,441,200	2.1344%
34228	0	0.0000%	4,070,931	0.0536%	0	0.0000%	75,714,063	0.3754%
34229	0	0.0000%	2,412,015	0.0318%	0	0.0000%	75,310,540	0.3734%
34230	0	0.0000%	730	0.0000%	0	0.0000%	14,898	0.0001%
34231	0	0.0000%	5,472,859	0.0721%	0	0.0000%	154,187,486	0.7646%
34232	0	0.0000%	4,638,526	0.0611%	0	0.0000%	113,443,099	0.5625%
34233	0	0.0000%	2,394,118	0.0315%	0	0.0000%	71,292,363	0.3535%
34234	0	0.0000%	1,480,021	0.0195%	0	0.0000%	28,442,845	0.1410%
34235	0	0.0000%	2,328,470	0.0307%	0	0.0000%	56,269,503	0.2790%
34236	0	0.0000%	2,479,628	0.0327%	0	0.0000%	46,748,038	0.2318%
34237	0	0.0000%	1,046,240	0.0138%	0	0.0000%	24,064,632	0.1193%
34238	0	0.0000%	3,775,899	0.0497%	0	0.0000%	127,634,609	0.6329%
34239	0	0.0000%	2,851,333	0.0376%	0	0.0000%	62,804,883	0.3114%
34240	0	0.0000%	3,687,490	0.0486%	0	0.0000%	72,723,940	0.3606%
34241	0	0.0000%	4,202,758	0.0554%	0	0.0000%	114,822,966	0.5694%
34242	0	0.0000%	3,275,938	0.0432%	0	0.0000%	71,624,989	0.3552%
34243	0	0.0000%	4,139,714	0.0545%	0	0.0000%	73,263,441	0.3633%
34250	0	0.0000%	206,245	0.0027%	0	0.0000%	1,577,079	0.0078%
34251	0	0.0000%	2,061,130	0.0272%	0	0.0000%	23,652,260	0.1173%
34264	0	0.0000%	9	0.0000%	0	0.0000%	211	0.0000%
34265	0	0.0000%	14,588	0.0002%	0	0.0000%	116,135	0.0006%
34266	0	0.0000%	18,020,271	0.2374%	0	0.0000%	166,339,093	0.8248%
34267	0	0.0000%	26,544	0.0003%	0	0.0000%	297,741	0.0015%
34268	0	0.0000%	36,002	0.0005%	0	0.0000%	408,719	0.0020%
34269	0	0.0000%	3,588,308	0.0473%	0	0.0000%	95,901,673	0.4756%
34270	0	0.0000%	3,048	0.0000%	0	0.0000%	54,087	0.0003%
34272	0	0.0000%	575	0.0000%	0	0.0000%	27,367	0.0001%
34274	0	0.0000%	699	0.0000%	0	0.0000%	16,074	0.0001%
34275	0	0.0000%	4,225,331	0.0557%	0	0.0000%	173,253,955	0.8591%
34276	0	0.0000%	1,054	0.0000%	0	0.0000%	48,364	0.0002%

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34277	0	0.0000%	6,462	0.0001%	0	0.0000%	233,094	0.0012%
34278	0	0.0000%	424	0.0000%	0	0.0000%	7,151	0.0000%
34280	0	0.0000%	29	0.0000%	0	0.0000%	571	0.0000%
34281	0	0.0000%	4,628	0.0001%	0	0.0000%	62,244	0.0003%
34282	0	0.0000%	1,276	0.0000%	0	0.0000%	16,867	0.0001%
34284	0	0.0000%	30	0.0000%	0	0.0000%	3,963	0.0000%
34285	0	0.0000%	3,199,835	0.0422%	0	0.0000%	170,926,846	0.8476%
34286	0	0.0000%	3,169,808	0.0418%	0	0.0000%	212,801,723	1.0552%
34287	0	0.0000%	5,878,090	0.0774%	0	0.0000%	345,931,042	1.7154%
34288	0	0.0000%	1,803,077	0.0238%	0	0.0000%	143,713,693	0.7126%
34289	0	0.0000%	359,499	0.0047%	0	0.0000%	34,538,282	0.1713%
34290	0	0.0000%	2,018	0.0000%	0	0.0000%	59,861	0.0003%
34291	0	0.0000%	918,632	0.0121%	0	0.0000%	53,491,886	0.2653%
34292	0	0.0000%	2,905,242	0.0383%	0	0.0000%	164,916,815	0.8178%
34293	0	0.0000%	7,142,198	0.0941%	0	0.0000%	491,653,980	2.4380%
34420	0	0.0000%	9,564,819	0.1260%	0	0.0000%	957,027	0.0047%
34421	0	0.0000%	20,875	0.0003%	0	0.0000%	1,996	0.0000%
34423	0	0.0000%	5,270	0.0001%	0	0.0000%	1,064	0.0000%
34428	0	0.0000%	2,853,811	0.0376%	0	0.0000%	576,863	0.0029%
34429	0	0.0000%	3,961,473	0.0522%	0	0.0000%	869,105	0.0043%
34430	0	0.0000%	21,066	0.0003%	0	0.0000%	3,055	0.0000%
34431	0	0.0000%	3,029,799	0.0399%	0	0.0000%	464,552	0.0023%
34432	0	0.0000%	4,968,566	0.0655%	0	0.0000%	752,359	0.0037%
34433	0	0.0000%	1,979,252	0.0261%	0	0.0000%	367,717	0.0018%
34434	0	0.0000%	2,510,660	0.0331%	0	0.0000%	489,323	0.0024%
34436	0	0.0000%	3,806,338	0.0501%	0	0.0000%	734,429	0.0036%
34442	0	0.0000%	6,511,419	0.0858%	0	0.0000%	1,271,366	0.0063%
34445	0	0.0000%	13,097	0.0002%	0	0.0000%	2,321	0.0000%
34446	0	0.0000%	6,716,214	0.0885%	0	0.0000%	1,743,226	0.0086%
34447	0	0.0000%	1,796	0.0000%	0	0.0000%	391	0.0000%
34448	0	0.0000%	3,259,718	0.0429%	0	0.0000%	775,657	0.0038%
34449	0	0.0000%	620,810	0.0082%	0	0.0000%	89,614	0.0004%
34450	0	0.0000%	6,304,825	0.0831%	0	0.0000%	1,086,271	0.0054%
34451	0	0.0000%	3,010	0.0000%	0	0.0000%	509	0.0000%
34452	0	0.0000%	6,416,132	0.0845%	0	0.0000%	1,152,977	0.0057%
34453	0	0.0000%	3,834,018	0.0505%	0	0.0000%	726,413	0.0036%
34460	0	0.0000%	1,328	0.0000%	0	0.0000%	288	0.0000%
34461	0	0.0000%	3,983,470	0.0525%	0	0.0000%	919,093	0.0046%

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34464	0	0.0000%	1,690	0.0000%	0	0.0000%	395	0.0000%
34465	0	0.0000%	6,904,717	0.0910%	0	0.0000%	1,425,718	0.0071%
34470	0	0.0000%	8,965,205	0.1181%	0	0.0000%	822,438	0.0041%
34471	0	0.0000%	17,106,925	0.2254%	0	0.0000%	1,742,310	0.0086%
34472	0	0.0000%	13,599,401	0.1792%	0	0.0000%	1,318,839	0.0065%
34473	0	0.0000%	6,287,655	0.0828%	0	0.0000%	900,731	0.0045%
34474	0	0.0000%	4,249,376	0.0560%	0	0.0000%	486,217	0.0024%
34475	0	0.0000%	2,331,046	0.0307%	0	0.0000%	228,987	0.0011%
34476	0	0.0000%	10,858,458	0.1430%	0	0.0000%	1,465,285	0.0073%
34477	0	0.0000%	11,813	0.0002%	0	0.0000%	1,366	0.0000%
34478	0	0.0000%	25,613	0.0003%	0	0.0000%	2,543	0.0000%
34479	0	0.0000%	7,007,350	0.0923%	0	0.0000%	618,955	0.0031%
34480	0	0.0000%	12,681,117	0.1671%	0	0.0000%	1,335,788	0.0066%
34481	0	0.0000%	7,405,722	0.0976%	0	0.0000%	1,049,827	0.0052%
34482	0	0.0000%	7,965,608	0.1049%	0	0.0000%	918,478	0.0046%
34483	0	0.0000%	3,133	0.0000%	0	0.0000%	285	0.0000%
34484	0	0.0000%	1,775,736	0.0234%	0	0.0000%	274,393	0.0014%
34487	0	0.0000%	865	0.0000%	0	0.0000%	213	0.0000%
34488	0	0.0000%	4,406,653	0.0581%	0	0.0000%	340,373	0.0017%
34489	0	0.0000%	7,055	0.0001%	0	0.0000%	583	0.0000%
34491	0	0.0000%	19,494,745	0.2568%	0	0.0000%	2,172,836	0.0108%
34492	0	0.0000%	16,053	0.0002%	0	0.0000%	1,654	0.0000%
34498	0	0.0000%	268,517	0.0035%	0	0.0000%	53,628	0.0003%
34601	0	0.0000%	4,788,518	0.0631%	0	0.0000%	1,614,878	0.0080%
34602	0	0.0000%	3,268,932	0.0431%	0	0.0000%	1,180,033	0.0059%
34603	0	0.0000%	2,277	0.0000%	0	0.0000%	711	0.0000%
34604	0	0.0000%	1,740,704	0.0229%	0	0.0000%	906,002	0.0045%
34605	0	0.0000%	925	0.0000%	0	0.0000%	245	0.0000%
34606	0	0.0000%	5,635,665	0.0742%	0	0.0000%	3,133,163	0.0155%
34607	0	0.0000%	2,381,075	0.0314%	0	0.0000%	1,315,281	0.0065%
34608	0	0.0000%	6,605,073	0.0870%	0	0.0000%	3,430,296	0.0170%
34609	0	0.0000%	7,809,529	0.1029%	0	0.0000%	4,059,634	0.0201%
34610	0	0.0000%	2,162,903	0.0285%	0	0.0000%	1,532,408	0.0076%
34611	0	0.0000%	1,452	0.0000%	0	0.0000%	866	0.0000%
34613	0	0.0000%	5,285,386	0.0696%	0	0.0000%	1,970,310	0.0098%
34614	0	0.0000%	1,133,372	0.0149%	0	0.0000%	406,640	0.0020%
34636	0	0.0000%	6,320	0.0001%	0	0.0000%	1,410	0.0000%
34637	0	0.0000%	880,354	0.0116%	0	0.0000%	782,695	0.0039%

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34638	0	0.0000%	2,586,597	0.0341%	0	0.0000%	2,644,105	0.0131%
34639	0	0.0000%	5,323,066	0.0701%	0	0.0000%	4,896,907	0.0243%
34652	0	0.0000%	2,724,000	0.0359%	0	0.0000%	3,555,283	0.0176%
34653	0	0.0000%	2,460,217	0.0324%	0	0.0000%	3,548,129	0.0176%
34654	0	0.0000%	2,201,392	0.0290%	0	0.0000%	2,491,379	0.0124%
34655	0	0.0000%	4,402,905	0.0580%	0	0.0000%	6,558,710	0.0325%
34656	0	0.0000%	254	0.0000%	0	0.0000%	412	0.0000%
34660	0	0.0000%	5,936	0.0001%	0	0.0000%	12,396	0.0001%
34661	0	0.0000%	32,951	0.0004%	0	0.0000%	8,279	0.0000%
34667	0	0.0000%	5,274,555	0.0695%	0	0.0000%	4,161,381	0.0206%
34668	0	0.0000%	4,199,886	0.0553%	0	0.0000%	4,804,063	0.0238%
34669	0	0.0000%	1,515,091	0.0200%	0	0.0000%	1,336,785	0.0066%
34674	0	0.0000%	9	0.0000%	0	0.0000%	8	0.0000%
34677	0	0.0000%	2,418,444	0.0319%	0	0.0000%	5,297,973	0.0263%
34679	0	0.0000%	3,643	0.0000%	0	0.0000%	2,343	0.0000%
34680	0	0.0000%	66	0.0000%	0	0.0000%	108	0.0000%
34681	0	0.0000%	306,827	0.0040%	0	0.0000%	559,481	0.0028%
34682	0	0.0000%	107	0.0000%	0	0.0000%	277	0.0000%
34683	0	0.0000%	4,738,273	0.0624%	0	0.0000%	9,531,488	0.0473%
34684	0	0.0000%	2,918,680	0.0385%	0	0.0000%	6,143,643	0.0305%
34685	0	0.0000%	2,180,521	0.0287%	0	0.0000%	3,982,654	0.0197%
34688	0	0.0000%	1,241,024	0.0163%	0	0.0000%	2,042,071	0.0101%
34689	0	0.0000%	2,687,060	0.0354%	0	0.0000%	4,635,827	0.0230%
34690	0	0.0000%	1,033,797	0.0136%	0	0.0000%	1,487,781	0.0074%
34691	0	0.0000%	1,645,973	0.0217%	0	0.0000%	2,386,727	0.0118%
34695	0	0.0000%	2,743,125	0.0361%	0	0.0000%	6,605,873	0.0328%
34698	0	0.0000%	4,376,566	0.0577%	0	0.0000%	9,516,722	0.0472%
34705	0	0.0000%	1,935,964	0.0255%	0	0.0000%	414,855	0.0021%
34711	0	0.0000%	30,181,552	0.3976%	0	0.0000%	10,772,909	0.0534%
34712	0	0.0000%	10,241	0.0001%	0	0.0000%	2,721	0.0000%
34713	0	0.0000%	7	0.0000%	0	0.0000%	3	0.0000%
34714	0	0.0000%	5,944,243	0.0783%	0	0.0000%	2,928,173	0.0145%
34715	0	0.0000%	7,926,427	0.1044%	0	0.0000%	2,333,423	0.0116%
34729	0	0.0000%	54,924	0.0007%	0	0.0000%	16,869	0.0001%
34731	0	0.0000%	9,564,556	0.1260%	0	0.0000%	1,208,858	0.0060%
34734	151,324	0.0267%	1,905,594	0.0251%	0	0.0000%	957,434	0.0047%
34736	0	0.0000%	10,614,764	0.1398%	0	0.0000%	2,524,339	0.0125%
34737	0	0.0000%	3,181,142	0.0419%	0	0.0000%	668,143	0.0033%

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34739	28,072	0.0050%	716,620	0.0094%	0	0.0000%	812,862	0.0040%
34740	1,493	0.0003%	29,311	0.0004%	0	0.0000%	14,149	0.0001%
34741	0	0.0000%	8,547,344	0.1126%	0	0.0000%	6,262,773	0.0311%
34742	0	0.0000%	1,539	0.0000%	0	0.0000%	1,083	0.0000%
34743	0	0.0000%	13,775,179	0.1815%	0	0.0000%	11,196,518	0.0555%
34744	0	0.0000%	19,896,827	0.2621%	0	0.0000%	17,496,819	0.0868%
34745	0	0.0000%	1,448	0.0000%	0	0.0000%	1,087	0.0000%
34746	0	0.0000%	17,997,744	0.2371%	0	0.0000%	15,049,568	0.0746%
34747	0	0.0000%	10,063,357	0.1326%	0	0.0000%	6,642,145	0.0329%
34748	0	0.0000%	35,223,101	0.4640%	0	0.0000%	5,623,858	0.0279%
34749	0	0.0000%	64,692	0.0009%	0	0.0000%	9,131	0.0000%
34753	0	0.0000%	1,888,484	0.0249%	0	0.0000%	449,191	0.0022%
34755	0	0.0000%	52,161	0.0007%	0	0.0000%	18,241	0.0001%
34756	0	0.0000%	2,961,363	0.0390%	0	0.0000%	1,112,692	0.0055%
34758	0	0.0000%	9,438,699	0.1243%	0	0.0000%	8,597,779	0.0426%
34759	0	0.0000%	10,421,011	0.1373%	0	0.0000%	11,195,581	0.0555%
34760	52,670	0.0093%	880,337	0.0116%	0	0.0000%	402,781	0.0020%
34761	1,292,915	0.2281%	13,970,428	0.1840%	0	0.0000%	6,296,101	0.0312%
34762	0	0.0000%	591,134	0.0078%	0	0.0000%	102,796	0.0005%
34769	0	0.0000%	11,549,817	0.1522%	0	0.0000%	13,332,551	0.0661%
34770	519	0.0001%	12,156	0.0002%	0	0.0000%	12,782	0.0001%
34771	564,287	0.0996%	7,912,226	0.1042%	0	0.0000%	9,961,219	0.0494%
34772	0	0.0000%	9,998,780	0.1317%	0	0.0000%	11,577,728	0.0574%
34773	0	0.0000%	970,491	0.0128%	0	0.0000%	1,093,229	0.0054%
34777	82	0.0000%	1,016	0.0000%	0	0.0000%	441	0.0000%
34778	117	0.0000%	2,464	0.0000%	0	0.0000%	1,233	0.0000%
34785	0	0.0000%	6,336,083	0.0835%	0	0.0000%	851,886	0.0042%
34786	0	0.0000%	31,899,156	0.4202%	0	0.0000%	16,564,264	0.0821%
34787	0	0.0000%	22,927,373	0.3020%	0	0.0000%	10,847,065	0.0538%
34788	747,225	0.1318%	19,236,736	0.2534%	0	0.0000%	2,638,273	0.0131%
34789	830	0.0001%	19,212	0.0003%	0	0.0000%	2,941	0.0000%
34797	0	0.0000%	2,260,284	0.0298%	0	0.0000%	440,223	0.0022%
34945	318,851	0.0563%	1,738,217	0.0229%	0	0.0000%	680,530	0.0034%
34946	521,554	0.0920%	1,723,323	0.0227%	0	0.0000%	560,518	0.0028%
34947	391,173	0.0690%	1,383,472	0.0182%	0	0.0000%	458,294	0.0023%
34948	6	0.0000%	24	0.0000%	0	0.0000%	6	0.0000%
34949	2,543,254	0.4487%	7,402,896	0.0975%	0	0.0000%	2,240,334	0.0111%
34950	622,665	0.1099%	2,342,998	0.0309%	0	0.0000%	730,669	0.0036%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss (\$)	Percent of Total Loss (%)
34951	1,852,251	0.3268%	6,355,748	0.0837%	0	0.0000%	2,247,593	0.0111%
34952	3,433,844	0.6058%	16,995,401	0.2239%	0	0.0000%	4,749,046	0.0235%
34953	2,911,477	0.5137%	17,486,587	0.2304%	0	0.0000%	6,151,784	0.0305%
34954	131	0.0000%	398	0.0000%	0	0.0000%	151	0.0000%
34956	92,021	0.0162%	1,952,564	0.0257%	0	0.0000%	787,933	0.0039%
34957	2,901,273	0.5119%	12,037,591	0.1586%	0	0.0000%	3,327,245	0.0165%
34958	1,757	0.0003%	8,122	0.0001%	0	0.0000%	2,226	0.0000%
34972	0	0.0000%	10,317,538	0.1359%	0	0.0000%	7,078,711	0.0351%
34973	0	0.0000%	42,542	0.0006%	0	0.0000%	27,082	0.0001%
34974	0	0.0000%	35,317,226	0.4653%	0	0.0000%	25,138,308	0.1247%
34979	174	0.0000%	969	0.0000%	0	0.0000%	289	0.0000%
34981	296,111	0.0522%	1,219,572	0.0161%	0	0.0000%	413,361	0.0020%
34982	2,121,088	0.3742%	8,672,163	0.1142%	0	0.0000%	2,579,751	0.0128%
34983	2,793,222	0.4928%	12,950,033	0.1706%	0	0.0000%	4,126,367	0.0205%
34984	1,080,039	0.1906%	5,954,246	0.0784%	0	0.0000%	1,871,566	0.0093%
34985	309	0.0001%	1,562	0.0000%	0	0.0000%	454	0.0000%
34986	1,802,545	0.3180%	9,168,270	0.1208%	0	0.0000%	3,505,723	0.0174%
34987	444,694	0.0785%	2,789,985	0.0368%	0	0.0000%	1,189,304	0.0059%
34990	3,224,490	0.5689%	21,147,099	0.2786%	0	0.0000%	6,057,566	0.0300%
34991	681	0.0001%	3,505	0.0000%	0	0.0000%	908	0.0000%
34992	908	0.0002%	3,856	0.0001%	0	0.0000%	851	0.0000%
34994	1,149,064	0.2027%	5,606,330	0.0739%	0	0.0000%	1,356,733	0.0067%
34995	240	0.0000%	1,036	0.0000%	0	0.0000%	271	0.0000%
34996	2,698,123	0.4760%	10,626,500	0.1400%	0	0.0000%	2,643,397	0.0131%
34997	3,988,313	0.7037%	21,305,563	0.2807%	0	0.0000%	5,156,561	0.0256%

Figure 74: Percentage of residential hurricane losses 2017 FHCF from Hurricane Matthew (2016) by ZIP Code

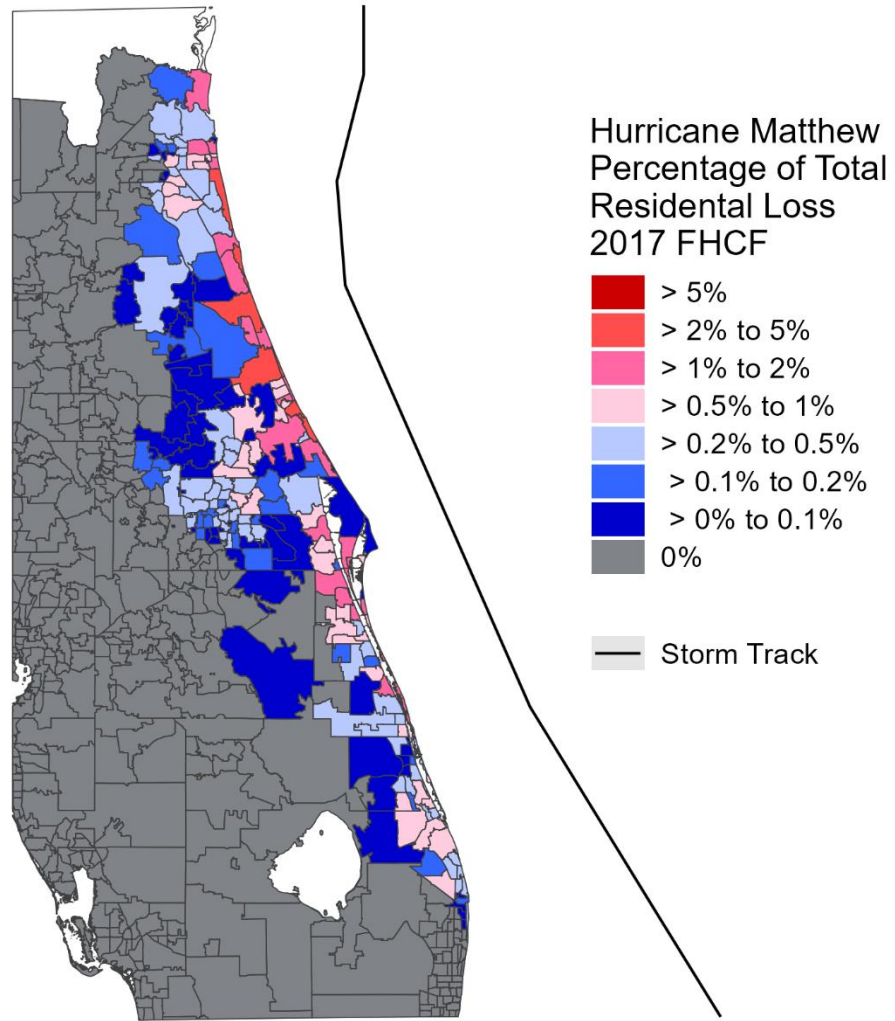


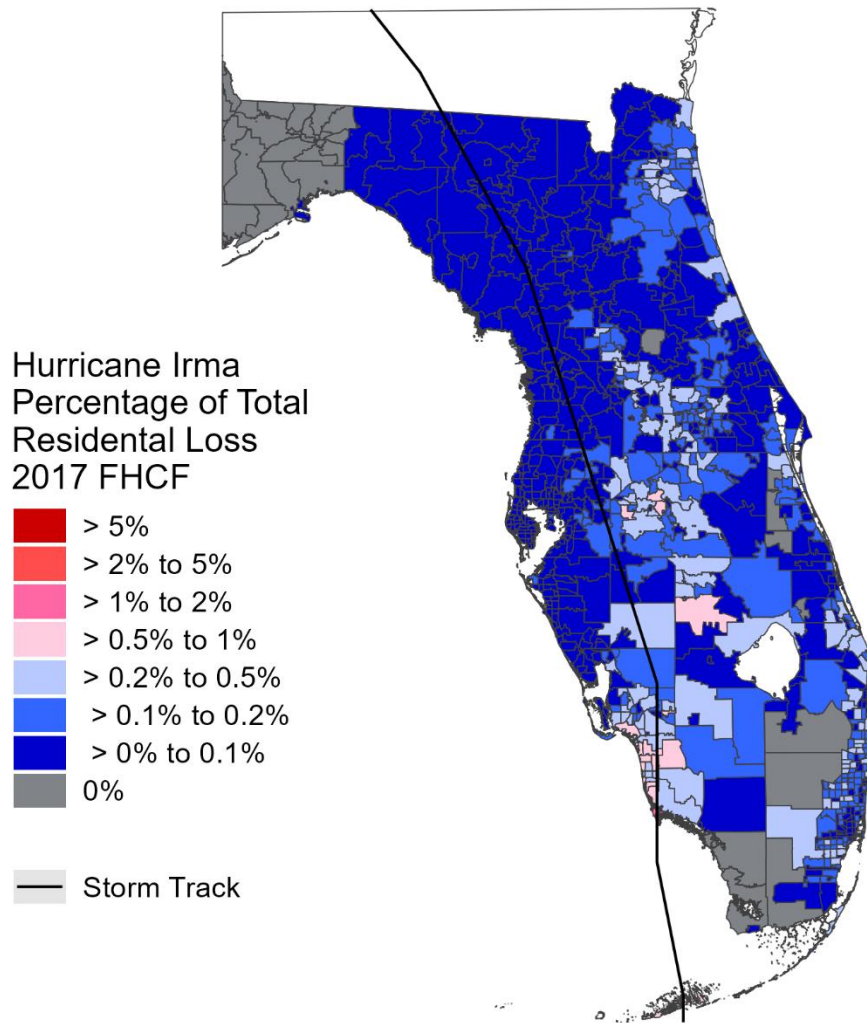
Figure 75: Percentage of residential hurricane losses 2017 FHCF from Hurricane Irma (2017) by ZIP Code

Figure 76: Percentage of residential hurricane losses 2017 FHCF from Hurricane Michael (2018) by ZIP Code

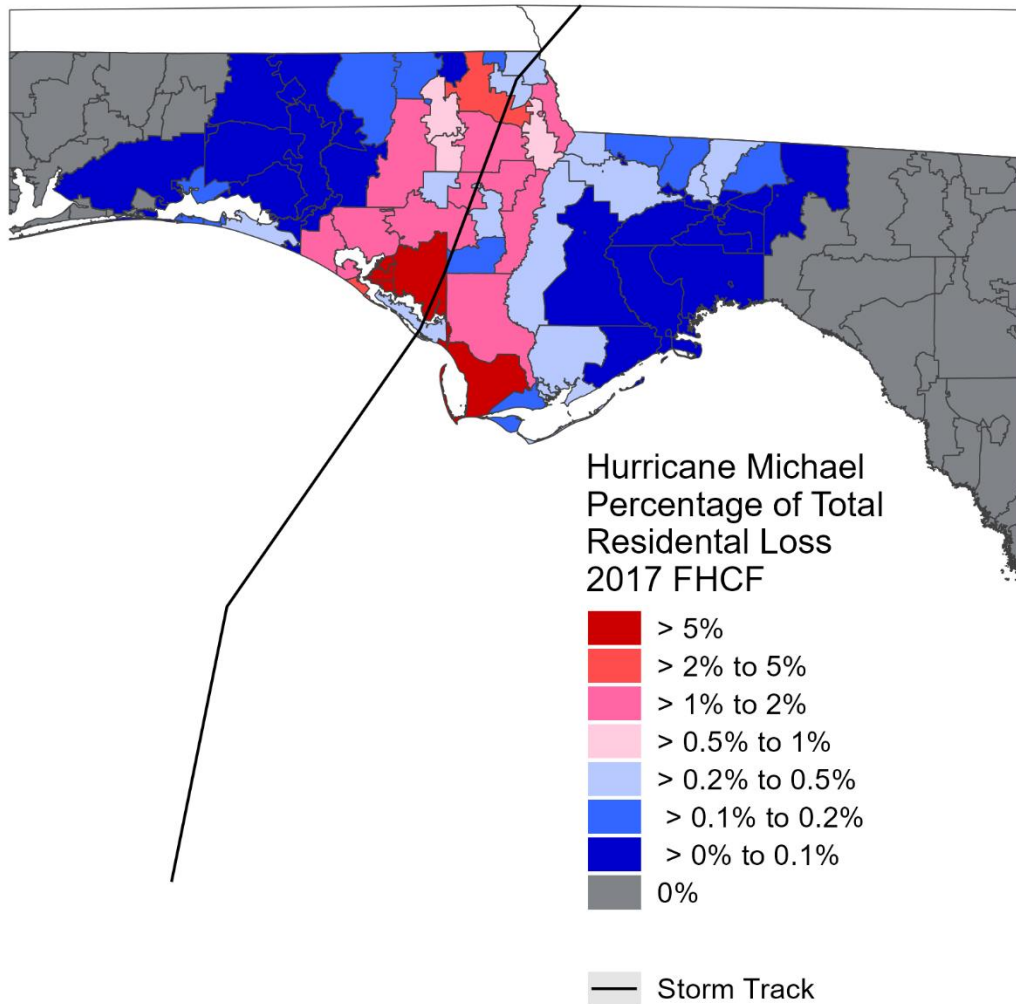
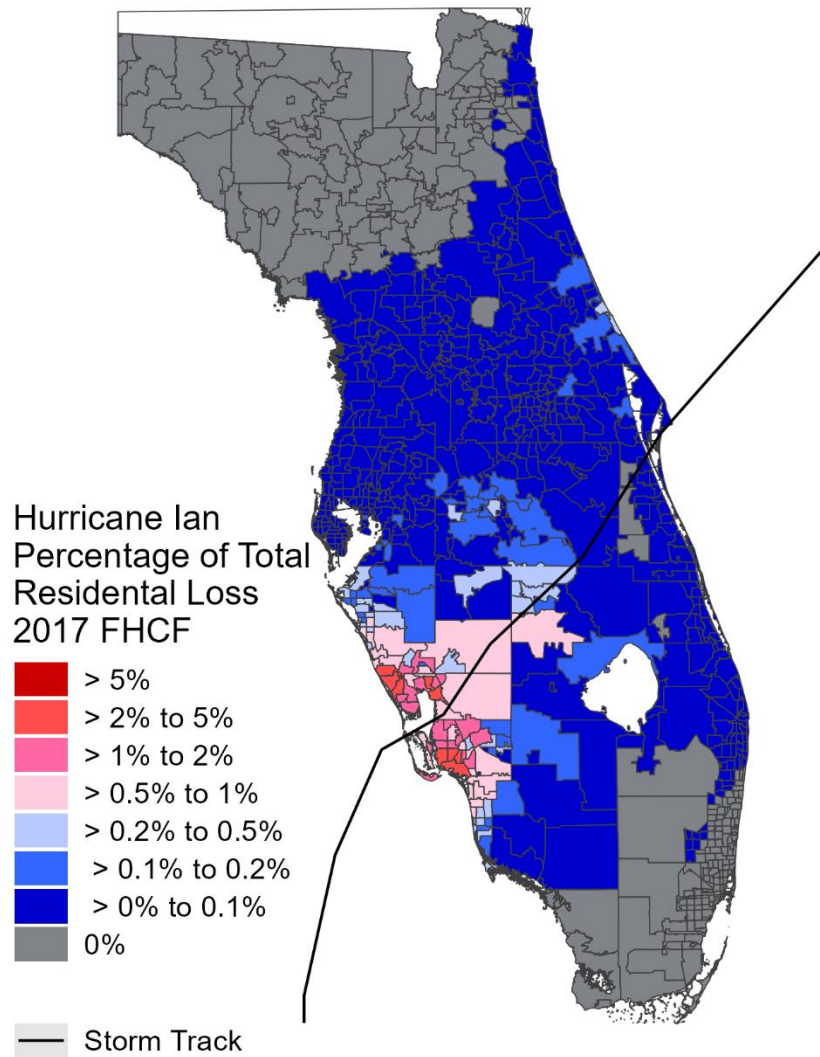


Figure 77: Percentage of residential hurricane losses 2017 FHCF from Hurricane Ian (2022) by ZIP Code

Part B – 2023 FHCF Exposure Data**Table 41: Hurricane Matthew (2016), Hurricane Irma (2017), Hurricane Michael (2018), and Hurricane Ian (2022) percent of hurricane losses for the 2023 FHCF exposure data**

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
32003	2,436,596	0.3047%	25,356,380	0.2426%	0	0.0000%	0	0.0000%
32004	6,544	0.0008%	12,501	0.0001%	0	0.0000%	2,773	0.0000%
32007	1,232	0.0002%	10,001	0.0001%	0	0.0000%	841	0.0000%
32008	0	0.0000%	1,005,024	0.0096%	0	0.0000%	0	0.0000%
32009	0	0.0000%	1,082,209	0.0104%	0	0.0000%	0	0.0000%
32011	0	0.0000%	4,362,523	0.0417%	0	0.0000%	0	0.0000%
32013	0	0.0000%	689	0.0000%	0	0.0000%	0	0.0000%
32024	0	0.0000%	3,834,658	0.0367%	0	0.0000%	0	0.0000%
32025	0	0.0000%	3,236,540	0.0310%	0	0.0000%	0	0.0000%
32033	690,446	0.0863%	1,725,775	0.0165%	0	0.0000%	360,973	0.0013%
32034	11,450,556	1.4319%	42,748,152	0.4089%	0	0.0000%	5,838,139	0.0209%
32035	1,977	0.0002%	6,717	0.0001%	0	0.0000%	1,183	0.0000%
32038	0	0.0000%	1,622,580	0.0155%	0	0.0000%	0	0.0000%
32040	0	0.0000%	1,928,805	0.0185%	0	0.0000%	0	0.0000%
32041	397	0.0000%	1,674	0.0000%	0	0.0000%	0	0.0000%
32042	0	0.0000%	21,841	0.0002%	0	0.0000%	0	0.0000%
32043	1,533,801	0.1918%	16,945,611	0.1621%	0	0.0000%	0	0.0000%
32044	0	0.0000%	576,620	0.0055%	0	0.0000%	0	0.0000%
32046	0	0.0000%	2,462,648	0.0236%	0	0.0000%	0	0.0000%
32050	0	0.0000%	1,733	0.0000%	0	0.0000%	0	0.0000%
32052	0	0.0000%	764,092	0.0073%	0	0.0000%	0	0.0000%
32053	0	0.0000%	362,273	0.0035%	0	0.0000%	0	0.0000%
32054	0	0.0000%	1,791,023	0.0171%	0	0.0000%	0	0.0000%
32055	0	0.0000%	1,973,988	0.0189%	0	0.0000%	0	0.0000%
32056	0	0.0000%	8,231	0.0001%	0	0.0000%	0	0.0000%
32058	0	0.0000%	1,004,642	0.0096%	0	0.0000%	0	0.0000%
32059	0	0.0000%	404,988	0.0039%	0	0.0000%	0	0.0000%
32060	0	0.0000%	3,225,973	0.0309%	0	0.0000%	0	0.0000%
32061	0	0.0000%	43,203	0.0004%	0	0.0000%	0	0.0000%
32062	0	0.0000%	410,475	0.0039%	0	0.0000%	0	0.0000%
32063	0	0.0000%	3,938,408	0.0377%	0	0.0000%	0	0.0000%
32064	0	0.0000%	830,010	0.0079%	0	0.0000%	0	0.0000%
32065	0	0.0000%	16,133,166	0.1543%	0	0.0000%	0	0.0000%
32066	0	0.0000%	608,512	0.0058%	0	0.0000%	0	0.0000%
32067	1	0.0000%	29	0.0000%	0	0.0000%	0	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
32068	0	0.0000%	20,329,662	0.1945%	0	0.0000%	0	0.0000%
32071	0	0.0000%	661,338	0.0063%	0	0.0000%	0	0.0000%
32073	2,111,533	0.2640%	34,088,959	0.3261%	0	0.0000%	0	0.0000%
32079	0	0.0000%	26,259	0.0003%	0	0.0000%	0	0.0000%
32080	20,629,508	2.5797%	22,706,446	0.2172%	0	0.0000%	7,435,017	0.0267%
32081	2,768,079	0.3461%	6,604,509	0.0632%	0	0.0000%	1,597,971	0.0057%
32082	24,988,418	3.1248%	50,332,439	0.4815%	0	0.0000%	9,147,137	0.0328%
32083	0	0.0000%	206,528	0.0020%	0	0.0000%	0	0.0000%
32084	9,247,343	1.1564%	14,563,670	0.1393%	0	0.0000%	3,922,196	0.0141%
32085	737	0.0001%	1,112	0.0000%	0	0.0000%	281	0.0000%
32086	11,461,663	1.4333%	14,439,924	0.1381%	0	0.0000%	4,723,104	0.0169%
32087	0	0.0000%	568,363	0.0054%	0	0.0000%	0	0.0000%
32091	0	0.0000%	6,198,245	0.0593%	0	0.0000%	0	0.0000%
32092	3,882,782	0.4855%	15,683,389	0.1500%	0	0.0000%	2,739,641	0.0098%
32094	0	0.0000%	477,211	0.0046%	0	0.0000%	0	0.0000%
32095	3,052,505	0.3817%	6,160,695	0.0589%	0	0.0000%	1,571,189	0.0056%
32096	0	0.0000%	329,192	0.0031%	0	0.0000%	0	0.0000%
32097	1,372,020	0.1716%	6,614,228	0.0633%	0	0.0000%	0	0.0000%
32099	0	0.0000%	1,907	0.0000%	0	0.0000%	0	0.0000%
32102	233,711	0.0292%	1,387,463	0.0133%	0	0.0000%	337,106	0.0012%
32105	214	0.0000%	790	0.0000%	0	0.0000%	389	0.0000%
32110	1,362,533	0.1704%	1,729,694	0.0165%	0	0.0000%	1,098,662	0.0039%
32111	0	0.0000%	25,080	0.0002%	0	0.0000%	2,357	0.0000%
32112	841,760	0.1053%	4,814,059	0.0461%	0	0.0000%	795,267	0.0029%
32113	0	0.0000%	2,757,211	0.0264%	0	0.0000%	0	0.0000%
32114	4,930,911	0.6166%	4,506,570	0.0431%	0	0.0000%	14,824,028	0.0532%
32117	6,418,260	0.8026%	5,639,436	0.0539%	0	0.0000%	16,724,125	0.0600%
32118	11,619,575	1.4530%	12,020,604	0.1150%	0	0.0000%	35,968,348	0.1290%
32119	8,984,391	1.1235%	8,712,980	0.0833%	0	0.0000%	31,619,668	0.1134%
32120	374	0.0000%	359	0.0000%	0	0.0000%	841	0.0000%
32121	304	0.0000%	309	0.0000%	0	0.0000%	945	0.0000%
32123	1,327	0.0002%	1,247	0.0000%	0	0.0000%	4,259	0.0000%
32124	1,575,320	0.1970%	1,687,280	0.0161%	0	0.0000%	4,120,546	0.0148%
32126	318	0.0000%	333	0.0000%	0	0.0000%	851	0.0000%
32127	17,053,396	2.1325%	16,184,652	0.1548%	0	0.0000%	65,992,357	0.2366%
32128	6,057,854	0.7575%	6,450,246	0.0617%	0	0.0000%	23,781,865	0.0853%
32129	6,789,323	0.8490%	6,616,108	0.0633%	0	0.0000%	24,714,054	0.0886%
32130	718,258	0.0898%	1,782,255	0.0170%	0	0.0000%	1,434,871	0.0051%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
32131	594,161	0.0743%	3,898,102	0.0373%	0	0.0000%	437,244	0.0016%
32132	3,862,925	0.4831%	3,502,934	0.0335%	0	0.0000%	16,068,226	0.0576%
32133	7,407	0.0009%	206,535	0.0020%	0	0.0000%	17,456	0.0001%
32134	0	0.0000%	5,104,229	0.0488%	0	0.0000%	390,154	0.0014%
32135	78	0.0000%	69	0.0000%	0	0.0000%	51	0.0000%
32136	12,843,008	1.6060%	7,231,898	0.0692%	0	0.0000%	9,884,038	0.0354%
32137	34,995,333	4.3761%	25,923,320	0.2480%	0	0.0000%	20,393,592	0.0731%
32138	729	0.0001%	15,733	0.0002%	0	0.0000%	0	0.0000%
32139	128,351	0.0160%	1,326,116	0.0127%	0	0.0000%	132,226	0.0005%
32140	56,259	0.0070%	932,858	0.0089%	0	0.0000%	0	0.0000%
32141	10,804,549	1.3511%	9,926,642	0.0950%	0	0.0000%	38,165,233	0.1368%
32145	504,516	0.0631%	1,479,574	0.0142%	0	0.0000%	293,217	0.0011%
32147	8,773	0.0011%	114,010	0.0011%	0	0.0000%	0	0.0000%
32148	265,164	0.0332%	4,879,374	0.0467%	0	0.0000%	0	0.0000%
32157	6,429	0.0008%	49,753	0.0005%	0	0.0000%	6,314	0.0000%
32158	0	0.0000%	9,149	0.0001%	0	0.0000%	988	0.0000%
32159	0	0.0000%	38,477,116	0.3681%	0	0.0000%	4,723,187	0.0169%
32160	0	0.0000%	13,977	0.0001%	0	0.0000%	0	0.0000%
32162	0	0.0000%	31,048,857	0.2970%	0	0.0000%	5,672,019	0.0203%
32163	0	0.0000%	22,276,151	0.2131%	0	0.0000%	4,585,367	0.0164%
32164	13,960,959	1.7458%	11,774,564	0.1126%	0	0.0000%	10,270,799	0.0368%
32168	10,196,162	1.2750%	10,560,610	0.1010%	0	0.0000%	45,455,536	0.1630%
32169	22,886,488	2.8619%	16,616,321	0.1589%	0	0.0000%	71,407,528	0.2560%
32174	27,408,713	3.4274%	22,225,696	0.2126%	0	0.0000%	50,271,436	0.1802%
32175	9	0.0000%	7	0.0000%	0	0.0000%	21	0.0000%
32176	16,657,885	2.0830%	15,084,724	0.1443%	0	0.0000%	34,989,079	0.1255%
32177	1,701,395	0.2128%	15,136,704	0.1448%	0	0.0000%	1,249,756	0.0045%
32178	768	0.0001%	5,943	0.0001%	0	0.0000%	600	0.0000%
32179	0	0.0000%	7,351,778	0.0703%	0	0.0000%	683,968	0.0025%
32180	296,259	0.0370%	1,037,705	0.0099%	0	0.0000%	435,764	0.0016%
32181	281,106	0.0352%	2,175,973	0.0208%	0	0.0000%	270,571	0.0010%
32182	3,735	0.0005%	80,694	0.0008%	0	0.0000%	4,441	0.0000%
32183	839	0.0001%	23,055	0.0002%	0	0.0000%	2,038	0.0000%
32185	0	0.0000%	4,778	0.0000%	0	0.0000%	0	0.0000%
32187	191,422	0.0239%	1,090,780	0.0104%	0	0.0000%	146,203	0.0005%
32189	393,075	0.0492%	3,678,637	0.0352%	0	0.0000%	332,952	0.0012%
32190	74,386	0.0093%	296,189	0.0028%	0	0.0000%	76,840	0.0003%
32192	0	0.0000%	52,058	0.0005%	0	0.0000%	4,012	0.0000%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
32193	135,456	0.0169%	1,389,511	0.0133%	0	0.0000%	130,538	0.0005%
32195	0	0.0000%	3,680,981	0.0352%	0	0.0000%	383,851	0.0014%
32201	217	0.0000%	1,426	0.0000%	0	0.0000%	0	0.0000%
32202	58,428	0.0073%	388,549	0.0037%	0	0.0000%	0	0.0000%
32203	5	0.0000%	42	0.0000%	0	0.0000%	0	0.0000%
32204	514,260	0.0643%	5,175,793	0.0495%	0	0.0000%	0	0.0000%
32205	2,380,190	0.2976%	28,452,480	0.2722%	0	0.0000%	0	0.0000%
32206	996,363	0.1246%	7,355,674	0.0704%	0	0.0000%	0	0.0000%
32207	4,171,438	0.5216%	28,264,779	0.2704%	0	0.0000%	0	0.0000%
32208	1,802,454	0.2254%	13,453,167	0.1287%	0	0.0000%	0	0.0000%
32209	945,486	0.1182%	7,860,657	0.0752%	0	0.0000%	0	0.0000%
32210	0	0.0000%	38,288,105	0.3663%	0	0.0000%	0	0.0000%
32211	2,996,505	0.3747%	14,947,484	0.1430%	0	0.0000%	1,685,464	0.0060%
32212	1,090	0.0001%	10,943	0.0001%	0	0.0000%	697	0.0000%
32214	6	0.0000%	123	0.0000%	0	0.0000%	4	0.0000%
32216	2,918,784	0.3650%	14,165,891	0.1355%	0	0.0000%	0	0.0000%
32217	2,388,855	0.2987%	14,810,544	0.1417%	0	0.0000%	0	0.0000%
32218	3,038,040	0.3799%	19,262,273	0.1843%	0	0.0000%	0	0.0000%
32219	0	0.0000%	3,601,388	0.0345%	0	0.0000%	0	0.0000%
32220	0	0.0000%	4,349,735	0.0416%	0	0.0000%	0	0.0000%
32221	0	0.0000%	10,756,630	0.1029%	0	0.0000%	0	0.0000%
32222	0	0.0000%	4,144,923	0.0396%	0	0.0000%	0	0.0000%
32223	4,743,761	0.5932%	33,620,314	0.3216%	0	0.0000%	2,678,795	0.0096%
32224	6,201,542	0.7755%	18,624,623	0.1782%	0	0.0000%	2,772,559	0.0099%
32225	11,430,978	1.4294%	37,351,078	0.3573%	0	0.0000%	5,287,991	0.0190%
32226	2,637,594	0.3298%	10,735,646	0.1027%	0	0.0000%	1,261,624	0.0045%
32227	9,330	0.0012%	20,401	0.0002%	0	0.0000%	2,635	0.0000%
32228	249	0.0000%	559	0.0000%	0	0.0000%	66	0.0000%
32232	502	0.0001%	4,551	0.0000%	0	0.0000%	0	0.0000%
32233	8,810,098	1.1017%	21,790,988	0.2084%	0	0.0000%	2,990,283	0.0107%
32234	0	0.0000%	2,373,523	0.0227%	0	0.0000%	0	0.0000%
32235	1	0.0000%	4	0.0000%	0	0.0000%	0	0.0000%
32241	245	0.0000%	1,056	0.0000%	0	0.0000%	0	0.0000%
32244	0	0.0000%	23,223,496	0.2222%	0	0.0000%	0	0.0000%
32245	3	0.0000%	14	0.0000%	0	0.0000%	0	0.0000%
32246	4,559,940	0.5702%	16,944,372	0.1621%	0	0.0000%	0	0.0000%
32247	3,877	0.0005%	20,679	0.0002%	0	0.0000%	2,443	0.0000%
32250	10,936,210	1.3676%	26,995,030	0.2582%	0	0.0000%	3,731,219	0.0134%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
32254	344,069	0.0430%	3,420,578	0.0327%	0	0.0000%	0	0.0000%
32256	3,468,370	0.4337%	14,333,902	0.1371%	0	0.0000%	0	0.0000%
32257	4,226,707	0.5285%	23,720,284	0.2269%	0	0.0000%	0	0.0000%
32258	2,669,248	0.3338%	11,423,562	0.1093%	0	0.0000%	0	0.0000%
32259	5,621,268	0.7029%	28,405,363	0.2717%	0	0.0000%	0	0.0000%
32266	4,078,866	0.5101%	10,688,276	0.1022%	0	0.0000%	1,378,013	0.0049%
32277	3,503,155	0.4381%	19,458,240	0.1861%	0	0.0000%	2,164,577	0.0078%
32301	0	0.0000%	0	0.0000%	2,831,058	0.0598%	0	0.0000%
32302	0	0.0000%	0	0.0000%	429	0.0000%	0	0.0000%
32303	0	0.0000%	0	0.0000%	9,823,384	0.2075%	0	0.0000%
32304	0	0.0000%	0	0.0000%	2,126,419	0.0449%	0	0.0000%
32305	0	0.0000%	0	0.0000%	1,703,704	0.0360%	0	0.0000%
32306	0	0.0000%	0	0.0000%	29	0.0000%	0	0.0000%
32307	0	0.0000%	0	0.0000%	597	0.0000%	0	0.0000%
32308	0	0.0000%	0	0.0000%	4,097,406	0.0866%	0	0.0000%
32309	0	0.0000%	0	0.0000%	8,147,906	0.1721%	0	0.0000%
32310	0	0.0000%	0	0.0000%	1,985,628	0.0419%	0	0.0000%
32311	0	0.0000%	0	0.0000%	2,212,294	0.0467%	0	0.0000%
32312	0	0.0000%	0	0.0000%	12,598,611	0.2662%	0	0.0000%
32313	0	0.0000%	0	0.0000%	284	0.0000%	0	0.0000%
32314	0	0.0000%	0	0.0000%	117	0.0000%	0	0.0000%
32316	0	0.0000%	0	0.0000%	227	0.0000%	0	0.0000%
32317	0	0.0000%	0	0.0000%	2,422,685	0.0512%	0	0.0000%
32320	0	0.0000%	0	0.0000%	5,847,966	0.1235%	0	0.0000%
32321	0	0.0000%	0	0.0000%	17,153,837	0.3624%	0	0.0000%
32322	0	0.0000%	0	0.0000%	1,383,084	0.0292%	0	0.0000%
32323	0	0.0000%	11,300	0.0001%	110,735	0.0023%	0	0.0000%
32324	0	0.0000%	0	0.0000%	18,145,354	0.3833%	0	0.0000%
32326	0	0.0000%	0	0.0000%	1,100	0.0000%	0	0.0000%
32327	0	0.0000%	0	0.0000%	2,639,883	0.0558%	0	0.0000%
32328	0	0.0000%	0	0.0000%	12,870,404	0.2719%	0	0.0000%
32329	0	0.0000%	0	0.0000%	4,426	0.0001%	0	0.0000%
32330	0	0.0000%	0	0.0000%	403,317	0.0085%	0	0.0000%
32331	0	0.0000%	270,917	0.0026%	0	0.0000%	0	0.0000%
32332	0	0.0000%	0	0.0000%	637,535	0.0135%	0	0.0000%
32333	0	0.0000%	0	0.0000%	5,081,951	0.1074%	0	0.0000%
32334	0	0.0000%	0	0.0000%	1,534,555	0.0324%	0	0.0000%
32336	0	0.0000%	92,164	0.0009%	0	0.0000%	0	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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32337	0	0.0000%	3,322	0.0000%	3,558	0.0001%	0	0.0000%
32340	0	0.0000%	1,304,350	0.0125%	0	0.0000%	0	0.0000%
32341	0	0.0000%	3,351	0.0000%	0	0.0000%	0	0.0000%
32343	0	0.0000%	0	0.0000%	460,801	0.0097%	0	0.0000%
32344	0	0.0000%	1,100,878	0.0105%	825,526	0.0174%	0	0.0000%
32345	0	0.0000%	1,914	0.0000%	1,385	0.0000%	0	0.0000%
32346	0	0.0000%	231,693	0.0022%	1,025,107	0.0217%	0	0.0000%
32347	0	0.0000%	763,694	0.0073%	0	0.0000%	0	0.0000%
32348	0	0.0000%	794,058	0.0076%	0	0.0000%	0	0.0000%
32350	0	0.0000%	182,541	0.0017%	0	0.0000%	0	0.0000%
32351	0	0.0000%	0	0.0000%	13,425,969	0.2836%	0	0.0000%
32352	0	0.0000%	0	0.0000%	4,434,587	0.0937%	0	0.0000%
32353	0	0.0000%	0	0.0000%	3,246	0.0001%	0	0.0000%
32355	0	0.0000%	19,095	0.0002%	31,379	0.0007%	0	0.0000%
32356	0	0.0000%	4,696	0.0000%	0	0.0000%	0	0.0000%
32357	0	0.0000%	2,839	0.0000%	0	0.0000%	0	0.0000%
32358	0	0.0000%	0	0.0000%	605,510	0.0128%	0	0.0000%
32359	0	0.0000%	271,914	0.0026%	0	0.0000%	0	0.0000%
32360	0	0.0000%	0	0.0000%	47,744	0.0010%	0	0.0000%
32361	0	0.0000%	7,527	0.0001%	5,407	0.0001%	0	0.0000%
32362	0	0.0000%	2,272	0.0000%	4,176	0.0001%	0	0.0000%
32399	0	0.0000%	0	0.0000%	6,587	0.0001%	0	0.0000%
32401	0	0.0000%	0	0.0000%	413,260,367	8.7304%	0	0.0000%
32402	0	0.0000%	0	0.0000%	46,992	0.0010%	0	0.0000%
32403	0	0.0000%	0	0.0000%	3,322,854	0.0702%	0	0.0000%
32404	0	0.0000%	0	0.0000%	1,467,291,941	30.9974%	0	0.0000%
32405	0	0.0000%	0	0.0000%	454,134,764	9.5939%	0	0.0000%
32406	0	0.0000%	0	0.0000%	2,956	0.0001%	0	0.0000%
32407	0	0.0000%	0	0.0000%	56,527,891	1.1942%	0	0.0000%
32408	0	0.0000%	0	0.0000%	204,786,014	4.3262%	0	0.0000%
32409	0	0.0000%	0	0.0000%	51,360,773	1.0850%	0	0.0000%
32410	0	0.0000%	0	0.0000%	8,406,495	0.1776%	0	0.0000%
32411	0	0.0000%	0	0.0000%	683,213	0.0144%	0	0.0000%
32413	0	0.0000%	0	0.0000%	41,839,004	0.8839%	0	0.0000%
32417	0	0.0000%	0	0.0000%	44,638	0.0009%	0	0.0000%
32420	0	0.0000%	0	0.0000%	23,242,405	0.4910%	0	0.0000%
32421	0	0.0000%	0	0.0000%	42,684,377	0.9017%	0	0.0000%
32422	0	0.0000%	0	0.0000%	496	0.0000%	0	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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32423	0	0.0000%	0	0.0000%	9,036,879	0.1909%	0	0.0000%
32424	0	0.0000%	0	0.0000%	73,175,889	1.5459%	0	0.0000%
32425	0	0.0000%	0	0.0000%	4,781,527	0.1010%	0	0.0000%
32426	0	0.0000%	0	0.0000%	2,537,386	0.0536%	0	0.0000%
32427	0	0.0000%	0	0.0000%	246,421	0.0052%	0	0.0000%
32428	0	0.0000%	0	0.0000%	50,811,930	1.0734%	0	0.0000%
32430	0	0.0000%	0	0.0000%	20,991,149	0.4434%	0	0.0000%
32431	0	0.0000%	0	0.0000%	22,231,551	0.4697%	0	0.0000%
32432	0	0.0000%	0	0.0000%	487,674	0.0103%	0	0.0000%
32433	0	0.0000%	0	0.0000%	816,950	0.0173%	0	0.0000%
32434	0	0.0000%	0	0.0000%	536	0.0000%	0	0.0000%
32435	0	0.0000%	0	0.0000%	635,790	0.0134%	0	0.0000%
32437	0	0.0000%	0	0.0000%	192,890	0.0041%	0	0.0000%
32438	0	0.0000%	0	0.0000%	16,321,313	0.3448%	0	0.0000%
32439	0	0.0000%	0	0.0000%	3,071,144	0.0649%	0	0.0000%
32440	0	0.0000%	0	0.0000%	5,321,577	0.1124%	0	0.0000%
32442	0	0.0000%	0	0.0000%	36,118,433	0.7630%	0	0.0000%
32443	0	0.0000%	0	0.0000%	18,327,959	0.3872%	0	0.0000%
32444	0	0.0000%	0	0.0000%	421,062,733	8.8952%	0	0.0000%
32445	0	0.0000%	0	0.0000%	7,406,695	0.1565%	0	0.0000%
32446	0	0.0000%	0	0.0000%	91,271,278	1.9282%	0	0.0000%
32447	0	0.0000%	0	0.0000%	35,725	0.0008%	0	0.0000%
32448	0	0.0000%	0	0.0000%	45,001,493	0.9507%	0	0.0000%
32449	0	0.0000%	0	0.0000%	8,073,295	0.1706%	0	0.0000%
32455	0	0.0000%	0	0.0000%	540,935	0.0114%	0	0.0000%
32456	0	0.0000%	0	0.0000%	732,812,135	15.4811%	0	0.0000%
32457	0	0.0000%	0	0.0000%	34,605	0.0007%	0	0.0000%
32459	0	0.0000%	0	0.0000%	21,422,112	0.4526%	0	0.0000%
32460	0	0.0000%	0	0.0000%	50,274,210	1.0621%	0	0.0000%
32461	0	0.0000%	0	0.0000%	12,011,302	0.2537%	0	0.0000%
32462	0	0.0000%	0	0.0000%	1,824,055	0.0385%	0	0.0000%
32463	0	0.0000%	0	0.0000%	229,417	0.0048%	0	0.0000%
32464	0	0.0000%	0	0.0000%	251,546	0.0053%	0	0.0000%
32465	0	0.0000%	0	0.0000%	81,531,849	1.7224%	0	0.0000%
32466	0	0.0000%	0	0.0000%	70,718,411	1.4940%	0	0.0000%
32540	0	0.0000%	0	0.0000%	53	0.0000%	0	0.0000%
32541	0	0.0000%	0	0.0000%	6,449,516	0.1362%	0	0.0000%
32542	0	0.0000%	0	0.0000%	1,022	0.0000%	0	0.0000%

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32548	0	0.0000%	0	0.0000%	1,386,648	0.0293%	0	0.0000%
32549	0	0.0000%	0	0.0000%	1,020	0.0000%	0	0.0000%
32550	0	0.0000%	0	0.0000%	6,912,556	0.1460%	0	0.0000%
32578	0	0.0000%	0	0.0000%	5,222,325	0.1103%	0	0.0000%
32579	0	0.0000%	0	0.0000%	1,360,710	0.0287%	0	0.0000%
32580	0	0.0000%	0	0.0000%	377,180	0.0080%	0	0.0000%
32588	0	0.0000%	0	0.0000%	51	0.0000%	0	0.0000%
32601	0	0.0000%	3,498,508	0.0335%	0	0.0000%	0	0.0000%
32603	0	0.0000%	834,606	0.0080%	0	0.0000%	0	0.0000%
32605	0	0.0000%	11,171,843	0.1069%	0	0.0000%	0	0.0000%
32606	0	0.0000%	6,930,906	0.0663%	0	0.0000%	0	0.0000%
32607	0	0.0000%	6,821,748	0.0653%	0	0.0000%	0	0.0000%
32608	0	0.0000%	10,344,545	0.0990%	0	0.0000%	0	0.0000%
32609	0	0.0000%	3,512,320	0.0336%	0	0.0000%	0	0.0000%
32610	0	0.0000%	3,965	0.0000%	0	0.0000%	0	0.0000%
32611	0	0.0000%	115	0.0000%	0	0.0000%	0	0.0000%
32612	0	0.0000%	149	0.0000%	0	0.0000%	0	0.0000%
32615	0	0.0000%	4,890,924	0.0468%	0	0.0000%	0	0.0000%
32616	0	0.0000%	6,036	0.0001%	0	0.0000%	0	0.0000%
32617	0	0.0000%	2,721,396	0.0260%	0	0.0000%	218,854	0.0008%
32618	0	0.0000%	2,057,144	0.0197%	0	0.0000%	0	0.0000%
32619	0	0.0000%	798,920	0.0076%	0	0.0000%	0	0.0000%
32621	0	0.0000%	922,941	0.0088%	0	0.0000%	0	0.0000%
32622	0	0.0000%	401,145	0.0038%	0	0.0000%	0	0.0000%
32625	0	0.0000%	704,875	0.0067%	0	0.0000%	0	0.0000%
32626	0	0.0000%	1,644,299	0.0157%	0	0.0000%	0	0.0000%
32627	0	0.0000%	610	0.0000%	0	0.0000%	0	0.0000%
32628	0	0.0000%	358,375	0.0034%	0	0.0000%	0	0.0000%
32631	0	0.0000%	411,301	0.0039%	0	0.0000%	0	0.0000%
32633	0	0.0000%	56,410	0.0005%	0	0.0000%	4,091	0.0000%
32634	0	0.0000%	14,411	0.0001%	0	0.0000%	1,302	0.0000%
32635	0	0.0000%	2	0.0000%	0	0.0000%	0	0.0000%
32639	0	0.0000%	9,801	0.0001%	0	0.0000%	0	0.0000%
32640	0	0.0000%	6,424,228	0.0615%	0	0.0000%	0	0.0000%
32641	0	0.0000%	2,832,642	0.0271%	0	0.0000%	0	0.0000%
32643	0	0.0000%	2,761,322	0.0264%	0	0.0000%	0	0.0000%
32644	0	0.0000%	5,337	0.0001%	0	0.0000%	0	0.0000%
32648	0	0.0000%	109,634	0.0010%	0	0.0000%	0	0.0000%

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32653	0	0.0000%	5,418,078	0.0518%	0	0.0000%	0	0.0000%
32654	0	0.0000%	11,013	0.0001%	0	0.0000%	0	0.0000%
32655	0	0.0000%	2,505	0.0000%	0	0.0000%	0	0.0000%
32656	0	0.0000%	11,048,727	0.1057%	0	0.0000%	0	0.0000%
32658	0	0.0000%	34,041	0.0003%	0	0.0000%	0	0.0000%
32662	0	0.0000%	1,193	0.0000%	0	0.0000%	0	0.0000%
32663	0	0.0000%	4,244	0.0000%	0	0.0000%	399	0.0000%
32664	0	0.0000%	512,725	0.0049%	0	0.0000%	40,888	0.0001%
32666	0	0.0000%	6,167,018	0.0590%	0	0.0000%	0	0.0000%
32667	0	0.0000%	2,235,223	0.0214%	0	0.0000%	0	0.0000%
32668	0	0.0000%	1,600,038	0.0153%	0	0.0000%	198,937	0.0007%
32669	0	0.0000%	4,276,312	0.0409%	0	0.0000%	0	0.0000%
32680	0	0.0000%	1,007,781	0.0096%	0	0.0000%	0	0.0000%
32681	0	0.0000%	34,452	0.0003%	0	0.0000%	2,629	0.0000%
32683	0	0.0000%	7,043	0.0001%	0	0.0000%	0	0.0000%
32686	0	0.0000%	2,519,867	0.0241%	0	0.0000%	224,621	0.0008%
32692	0	0.0000%	129,801	0.0012%	0	0.0000%	0	0.0000%
32693	0	0.0000%	1,937,045	0.0185%	0	0.0000%	0	0.0000%
32694	0	0.0000%	679,737	0.0065%	0	0.0000%	0	0.0000%
32696	0	0.0000%	3,520,015	0.0337%	0	0.0000%	0	0.0000%
32697	0	0.0000%	11,204	0.0001%	0	0.0000%	0	0.0000%
32701	1,043,435	0.1305%	7,547,536	0.0722%	0	0.0000%	5,738,524	0.0206%
32702	128,706	0.0161%	1,460,309	0.0140%	0	0.0000%	243,474	0.0009%
32703	2,022,932	0.2530%	19,152,998	0.1832%	0	0.0000%	9,045,860	0.0324%
32704	76	0.0000%	1,029	0.0000%	0	0.0000%	421	0.0000%
32706	4,063	0.0005%	10,023	0.0001%	0	0.0000%	16,464	0.0001%
32707	2,187,591	0.2736%	13,086,980	0.1252%	0	0.0000%	13,129,261	0.0471%
32708	3,993,476	0.4994%	21,226,496	0.2030%	0	0.0000%	25,475,623	0.0913%
32709	156,826	0.0196%	699,930	0.0067%	0	0.0000%	1,340,301	0.0048%
32712	2,636,284	0.3297%	24,592,134	0.2352%	0	0.0000%	9,659,474	0.0346%
32713	2,485,160	0.3108%	10,565,402	0.1011%	0	0.0000%	9,555,866	0.0343%
32714	1,579,194	0.1975%	12,857,977	0.1230%	0	0.0000%	8,378,316	0.0300%
32715	96	0.0000%	692	0.0000%	0	0.0000%	524	0.0000%
32719	154	0.0000%	789	0.0000%	0	0.0000%	958	0.0000%
32720	3,219,156	0.4025%	10,740,774	0.1027%	0	0.0000%	9,258,050	0.0332%
32721	63	0.0000%	220	0.0000%	0	0.0000%	266	0.0000%
32723	418	0.0001%	1,370	0.0000%	0	0.0000%	1,294	0.0000%
32724	4,559,528	0.5702%	11,607,449	0.1110%	0	0.0000%	13,319,336	0.0478%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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32725	5,583,778	0.6982%	18,345,864	0.1755%	0	0.0000%	26,405,928	0.0947%
32726	1,263,405	0.1580%	19,295,986	0.1846%	0	0.0000%	3,329,213	0.0119%
32727	3	0.0000%	54	0.0000%	0	0.0000%	7	0.0000%
32728	298	0.0000%	1,052	0.0000%	0	0.0000%	1,075	0.0000%
32730	294,525	0.0368%	1,823,062	0.0174%	0	0.0000%	1,695,629	0.0061%
32732	767,595	0.0960%	2,680,520	0.0256%	0	0.0000%	6,195,708	0.0222%
32733	235	0.0000%	1,172	0.0000%	0	0.0000%	1,383	0.0000%
32735	329,638	0.0412%	6,230,725	0.0596%	0	0.0000%	939,318	0.0034%
32736	787,275	0.0984%	6,005,663	0.0574%	0	0.0000%	2,048,040	0.0073%
32738	5,356,647	0.6698%	13,895,829	0.1329%	0	0.0000%	27,165,048	0.0974%
32739	3	0.0000%	7	0.0000%	0	0.0000%	16	0.0000%
32744	533,864	0.0668%	1,293,456	0.0124%	0	0.0000%	2,124,882	0.0076%
32746	3,545,777	0.4434%	18,825,603	0.1801%	0	0.0000%	16,035,084	0.0575%
32747	987	0.0001%	4,807	0.0000%	0	0.0000%	4,239	0.0000%
32750	2,095,804	0.2621%	12,144,487	0.1162%	0	0.0000%	10,978,354	0.0394%
32751	2,049,894	0.2563%	15,682,086	0.1500%	0	0.0000%	12,295,600	0.0441%
32754	2,598,208	0.3249%	4,287,596	0.0410%	0	0.0000%	10,028,380	0.0360%
32756	2,053	0.0003%	16,520	0.0002%	0	0.0000%	4,725	0.0000%
32757	1,934,440	0.2419%	23,847,227	0.2281%	0	0.0000%	5,669,646	0.0203%
32759	882,617	0.1104%	934,897	0.0089%	0	0.0000%	2,764,252	0.0099%
32762	3	0.0000%	17	0.0000%	0	0.0000%	29	0.0000%
32763	1,793,845	0.2243%	6,280,327	0.0601%	0	0.0000%	6,692,165	0.0240%
32764	378,802	0.0474%	1,083,668	0.0104%	0	0.0000%	2,397,635	0.0086%
32765	4,547,937	0.5687%	22,544,196	0.2157%	0	0.0000%	34,953,316	0.1253%
32766	1,262,448	0.1579%	5,455,831	0.0522%	0	0.0000%	10,510,850	0.0377%
32767	126,455	0.0158%	922,952	0.0088%	0	0.0000%	299,794	0.0011%
32768	1,815	0.0002%	22,873	0.0002%	0	0.0000%	7,462	0.0000%
32771	4,338,673	0.5425%	17,647,489	0.1688%	0	0.0000%	18,520,667	0.0664%
32772	776	0.0001%	3,106	0.0000%	0	0.0000%	3,731	0.0000%
32773	1,680,492	0.2101%	7,667,346	0.0733%	0	0.0000%	9,536,873	0.0342%
32774	540	0.0001%	1,831	0.0000%	0	0.0000%	2,213	0.0000%
32775	7,211	0.0009%	10,804	0.0001%	0	0.0000%	27,366	0.0001%
32776	708,899	0.0886%	5,855,863	0.0560%	0	0.0000%	2,071,862	0.0074%
32777	7,271	0.0009%	93,408	0.0009%	0	0.0000%	23,050	0.0001%
32778	1,409,920	0.1763%	28,667,828	0.2742%	0	0.0000%	5,342,088	0.0192%
32779	3,369,912	0.4214%	24,618,678	0.2355%	0	0.0000%	16,316,465	0.0585%
32780	9,378,156	1.1727%	17,763,014	0.1699%	0	0.0000%	28,865,673	0.1035%
32784	620,932	0.0776%	8,373,881	0.0801%	0	0.0000%	1,318,452	0.0047%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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32789	3,372,937	0.4218%	26,194,821	0.2506%	0	0.0000%	20,966,448	0.0752%
32790	1,100	0.0001%	8,752	0.0001%	0	0.0000%	6,748	0.0000%
32791	0	0.0000%	7	0.0000%	0	0.0000%	4	0.0000%
32792	2,675,917	0.3346%	18,190,564	0.1740%	0	0.0000%	18,991,177	0.0681%
32793	944	0.0001%	4,969	0.0000%	0	0.0000%	4,708	0.0000%
32795	148	0.0000%	743	0.0000%	0	0.0000%	695	0.0000%
32796	5,627,472	0.7037%	10,018,928	0.0958%	0	0.0000%	18,412,580	0.0660%
32798	251,737	0.0315%	3,691,131	0.0353%	0	0.0000%	1,164,057	0.0042%
32801	346,119	0.0433%	3,423,877	0.0328%	0	0.0000%	2,476,515	0.0089%
32802	309	0.0000%	3,298	0.0000%	0	0.0000%	2,365	0.0000%
32803	1,580,640	0.1977%	13,795,217	0.1320%	0	0.0000%	11,337,235	0.0406%
32804	1,600,885	0.2002%	14,794,180	0.1415%	0	0.0000%	10,562,189	0.0379%
32805	432,595	0.0541%	4,760,336	0.0455%	0	0.0000%	3,225,816	0.0116%
32806	1,809,391	0.2263%	19,002,752	0.1818%	0	0.0000%	14,067,139	0.0504%
32807	1,095,851	0.1370%	8,894,792	0.0851%	0	0.0000%	9,310,079	0.0334%
32808	1,158,408	0.1449%	12,245,471	0.1171%	0	0.0000%	7,642,226	0.0274%
32809	0	0.0000%	10,001,580	0.0957%	0	0.0000%	6,943,080	0.0249%
32810	1,113,642	0.1393%	10,163,676	0.0972%	0	0.0000%	6,345,489	0.0228%
32811	438,228	0.0548%	5,413,086	0.0518%	0	0.0000%	3,259,436	0.0117%
32812	1,731,538	0.2165%	18,020,662	0.1724%	0	0.0000%	16,332,433	0.0586%
32814	254,547	0.0318%	1,478,419	0.0141%	0	0.0000%	1,394,769	0.0050%
32816	4,513	0.0006%	28,054	0.0003%	0	0.0000%	46,855	0.0002%
32817	1,747,698	0.2185%	11,088,969	0.1061%	0	0.0000%	14,904,522	0.0534%
32818	1,406,363	0.1759%	15,123,289	0.1447%	0	0.0000%	8,301,671	0.0298%
32819	0	0.0000%	26,598,578	0.2544%	0	0.0000%	15,292,314	0.0548%
32820	483,340	0.0604%	2,250,363	0.0215%	0	0.0000%	4,135,306	0.0148%
32821	0	0.0000%	7,895,440	0.0755%	0	0.0000%	5,010,079	0.0180%
32822	1,234,318	0.1543%	12,823,370	0.1227%	0	0.0000%	13,109,540	0.0470%
32824	0	0.0000%	15,032,376	0.1438%	0	0.0000%	12,146,626	0.0436%
32825	2,375,352	0.2970%	16,815,023	0.1608%	0	0.0000%	21,940,243	0.0787%
32826	845,365	0.1057%	5,159,441	0.0494%	0	0.0000%	8,259,829	0.0296%
32827	921,867	0.1153%	8,402,852	0.0804%	0	0.0000%	8,969,078	0.0322%
32828	2,286,575	0.2859%	13,446,637	0.1286%	0	0.0000%	21,169,939	0.0759%
32829	631,803	0.0790%	5,218,287	0.0499%	0	0.0000%	6,030,666	0.0216%
32830	0	0.0000%	45,951	0.0004%	0	0.0000%	29,613	0.0001%
32831	683	0.0001%	7,420	0.0001%	0	0.0000%	10,889	0.0000%
32832	1,173,674	0.1468%	9,525,931	0.0911%	0	0.0000%	11,670,531	0.0418%
32833	640,233	0.0801%	3,568,404	0.0341%	0	0.0000%	6,172,897	0.0221%

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32835	1,316,551	0.1646%	17,195,597	0.1645%	0	0.0000%	9,176,611	0.0329%
32836	0	0.0000%	18,510,203	0.1771%	0	0.0000%	11,408,617	0.0409%
32837	0	0.0000%	21,440,759	0.2051%	0	0.0000%	14,346,935	0.0514%
32839	618,401	0.0773%	7,989,655	0.0764%	0	0.0000%	5,366,742	0.0192%
32853	0	0.0000%	7	0.0000%	0	0.0000%	5	0.0000%
32856	252	0.0000%	2,698	0.0000%	0	0.0000%	1,933	0.0000%
32859	2	0.0000%	34	0.0000%	0	0.0000%	23	0.0000%
32891	0	0.0000%	4	0.0000%	0	0.0000%	3	0.0000%
32901	3,540,266	0.4427%	8,919,825	0.0853%	0	0.0000%	4,490,346	0.0161%
32902	888	0.0001%	2,058	0.0000%	0	0.0000%	1,082	0.0000%
32903	5,750,378	0.7191%	13,678,776	0.1308%	0	0.0000%	6,772,258	0.0243%
32904	4,629,097	0.5789%	12,605,171	0.1206%	0	0.0000%	7,482,651	0.0268%
32905	4,458,744	0.5576%	11,591,236	0.1109%	0	0.0000%	5,377,637	0.0193%
32907	6,301,263	0.7880%	20,919,823	0.2001%	0	0.0000%	11,891,161	0.0426%
32908	1,228,861	0.1537%	4,995,695	0.0478%	0	0.0000%	2,677,679	0.0096%
32909	4,105,708	0.5134%	14,176,250	0.1356%	0	0.0000%	7,216,426	0.0259%
32920	7,016,643	0.8774%	6,426,984	0.0615%	0	0.0000%	6,115,864	0.0219%
32922	1,621,724	0.2028%	4,025,234	0.0385%	0	0.0000%	4,316,632	0.0155%
32925	18,875	0.0024%	14,702	0.0001%	0	0.0000%	12,416	0.0000%
32926	4,102,597	0.5130%	10,275,243	0.0983%	0	0.0000%	12,521,908	0.0449%
32927	5,300,163	0.6628%	11,593,947	0.1109%	0	0.0000%	15,823,400	0.0567%
32931	11,055,919	1.3825%	16,467,266	0.1575%	0	0.0000%	14,495,094	0.0520%
32934	4,739,172	0.5926%	12,300,696	0.1177%	0	0.0000%	8,353,386	0.0300%
32935	8,669,829	1.0841%	21,795,586	0.2085%	0	0.0000%	12,935,353	0.0464%
32937	11,999,296	1.5005%	24,600,316	0.2353%	0	0.0000%	14,943,452	0.0536%
32940	10,897,024	1.3627%	27,700,540	0.2650%	0	0.0000%	23,280,519	0.0835%
32941	37	0.0000%	110	0.0000%	0	0.0000%	80	0.0000%
32948	272,301	0.0341%	1,098,385	0.0105%	0	0.0000%	505,962	0.0018%
32949	1,139,291	0.1425%	2,508,240	0.0240%	0	0.0000%	982,565	0.0035%
32950	1,683,281	0.2105%	4,413,117	0.0422%	0	0.0000%	1,967,231	0.0071%
32951	8,060,060	1.0079%	17,389,074	0.1663%	0	0.0000%	7,306,904	0.0262%
32952	10,089,325	1.2616%	22,569,365	0.2159%	0	0.0000%	21,892,205	0.0785%
32953	8,541,729	1.0681%	15,746,085	0.1506%	0	0.0000%	16,624,346	0.0596%
32955	8,171,791	1.0219%	21,193,702	0.2027%	0	0.0000%	20,482,547	0.0734%
32956	3	0.0000%	9	0.0000%	0	0.0000%	8	0.0000%
32957	6,033	0.0008%	14,195	0.0001%	0	0.0000%	5,242	0.0000%
32958	8,010,577	1.0017%	19,738,145	0.1888%	0	0.0000%	6,808,443	0.0244%
32960	3,578,601	0.4475%	9,448,435	0.0904%	0	0.0000%	2,900,306	0.0104%

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32961	24	0.0000%	76	0.0000%	0	0.0000%	18	0.0000%
32962	4,288,682	0.5363%	13,013,630	0.1245%	0	0.0000%	4,235,396	0.0152%
32963	15,777,664	1.9730%	33,898,364	0.3243%	0	0.0000%	10,746,015	0.0385%
32966	2,694,534	0.3369%	9,371,190	0.0896%	0	0.0000%	3,824,583	0.0137%
32967	4,147,436	0.5186%	10,247,219	0.0980%	0	0.0000%	3,886,451	0.0139%
32968	2,454,320	0.3069%	8,110,761	0.0776%	0	0.0000%	3,098,081	0.0111%
32970	1,083	0.0001%	2,552	0.0000%	0	0.0000%	848	0.0000%
32976	6,166,225	0.7711%	14,332,698	0.1371%	0	0.0000%	5,313,093	0.0190%
33001	0	0.0000%	1,963,708	0.0188%	0	0.0000%	34,191	0.0001%
33002	0	0.0000%	1,022	0.0000%	0	0.0000%	0	0.0000%
33004	0	0.0000%	4,887,875	0.0468%	0	0.0000%	0	0.0000%
33009	0	0.0000%	10,863,255	0.1039%	0	0.0000%	0	0.0000%
33010	0	0.0000%	4,768,383	0.0456%	0	0.0000%	0	0.0000%
33012	0	0.0000%	10,790,727	0.1032%	0	0.0000%	0	0.0000%
33013	0	0.0000%	5,490,029	0.0525%	0	0.0000%	0	0.0000%
33014	0	0.0000%	11,030,946	0.1055%	0	0.0000%	0	0.0000%
33015	0	0.0000%	17,921,646	0.1714%	0	0.0000%	0	0.0000%
33016	0	0.0000%	9,045,903	0.0865%	0	0.0000%	0	0.0000%
33017	0	0.0000%	1,588	0.0000%	0	0.0000%	0	0.0000%
33018	0	0.0000%	15,247,748	0.1459%	0	0.0000%	0	0.0000%
33019	0	0.0000%	15,916,285	0.1523%	0	0.0000%	0	0.0000%
33020	0	0.0000%	8,767,457	0.0839%	0	0.0000%	0	0.0000%
33021	0	0.0000%	19,648,800	0.1880%	0	0.0000%	0	0.0000%
33022	0	0.0000%	15	0.0000%	0	0.0000%	0	0.0000%
33023	0	0.0000%	19,359,992	0.1852%	0	0.0000%	0	0.0000%
33024	0	0.0000%	22,396,698	0.2142%	0	0.0000%	0	0.0000%
33025	0	0.0000%	15,140,294	0.1448%	0	0.0000%	0	0.0000%
33026	0	0.0000%	19,508,757	0.1866%	0	0.0000%	0	0.0000%
33027	0	0.0000%	26,129,001	0.2499%	0	0.0000%	0	0.0000%
33028	0	0.0000%	10,025,015	0.0959%	0	0.0000%	0	0.0000%
33029	0	0.0000%	36,390,221	0.3481%	0	0.0000%	2,342,041	0.0084%
33030	0	0.0000%	10,360,643	0.0991%	0	0.0000%	0	0.0000%
33031	0	0.0000%	6,748,288	0.0646%	0	0.0000%	0	0.0000%
33032	0	0.0000%	16,355,627	0.1565%	0	0.0000%	0	0.0000%
33033	0	0.0000%	16,744,980	0.1602%	0	0.0000%	0	0.0000%
33034	0	0.0000%	4,466,059	0.0427%	0	0.0000%	0	0.0000%
33035	0	0.0000%	5,338,753	0.0511%	0	0.0000%	0	0.0000%
33036	0	0.0000%	20,356,055	0.1947%	0	0.0000%	375,518	0.0013%

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33037	0	0.0000%	34,154,239	0.3267%	0	0.0000%	0	0.0000%
33039	0	0.0000%	37,680	0.0004%	0	0.0000%	0	0.0000%
33040	0	0.0000%	93,556,613	0.8949%	0	0.0000%	10,065,746	0.0361%
33042	0	0.0000%	85,440,407	0.8173%	0	0.0000%	2,546,648	0.0091%
33043	0	0.0000%	71,637,035	0.6853%	0	0.0000%	1,153,105	0.0041%
33050	0	0.0000%	83,157,381	0.7955%	0	0.0000%	1,159,392	0.0042%
33051	0	0.0000%	22,156,892	0.2119%	0	0.0000%	254,736	0.0009%
33054	0	0.0000%	4,532,517	0.0434%	0	0.0000%	0	0.0000%
33055	0	0.0000%	10,743,204	0.1028%	0	0.0000%	0	0.0000%
33056	0	0.0000%	8,333,675	0.0797%	0	0.0000%	0	0.0000%
33060	0	0.0000%	10,089,578	0.0965%	0	0.0000%	0	0.0000%
33061	0	0.0000%	167	0.0000%	0	0.0000%	0	0.0000%
33062	0	0.0000%	21,177,528	0.2026%	0	0.0000%	0	0.0000%
33063	0	0.0000%	19,914,725	0.1905%	0	0.0000%	0	0.0000%
33064	0	0.0000%	20,508,363	0.1962%	0	0.0000%	0	0.0000%
33065	0	0.0000%	21,214,025	0.2029%	0	0.0000%	0	0.0000%
33066	0	0.0000%	7,070,399	0.0676%	0	0.0000%	0	0.0000%
33067	0	0.0000%	19,233,526	0.1840%	0	0.0000%	0	0.0000%
33068	0	0.0000%	13,554,078	0.1297%	0	0.0000%	0	0.0000%
33069	0	0.0000%	6,945,413	0.0664%	0	0.0000%	0	0.0000%
33070	0	0.0000%	14,980,486	0.1433%	0	0.0000%	0	0.0000%
33071	0	0.0000%	25,419,925	0.2432%	0	0.0000%	0	0.0000%
33072	0	0.0000%	51	0.0000%	0	0.0000%	0	0.0000%
33073	0	0.0000%	9,240,896	0.0884%	0	0.0000%	0	0.0000%
33074	0	0.0000%	732	0.0000%	0	0.0000%	0	0.0000%
33075	0	0.0000%	7,978	0.0001%	0	0.0000%	0	0.0000%
33076	0	0.0000%	23,463,322	0.2244%	0	0.0000%	2,617,994	0.0094%
33081	0	0.0000%	14	0.0000%	0	0.0000%	0	0.0000%
33084	0	0.0000%	1,066	0.0000%	0	0.0000%	0	0.0000%
33092	0	0.0000%	1,688	0.0000%	0	0.0000%	0	0.0000%
33101	0	0.0000%	6,697	0.0001%	0	0.0000%	0	0.0000%
33102	0	0.0000%	15	0.0000%	0	0.0000%	0	0.0000%
33106	0	0.0000%	1,633	0.0000%	0	0.0000%	0	0.0000%
33109	0	0.0000%	5,907,898	0.0565%	0	0.0000%	0	0.0000%
33114	0	0.0000%	5,837	0.0001%	0	0.0000%	0	0.0000%
33116	0	0.0000%	20	0.0000%	0	0.0000%	0	0.0000%
33122	0	0.0000%	72,000	0.0007%	0	0.0000%	0	0.0000%
33125	0	0.0000%	5,224,787	0.0500%	0	0.0000%	0	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33126	0	0.0000%	6,178,845	0.0591%	0	0.0000%	0	0.0000%
33127	0	0.0000%	2,846,017	0.0272%	0	0.0000%	0	0.0000%
33128	0	0.0000%	240,355	0.0023%	0	0.0000%	0	0.0000%
33129	0	0.0000%	6,370,103	0.0609%	0	0.0000%	0	0.0000%
33130	0	0.0000%	3,103,694	0.0297%	0	0.0000%	0	0.0000%
33131	0	0.0000%	5,883,481	0.0563%	0	0.0000%	0	0.0000%
33132	0	0.0000%	4,498,183	0.0430%	0	0.0000%	0	0.0000%
33133	0	0.0000%	17,280,017	0.1653%	0	0.0000%	0	0.0000%
33134	0	0.0000%	16,002,206	0.1531%	0	0.0000%	0	0.0000%
33135	0	0.0000%	3,282,655	0.0314%	0	0.0000%	0	0.0000%
33136	0	0.0000%	656,171	0.0063%	0	0.0000%	0	0.0000%
33137	0	0.0000%	5,513,428	0.0527%	0	0.0000%	0	0.0000%
33138	0	0.0000%	10,893,221	0.1042%	0	0.0000%	0	0.0000%
33139	0	0.0000%	20,782,060	0.1988%	0	0.0000%	0	0.0000%
33140	0	0.0000%	23,640,920	0.2261%	0	0.0000%	0	0.0000%
33141	0	0.0000%	12,430,471	0.1189%	0	0.0000%	0	0.0000%
33142	0	0.0000%	4,739,324	0.0453%	0	0.0000%	0	0.0000%
33143	0	0.0000%	19,822,480	0.1896%	0	0.0000%	0	0.0000%
33144	0	0.0000%	6,429,069	0.0615%	0	0.0000%	0	0.0000%
33145	0	0.0000%	7,673,110	0.0734%	0	0.0000%	0	0.0000%
33146	0	0.0000%	9,949,227	0.0952%	0	0.0000%	0	0.0000%
33147	0	0.0000%	5,622,095	0.0538%	0	0.0000%	0	0.0000%
33149	0	0.0000%	18,512,502	0.1771%	0	0.0000%	0	0.0000%
33150	0	0.0000%	3,494,147	0.0334%	0	0.0000%	0	0.0000%
33153	0	0.0000%	22	0.0000%	0	0.0000%	0	0.0000%
33154	0	0.0000%	16,186,100	0.1548%	0	0.0000%	0	0.0000%
33155	0	0.0000%	17,357,958	0.1660%	0	0.0000%	0	0.0000%
33156	0	0.0000%	34,648,634	0.3314%	0	0.0000%	0	0.0000%
33157	0	0.0000%	37,345,246	0.3572%	0	0.0000%	0	0.0000%
33158	0	0.0000%	8,750,758	0.0837%	0	0.0000%	0	0.0000%
33160	0	0.0000%	23,145,892	0.2214%	0	0.0000%	0	0.0000%
33161	0	0.0000%	9,725,434	0.0930%	0	0.0000%	0	0.0000%
33162	0	0.0000%	8,782,349	0.0840%	0	0.0000%	0	0.0000%
33164	0	0.0000%	7	0.0000%	0	0.0000%	0	0.0000%
33165	0	0.0000%	20,277,643	0.1940%	0	0.0000%	0	0.0000%
33166	0	0.0000%	7,804,957	0.0747%	0	0.0000%	0	0.0000%
33167	0	0.0000%	3,449,761	0.0330%	0	0.0000%	0	0.0000%
33168	0	0.0000%	4,935,162	0.0472%	0	0.0000%	0	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33169	0	0.0000%	8,316,032	0.0795%	0	0.0000%	0	0.0000%
33170	0	0.0000%	4,999,101	0.0478%	0	0.0000%	0	0.0000%
33172	0	0.0000%	6,156,273	0.0589%	0	0.0000%	0	0.0000%
33173	0	0.0000%	15,563,030	0.1489%	0	0.0000%	0	0.0000%
33174	0	0.0000%	7,371,074	0.0705%	0	0.0000%	0	0.0000%
33175	0	0.0000%	22,728,874	0.2174%	0	0.0000%	0	0.0000%
33176	0	0.0000%	34,155,204	0.3267%	0	0.0000%	0	0.0000%
33177	0	0.0000%	21,118,191	0.2020%	0	0.0000%	0	0.0000%
33178	0	0.0000%	14,338,837	0.1372%	0	0.0000%	0	0.0000%
33179	0	0.0000%	11,379,427	0.1089%	0	0.0000%	0	0.0000%
33180	0	0.0000%	13,036,023	0.1247%	0	0.0000%	0	0.0000%
33181	0	0.0000%	4,989,569	0.0477%	0	0.0000%	0	0.0000%
33182	0	0.0000%	6,077,963	0.0581%	0	0.0000%	0	0.0000%
33183	0	0.0000%	14,243,257	0.1362%	0	0.0000%	0	0.0000%
33184	0	0.0000%	7,600,548	0.0727%	0	0.0000%	0	0.0000%
33185	0	0.0000%	11,602,821	0.1110%	0	0.0000%	0	0.0000%
33186	0	0.0000%	37,431,343	0.3581%	0	0.0000%	0	0.0000%
33187	0	0.0000%	10,685,451	0.1022%	0	0.0000%	0	0.0000%
33189	0	0.0000%	11,141,882	0.1066%	0	0.0000%	0	0.0000%
33190	0	0.0000%	4,108,547	0.0393%	0	0.0000%	0	0.0000%
33192	0	0.0000%	17	0.0000%	0	0.0000%	0	0.0000%
33193	0	0.0000%	15,819,214	0.1513%	0	0.0000%	0	0.0000%
33194	0	0.0000%	1,274,113	0.0122%	0	0.0000%	0	0.0000%
33196	0	0.0000%	21,485,321	0.2055%	0	0.0000%	0	0.0000%
33197	0	0.0000%	2,596	0.0000%	0	0.0000%	0	0.0000%
33199	0	0.0000%	16	0.0000%	0	0.0000%	0	0.0000%
33222	0	0.0000%	15	0.0000%	0	0.0000%	0	0.0000%
33242	0	0.0000%	14	0.0000%	0	0.0000%	0	0.0000%
33256	0	0.0000%	68	0.0000%	0	0.0000%	0	0.0000%
33257	0	0.0000%	16	0.0000%	0	0.0000%	0	0.0000%
33265	0	0.0000%	2,935	0.0000%	0	0.0000%	0	0.0000%
33269	0	0.0000%	28	0.0000%	0	0.0000%	0	0.0000%
33283	0	0.0000%	4	0.0000%	0	0.0000%	0	0.0000%
33301	0	0.0000%	8,730,606	0.0835%	0	0.0000%	0	0.0000%
33303	0	0.0000%	80	0.0000%	0	0.0000%	0	0.0000%
33304	0	0.0000%	9,457,838	0.0905%	0	0.0000%	0	0.0000%
33305	0	0.0000%	7,734,041	0.0740%	0	0.0000%	0	0.0000%
33306	0	0.0000%	2,702,892	0.0259%	0	0.0000%	0	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33307	0	0.0000%	12	0.0000%	0	0.0000%	0	0.0000%
33308	0	0.0000%	22,069,304	0.2111%	0	0.0000%	0	0.0000%
33309	0	0.0000%	11,629,907	0.1112%	0	0.0000%	0	0.0000%
33310	0	0.0000%	7,947	0.0001%	0	0.0000%	0	0.0000%
33311	0	0.0000%	11,380,602	0.1089%	0	0.0000%	0	0.0000%
33312	0	0.0000%	16,792,021	0.1606%	0	0.0000%	0	0.0000%
33313	0	0.0000%	11,039,635	0.1056%	0	0.0000%	0	0.0000%
33314	0	0.0000%	5,041,560	0.0482%	0	0.0000%	0	0.0000%
33315	0	0.0000%	5,469,373	0.0523%	0	0.0000%	0	0.0000%
33316	0	0.0000%	10,438,748	0.0999%	0	0.0000%	0	0.0000%
33317	0	0.0000%	18,875,146	0.1806%	0	0.0000%	0	0.0000%
33318	0	0.0000%	29	0.0000%	0	0.0000%	0	0.0000%
33319	0	0.0000%	14,893,628	0.1425%	0	0.0000%	0	0.0000%
33320	0	0.0000%	4	0.0000%	0	0.0000%	0	0.0000%
33321	0	0.0000%	20,317,525	0.1944%	0	0.0000%	0	0.0000%
33322	0	0.0000%	20,427,736	0.1954%	0	0.0000%	0	0.0000%
33323	0	0.0000%	13,616,865	0.1303%	0	0.0000%	941,625	0.0034%
33324	0	0.0000%	19,127,562	0.1830%	0	0.0000%	0	0.0000%
33325	0	0.0000%	16,462,179	0.1575%	0	0.0000%	1,019,266	0.0037%
33326	0	0.0000%	27,906,418	0.2669%	0	0.0000%	1,845,973	0.0066%
33327	0	0.0000%	13,883,614	0.1328%	0	0.0000%	1,264,675	0.0045%
33328	0	0.0000%	17,285,250	0.1653%	0	0.0000%	0	0.0000%
33330	0	0.0000%	12,897,204	0.1234%	0	0.0000%	0	0.0000%
33331	0	0.0000%	18,456,630	0.1766%	0	0.0000%	1,260,756	0.0045%
33332	0	0.0000%	11,142,364	0.1066%	0	0.0000%	810,533	0.0029%
33334	0	0.0000%	10,592,227	0.1013%	0	0.0000%	0	0.0000%
33335	0	0.0000%	1,523	0.0000%	0	0.0000%	0	0.0000%
33338	0	0.0000%	643	0.0000%	0	0.0000%	0	0.0000%
33346	0	0.0000%	512	0.0000%	0	0.0000%	0	0.0000%
33351	0	0.0000%	12,223,654	0.1169%	0	0.0000%	0	0.0000%
33359	0	0.0000%	42	0.0000%	0	0.0000%	0	0.0000%
33394	0	0.0000%	12	0.0000%	0	0.0000%	0	0.0000%
33401	687,527	0.0860%	8,675,385	0.0830%	0	0.0000%	845,994	0.0030%
33402	85	0.0000%	1,007	0.0000%	0	0.0000%	93	0.0000%
33403	350,635	0.0438%	3,496,696	0.0334%	0	0.0000%	380,525	0.0014%
33404	1,029,523	0.1287%	10,258,835	0.0981%	0	0.0000%	1,179,918	0.0042%
33405	508,683	0.0636%	8,641,804	0.0827%	0	0.0000%	775,429	0.0028%
33406	0	0.0000%	8,653,029	0.0828%	0	0.0000%	811,084	0.0029%

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33407	643,167	0.0804%	7,250,650	0.0694%	0	0.0000%	820,143	0.0029%
33408	1,959,572	0.2450%	16,897,615	0.1616%	0	0.0000%	2,149,550	0.0077%
33409	0	0.0000%	6,985,770	0.0668%	0	0.0000%	737,265	0.0026%
33410	2,319,418	0.2900%	18,651,219	0.1784%	0	0.0000%	2,552,102	0.0092%
33411	0	0.0000%	28,252,334	0.2703%	0	0.0000%	4,145,065	0.0149%
33412	0	0.0000%	9,602,244	0.0919%	0	0.0000%	1,757,950	0.0063%
33413	0	0.0000%	3,968,829	0.0380%	0	0.0000%	542,526	0.0019%
33414	0	0.0000%	34,067,670	0.3259%	0	0.0000%	4,922,551	0.0176%
33415	0	0.0000%	9,702,476	0.0928%	0	0.0000%	974,364	0.0035%
33416	0	0.0000%	491	0.0000%	0	0.0000%	32	0.0000%
33417	0	0.0000%	9,124,693	0.0873%	0	0.0000%	993,994	0.0036%
33418	3,822,750	0.4780%	30,493,614	0.2917%	0	0.0000%	5,304,935	0.0190%
33421	0	0.0000%	1,334	0.0000%	0	0.0000%	176	0.0000%
33424	0	0.0000%	3,633	0.0000%	0	0.0000%	313	0.0000%
33425	0	0.0000%	103	0.0000%	0	0.0000%	7	0.0000%
33426	0	0.0000%	9,734,738	0.0931%	0	0.0000%	672,468	0.0024%
33427	0	0.0000%	550	0.0000%	0	0.0000%	0	0.0000%
33428	0	0.0000%	22,232,726	0.2127%	0	0.0000%	1,806,408	0.0065%
33429	0	0.0000%	4,777	0.0000%	0	0.0000%	0	0.0000%
33430	0	0.0000%	2,962,214	0.0283%	0	0.0000%	919,443	0.0033%
33431	0	0.0000%	13,542,458	0.1295%	0	0.0000%	0	0.0000%
33432	0	0.0000%	17,960,695	0.1718%	0	0.0000%	0	0.0000%
33433	0	0.0000%	29,502,922	0.2822%	0	0.0000%	0	0.0000%
33434	0	0.0000%	18,925,944	0.1810%	0	0.0000%	1,243,869	0.0045%
33435	0	0.0000%	15,722,903	0.1504%	0	0.0000%	974,341	0.0035%
33436	0	0.0000%	22,800,887	0.2181%	0	0.0000%	1,718,631	0.0062%
33437	0	0.0000%	20,716,404	0.1982%	0	0.0000%	2,145,840	0.0077%
33438	0	0.0000%	199,732	0.0019%	0	0.0000%	74,176	0.0003%
33440	0	0.0000%	13,414,444	0.1283%	0	0.0000%	7,788,959	0.0279%
33441	0	0.0000%	9,958,986	0.0953%	0	0.0000%	0	0.0000%
33442	0	0.0000%	14,614,427	0.1398%	0	0.0000%	0	0.0000%
33443	0	0.0000%	2,049	0.0000%	0	0.0000%	0	0.0000%
33444	0	0.0000%	8,376,118	0.0801%	0	0.0000%	0	0.0000%
33445	0	0.0000%	17,887,582	0.1711%	0	0.0000%	0	0.0000%
33446	0	0.0000%	20,513,913	0.1962%	0	0.0000%	2,322,640	0.0083%
33448	0	0.0000%	11,691	0.0001%	0	0.0000%	1,496	0.0000%
33449	0	0.0000%	5,522,827	0.0528%	0	0.0000%	849,573	0.0030%
33455	4,361,387	0.5454%	21,791,749	0.2085%	0	0.0000%	4,447,839	0.0159%

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33458	3,468,457	0.4337%	21,886,820	0.2094%	0	0.0000%	3,808,692	0.0137%
33459	0	0.0000%	9,049	0.0001%	0	0.0000%	3,744	0.0000%
33460	0	0.0000%	9,312,985	0.0891%	0	0.0000%	757,127	0.0027%
33461	0	0.0000%	8,491,493	0.0812%	0	0.0000%	720,137	0.0026%
33462	0	0.0000%	15,699,813	0.1502%	0	0.0000%	1,244,973	0.0045%
33463	0	0.0000%	14,681,309	0.1404%	0	0.0000%	1,557,546	0.0056%
33464	0	0.0000%	3,569	0.0000%	0	0.0000%	285	0.0000%
33466	0	0.0000%	1,219	0.0000%	0	0.0000%	103	0.0000%
33467	0	0.0000%	26,887,247	0.2572%	0	0.0000%	3,310,030	0.0119%
33469	2,857,680	0.3573%	18,535,556	0.1773%	0	0.0000%	2,918,502	0.0105%
33470	0	0.0000%	14,569,375	0.1394%	0	0.0000%	3,013,483	0.0108%
33471	0	0.0000%	6,463,031	0.0618%	0	0.0000%	5,593,039	0.0201%
33472	0	0.0000%	12,228,169	0.1170%	0	0.0000%	1,404,932	0.0050%
33473	0	0.0000%	4,761,872	0.0456%	0	0.0000%	800,456	0.0029%
33474	0	0.0000%	4,998	0.0000%	0	0.0000%	302	0.0000%
33475	3,590	0.0004%	15,757	0.0002%	0	0.0000%	3,468	0.0000%
33476	0	0.0000%	1,373,933	0.0131%	0	0.0000%	532,924	0.0019%
33477	2,191,542	0.2740%	15,269,635	0.1461%	0	0.0000%	2,265,106	0.0081%
33478	1,033,483	0.1292%	8,433,829	0.0807%	0	0.0000%	1,818,168	0.0065%
33480	3,409,402	0.4263%	46,989,986	0.4495%	0	0.0000%	4,444,379	0.0159%
33481	0	0.0000%	41	0.0000%	0	0.0000%	0	0.0000%
33482	0	0.0000%	122	0.0000%	0	0.0000%	0	0.0000%
33483	0	0.0000%	13,840,053	0.1324%	0	0.0000%	0	0.0000%
33484	0	0.0000%	14,911,474	0.1426%	0	0.0000%	1,056,431	0.0038%
33486	0	0.0000%	17,104,456	0.1636%	0	0.0000%	0	0.0000%
33487	0	0.0000%	16,312,992	0.1560%	0	0.0000%	0	0.0000%
33493	0	0.0000%	645,626	0.0062%	0	0.0000%	231,425	0.0008%
33496	0	0.0000%	34,301,450	0.3281%	0	0.0000%	2,933,179	0.0105%
33497	0	0.0000%	881	0.0000%	0	0.0000%	46	0.0000%
33498	0	0.0000%	16,014,080	0.1532%	0	0.0000%	1,494,635	0.0054%
33503	0	0.0000%	8,091	0.0001%	0	0.0000%	22,555	0.0001%
33508	0	0.0000%	19	0.0000%	0	0.0000%	41	0.0000%
33510	0	0.0000%	9,925,086	0.0949%	0	0.0000%	16,962,080	0.0608%
33511	0	0.0000%	16,727,221	0.1600%	0	0.0000%	32,038,369	0.1149%
33513	0	0.0000%	5,346,155	0.0511%	0	0.0000%	1,281,764	0.0046%
33514	0	0.0000%	918,888	0.0088%	0	0.0000%	196,129	0.0007%
33521	0	0.0000%	359,245	0.0034%	0	0.0000%	57,470	0.0002%
33523	0	0.0000%	8,476,898	0.0811%	0	0.0000%	3,380,456	0.0121%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
33524	0	0.0000%	7,835	0.0001%	0	0.0000%	6,047	0.0000%
33525	0	0.0000%	12,075,994	0.1155%	0	0.0000%	6,053,162	0.0217%
33526	0	0.0000%	2,754	0.0000%	0	0.0000%	1,136	0.0000%
33527	0	0.0000%	5,173,504	0.0495%	0	0.0000%	6,773,693	0.0243%
33530	0	0.0000%	9,878	0.0001%	0	0.0000%	15,440	0.0001%
33534	0	0.0000%	1,913,301	0.0183%	0	0.0000%	5,148,272	0.0185%
33537	0	0.0000%	5,364	0.0001%	0	0.0000%	1,895	0.0000%
33538	0	0.0000%	2,548,344	0.0244%	0	0.0000%	428,390	0.0015%
33539	0	0.0000%	4,244	0.0000%	0	0.0000%	2,782	0.0000%
33540	0	0.0000%	5,867,941	0.0561%	0	0.0000%	3,768,134	0.0135%
33541	0	0.0000%	13,563,252	0.1297%	0	0.0000%	9,138,399	0.0328%
33542	0	0.0000%	15,238,121	0.1458%	0	0.0000%	9,931,510	0.0356%
33543	0	0.0000%	12,660,802	0.1211%	0	0.0000%	9,891,264	0.0355%
33544	0	0.0000%	5,276,284	0.0505%	0	0.0000%	4,640,638	0.0166%
33545	0	0.0000%	8,025,175	0.0768%	0	0.0000%	5,497,879	0.0197%
33547	0	0.0000%	11,528,016	0.1103%	0	0.0000%	24,168,844	0.0867%
33548	0	0.0000%	3,130,676	0.0299%	0	0.0000%	3,737,008	0.0134%
33549	0	0.0000%	5,363,858	0.0513%	0	0.0000%	6,182,451	0.0222%
33550	0	0.0000%	9,413	0.0001%	0	0.0000%	14,692	0.0001%
33556	0	0.0000%	7,138,858	0.0683%	0	0.0000%	10,713,701	0.0384%
33558	0	0.0000%	5,665,520	0.0542%	0	0.0000%	6,982,474	0.0250%
33559	0	0.0000%	3,631,190	0.0347%	0	0.0000%	3,726,706	0.0134%
33563	0	0.0000%	9,542,902	0.0913%	0	0.0000%	10,321,490	0.0370%
33564	0	0.0000%	3,737	0.0000%	0	0.0000%	4,323	0.0000%
33565	0	0.0000%	9,333,098	0.0893%	0	0.0000%	8,739,298	0.0313%
33566	0	0.0000%	11,079,016	0.1060%	0	0.0000%	12,922,358	0.0463%
33567	0	0.0000%	4,032,665	0.0386%	0	0.0000%	5,639,314	0.0202%
33568	0	0.0000%	1,034	0.0000%	0	0.0000%	2,363	0.0000%
33569	0	0.0000%	7,719,072	0.0738%	0	0.0000%	17,446,836	0.0626%
33570	0	0.0000%	5,160,875	0.0494%	0	0.0000%	24,238,744	0.0869%
33571	0	0.0000%	700	0.0000%	0	0.0000%	2,523	0.0000%
33572	0	0.0000%	9,368,160	0.0896%	0	0.0000%	33,523,471	0.1202%
33573	0	0.0000%	10,643,598	0.1018%	0	0.0000%	49,720,492	0.1783%
33574	0	0.0000%	6,159	0.0001%	0	0.0000%	3,245	0.0000%
33575	0	0.0000%	1,012	0.0000%	0	0.0000%	3,878	0.0000%
33576	0	0.0000%	2,674,740	0.0256%	0	0.0000%	1,586,744	0.0057%
33578	0	0.0000%	8,202,533	0.0785%	0	0.0000%	18,616,632	0.0667%
33579	0	0.0000%	8,548,143	0.0818%	0	0.0000%	22,244,253	0.0798%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
33583	0	0.0000%	6,302	0.0001%	0	0.0000%	9,173	0.0000%
33584	0	0.0000%	9,806,265	0.0938%	0	0.0000%	13,698,002	0.0491%
33585	0	0.0000%	667,905	0.0064%	0	0.0000%	134,326	0.0005%
33586	0	0.0000%	1,025	0.0000%	0	0.0000%	5,916	0.0000%
33587	0	0.0000%	1,876	0.0000%	0	0.0000%	2,503	0.0000%
33592	0	0.0000%	2,598,749	0.0249%	0	0.0000%	3,075,686	0.0110%
33593	0	0.0000%	4,869	0.0000%	0	0.0000%	1,737	0.0000%
33594	0	0.0000%	12,192,557	0.1166%	0	0.0000%	19,757,994	0.0708%
33595	0	0.0000%	2,048	0.0000%	0	0.0000%	3,470	0.0000%
33596	0	0.0000%	14,876,437	0.1423%	0	0.0000%	28,185,132	0.1011%
33597	0	0.0000%	3,621,732	0.0346%	0	0.0000%	1,033,676	0.0037%
33598	0	0.0000%	4,737,771	0.0453%	0	0.0000%	18,807,548	0.0674%
33601	0	0.0000%	13,484	0.0001%	0	0.0000%	29,797	0.0001%
33602	0	0.0000%	2,014,951	0.0193%	0	0.0000%	4,402,361	0.0158%
33603	0	0.0000%	3,776,667	0.0361%	0	0.0000%	6,993,817	0.0251%
33604	0	0.0000%	5,818,740	0.0557%	0	0.0000%	9,574,747	0.0343%
33605	0	0.0000%	1,997,740	0.0191%	0	0.0000%	4,102,658	0.0147%
33606	0	0.0000%	5,490,641	0.0525%	0	0.0000%	12,600,604	0.0452%
33607	0	0.0000%	2,543,318	0.0243%	0	0.0000%	5,401,878	0.0194%
33608	0	0.0000%	55	0.0000%	0	0.0000%	223	0.0000%
33609	0	0.0000%	5,094,719	0.0487%	0	0.0000%	11,549,034	0.0414%
33610	0	0.0000%	5,086,124	0.0487%	0	0.0000%	8,236,176	0.0295%
33611	0	0.0000%	8,096,846	0.0775%	0	0.0000%	22,682,778	0.0813%
33612	0	0.0000%	5,048,245	0.0483%	0	0.0000%	7,416,592	0.0266%
33613	0	0.0000%	4,731,947	0.0453%	0	0.0000%	6,305,835	0.0226%
33614	0	0.0000%	4,137,084	0.0396%	0	0.0000%	7,973,901	0.0286%
33615	0	0.0000%	6,191,297	0.0592%	0	0.0000%	12,846,347	0.0461%
33616	0	0.0000%	2,629,614	0.0252%	0	0.0000%	7,679,615	0.0275%
33617	0	0.0000%	8,094,183	0.0774%	0	0.0000%	10,840,541	0.0389%
33618	0	0.0000%	7,579,300	0.0725%	0	0.0000%	11,754,393	0.0421%
33619	0	0.0000%	5,073,727	0.0485%	0	0.0000%	10,169,501	0.0365%
33620	0	0.0000%	42,478	0.0004%	0	0.0000%	53,957	0.0002%
33621	0	0.0000%	6,589	0.0001%	0	0.0000%	26,807	0.0001%
33624	0	0.0000%	9,101,217	0.0871%	0	0.0000%	14,903,278	0.0534%
33625	0	0.0000%	3,556,907	0.0340%	0	0.0000%	6,529,931	0.0234%
33626	0	0.0000%	3,122,428	0.0299%	0	0.0000%	6,019,145	0.0216%
33629	0	0.0000%	10,992,817	0.1052%	0	0.0000%	27,265,587	0.0978%
33634	0	0.0000%	2,997,555	0.0287%	0	0.0000%	6,039,650	0.0217%

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	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
33635	0	0.0000%	1,766,467	0.0169%	0	0.0000%	3,822,991	0.0137%
33637	0	0.0000%	2,603,588	0.0249%	0	0.0000%	3,501,994	0.0126%
33647	0	0.0000%	16,540,244	0.1582%	0	0.0000%	15,872,268	0.0569%
33655	0	0.0000%	490	0.0000%	0	0.0000%	1,113	0.0000%
33673	0	0.0000%	4	0.0000%	0	0.0000%	7	0.0000%
33675	0	0.0000%	5	0.0000%	0	0.0000%	11	0.0000%
33677	0	0.0000%	1	0.0000%	0	0.0000%	3	0.0000%
33679	0	0.0000%	28	0.0000%	0	0.0000%	72	0.0000%
33681	0	0.0000%	418	0.0000%	0	0.0000%	1,151	0.0000%
33687	0	0.0000%	5	0.0000%	0	0.0000%	8	0.0000%
33689	0	0.0000%	13	0.0000%	0	0.0000%	27	0.0000%
33701	0	0.0000%	2,057,451	0.0197%	0	0.0000%	9,273,317	0.0332%
33702	0	0.0000%	5,378,216	0.0514%	0	0.0000%	20,192,088	0.0724%
33703	0	0.0000%	6,389,475	0.0611%	0	0.0000%	25,989,693	0.0932%
33704	0	0.0000%	4,788,942	0.0458%	0	0.0000%	20,525,632	0.0736%
33705	0	0.0000%	4,059,476	0.0388%	0	0.0000%	21,288,870	0.0763%
33706	0	0.0000%	4,936,998	0.0472%	0	0.0000%	22,366,266	0.0802%
33707	0	0.0000%	4,383,817	0.0419%	0	0.0000%	20,589,064	0.0738%
33708	0	0.0000%	2,995,795	0.0287%	0	0.0000%	12,490,669	0.0448%
33709	0	0.0000%	2,223,583	0.0213%	0	0.0000%	8,232,736	0.0295%
33710	0	0.0000%	4,978,185	0.0476%	0	0.0000%	20,619,658	0.0739%
33711	0	0.0000%	2,168,540	0.0207%	0	0.0000%	11,144,812	0.0400%
33712	0	0.0000%	2,476,919	0.0237%	0	0.0000%	12,802,465	0.0459%
33713	0	0.0000%	3,622,500	0.0347%	0	0.0000%	15,774,745	0.0566%
33714	0	0.0000%	1,294,884	0.0124%	0	0.0000%	5,055,831	0.0181%
33715	0	0.0000%	4,292,947	0.0411%	0	0.0000%	26,063,260	0.0934%
33716	0	0.0000%	502,780	0.0048%	0	0.0000%	1,687,472	0.0061%
33733	0	0.0000%	23	0.0000%	0	0.0000%	114	0.0000%
33740	0	0.0000%	226	0.0000%	0	0.0000%	1,207	0.0000%
33743	0	0.0000%	13	0.0000%	0	0.0000%	75	0.0000%
33755	0	0.0000%	2,925,222	0.0280%	0	0.0000%	7,029,964	0.0252%
33756	0	0.0000%	4,244,227	0.0406%	0	0.0000%	10,813,885	0.0388%
33757	0	0.0000%	2,972	0.0000%	0	0.0000%	6,902	0.0000%
33758	0	0.0000%	8	0.0000%	0	0.0000%	22	0.0000%
33759	0	0.0000%	2,129,688	0.0204%	0	0.0000%	5,514,386	0.0198%
33760	0	0.0000%	1,350,733	0.0129%	0	0.0000%	4,330,010	0.0155%
33761	0	0.0000%	2,785,899	0.0266%	0	0.0000%	6,544,034	0.0235%
33762	0	0.0000%	1,543,921	0.0148%	0	0.0000%	5,258,114	0.0189%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33763	0	0.0000%	1,568,138	0.0150%	0	0.0000%	3,764,685	0.0135%
33764	0	0.0000%	3,457,375	0.0331%	0	0.0000%	10,171,023	0.0365%
33765	0	0.0000%	1,172,770	0.0112%	0	0.0000%	3,071,504	0.0110%
33767	0	0.0000%	3,409,593	0.0326%	0	0.0000%	7,437,993	0.0267%
33769	0	0.0000%	19	0.0000%	0	0.0000%	47	0.0000%
33770	0	0.0000%	3,247,642	0.0311%	0	0.0000%	9,244,533	0.0331%
33771	0	0.0000%	2,204,443	0.0211%	0	0.0000%	7,400,419	0.0265%
33772	0	0.0000%	3,447,556	0.0330%	0	0.0000%	12,690,906	0.0455%
33773	0	0.0000%	1,975,495	0.0189%	0	0.0000%	6,388,403	0.0229%
33774	0	0.0000%	2,650,449	0.0254%	0	0.0000%	8,094,696	0.0290%
33775	0	0.0000%	327	0.0000%	0	0.0000%	1,128	0.0000%
33776	0	0.0000%	2,560,808	0.0245%	0	0.0000%	8,061,344	0.0289%
33777	0	0.0000%	2,334,039	0.0223%	0	0.0000%	8,002,805	0.0287%
33778	0	0.0000%	1,690,659	0.0162%	0	0.0000%	5,499,888	0.0197%
33779	0	0.0000%	3	0.0000%	0	0.0000%	11	0.0000%
33780	0	0.0000%	357	0.0000%	0	0.0000%	1,219	0.0000%
33781	0	0.0000%	2,014,452	0.0193%	0	0.0000%	7,012,796	0.0251%
33782	0	0.0000%	2,497,818	0.0239%	0	0.0000%	8,584,576	0.0308%
33784	0	0.0000%	573	0.0000%	0	0.0000%	3,892	0.0000%
33785	0	0.0000%	1,390,740	0.0133%	0	0.0000%	3,517,908	0.0126%
33786	0	0.0000%	880,724	0.0084%	0	0.0000%	1,953,738	0.0070%
33801	0	0.0000%	27,814,453	0.2661%	0	0.0000%	21,107,228	0.0757%
33802	0	0.0000%	9,950	0.0001%	0	0.0000%	8,683	0.0000%
33803	0	0.0000%	35,991,615	0.3443%	0	0.0000%	30,600,962	0.1097%
33804	0	0.0000%	972	0.0000%	0	0.0000%	752	0.0000%
33805	0	0.0000%	13,106,233	0.1254%	0	0.0000%	9,193,288	0.0330%
33807	0	0.0000%	2,076	0.0000%	0	0.0000%	2,159	0.0000%
33809	0	0.0000%	35,007,898	0.3349%	0	0.0000%	20,443,805	0.0733%
33810	0	0.0000%	35,043,486	0.3352%	0	0.0000%	25,894,607	0.0928%
33811	0	0.0000%	17,476,440	0.1672%	0	0.0000%	19,189,804	0.0688%
33812	0	0.0000%	16,580,371	0.1586%	0	0.0000%	14,892,753	0.0534%
33813	0	0.0000%	55,491,590	0.5308%	0	0.0000%	57,619,854	0.2066%
33815	0	0.0000%	4,887,664	0.0468%	0	0.0000%	4,253,631	0.0153%
33820	0	0.0000%	194,014	0.0019%	0	0.0000%	193,624	0.0007%
33823	0	0.0000%	42,916,152	0.4105%	0	0.0000%	27,234,392	0.0976%
33825	0	0.0000%	35,777,314	0.3422%	0	0.0000%	94,408,032	0.3385%
33826	0	0.0000%	218	0.0000%	0	0.0000%	906	0.0000%
33827	0	0.0000%	6,320,959	0.0605%	0	0.0000%	11,119,475	0.0399%

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33830	0	0.0000%	38,209,705	0.3655%	0	0.0000%	41,812,305	0.1499%
33831	0	0.0000%	17	0.0000%	0	0.0000%	18	0.0000%
33834	0	0.0000%	2,619,711	0.0251%	0	0.0000%	10,276,652	0.0368%
33835	0	0.0000%	185,171	0.0018%	0	0.0000%	365,866	0.0013%
33836	0	0.0000%	19,133	0.0002%	0	0.0000%	16,775	0.0001%
33837	0	0.0000%	22,844,115	0.2185%	0	0.0000%	17,785,717	0.0638%
33838	0	0.0000%	3,857,351	0.0369%	0	0.0000%	3,948,775	0.0142%
33839	0	0.0000%	4,779,774	0.0457%	0	0.0000%	3,929,381	0.0141%
33840	0	0.0000%	119,160	0.0011%	0	0.0000%	94,430	0.0003%
33841	0	0.0000%	10,545,738	0.1009%	0	0.0000%	18,585,995	0.0666%
33843	0	0.0000%	13,921,284	0.1332%	0	0.0000%	30,552,143	0.1095%
33844	0	0.0000%	35,353,460	0.3382%	0	0.0000%	32,333,813	0.1159%
33845	0	0.0000%	59,787	0.0006%	0	0.0000%	51,756	0.0002%
33846	0	0.0000%	335,940	0.0032%	0	0.0000%	289,904	0.0010%
33847	0	0.0000%	376,679	0.0036%	0	0.0000%	512,526	0.0018%
33848	0	0.0000%	201,407	0.0019%	0	0.0000%	146,056	0.0005%
33849	0	0.0000%	351,788	0.0034%	0	0.0000%	207,765	0.0007%
33850	0	0.0000%	11,528,042	0.1103%	0	0.0000%	7,812,194	0.0280%
33851	0	0.0000%	1,107,455	0.0106%	0	0.0000%	1,109,189	0.0040%
33852	0	0.0000%	60,066,794	0.5746%	0	0.0000%	142,680,807	0.5116%
33853	0	0.0000%	12,546,671	0.1200%	0	0.0000%	16,694,166	0.0599%
33854	0	0.0000%	445,761	0.0043%	0	0.0000%	1,003,209	0.0036%
33855	0	0.0000%	1,976,330	0.0189%	0	0.0000%	4,431,994	0.0159%
33856	0	0.0000%	9,832	0.0001%	0	0.0000%	21,569	0.0001%
33857	0	0.0000%	2,264,822	0.0217%	0	0.0000%	4,264,890	0.0153%
33858	0	0.0000%	22,524	0.0002%	0	0.0000%	17,608	0.0001%
33859	0	0.0000%	12,492,157	0.1195%	0	0.0000%	16,257,284	0.0583%
33860	0	0.0000%	15,977,920	0.1528%	0	0.0000%	22,964,906	0.0823%
33862	0	0.0000%	167	0.0000%	0	0.0000%	583	0.0000%
33863	0	0.0000%	21,966	0.0002%	0	0.0000%	32,616	0.0001%
33865	0	0.0000%	435,673	0.0042%	0	0.0000%	3,486,935	0.0125%
33867	0	0.0000%	177,623	0.0017%	0	0.0000%	299,097	0.0011%
33868	0	0.0000%	13,364,793	0.1278%	0	0.0000%	6,618,173	0.0237%
33870	0	0.0000%	37,709,848	0.3607%	0	0.0000%	100,743,703	0.3612%
33871	0	0.0000%	8,342	0.0001%	0	0.0000%	22,465	0.0001%
33872	0	0.0000%	32,026,575	0.3064%	0	0.0000%	87,802,994	0.3148%
33873	0	0.0000%	10,133,026	0.0969%	0	0.0000%	50,442,524	0.1809%
33875	0	0.0000%	27,650,672	0.2645%	0	0.0000%	73,339,617	0.2630%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33876	0	0.0000%	11,764,399	0.1125%	0	0.0000%	31,544,543	0.1131%
33877	0	0.0000%	299,721	0.0029%	0	0.0000%	325,232	0.0012%
33880	0	0.0000%	49,482,734	0.4733%	0	0.0000%	38,604,556	0.1384%
33881	0	0.0000%	50,758,066	0.4855%	0	0.0000%	39,004,214	0.1398%
33882	0	0.0000%	1,795	0.0000%	0	0.0000%	1,410	0.0000%
33883	0	0.0000%	5,941	0.0001%	0	0.0000%	4,638	0.0000%
33884	0	0.0000%	60,946,927	0.5830%	0	0.0000%	58,444,706	0.2096%
33885	0	0.0000%	113	0.0000%	0	0.0000%	83	0.0000%
33890	0	0.0000%	5,295,766	0.0507%	0	0.0000%	19,265,781	0.0691%
33896	0	0.0000%	8,135,515	0.0778%	0	0.0000%	5,753,583	0.0206%
33897	0	0.0000%	13,247,377	0.1267%	0	0.0000%	8,054,801	0.0289%
33898	0	0.0000%	24,861,850	0.2378%	0	0.0000%	40,611,678	0.1456%
33901	0	0.0000%	17,602,408	0.1684%	0	0.0000%	215,027,123	0.7710%
33902	0	0.0000%	1,603	0.0000%	0	0.0000%	19,335	0.0001%
33903	0	0.0000%	26,090,477	0.2496%	0	0.0000%	312,016,964	1.1187%
33904	0	0.0000%	47,874,729	0.4580%	0	0.0000%	909,284,728	3.2602%
33905	0	0.0000%	39,735,514	0.3801%	0	0.0000%	353,342,669	1.2669%
33906	0	0.0000%	30	0.0000%	0	0.0000%	716	0.0000%
33907	0	0.0000%	16,912,691	0.1618%	0	0.0000%	258,896,313	0.9283%
33908	0	0.0000%	50,985,222	0.4877%	0	0.0000%	750,323,810	2.6903%
33909	0	0.0000%	15,654,060	0.1497%	0	0.0000%	302,387,324	1.0842%
33910	0	0.0000%	41	0.0000%	0	0.0000%	1,788	0.0000%
33912	0	0.0000%	37,368,778	0.3575%	0	0.0000%	329,303,943	1.1807%
33913	0	0.0000%	57,870,791	0.5536%	0	0.0000%	282,010,944	1.0111%
33914	0	0.0000%	35,808,573	0.3425%	0	0.0000%	1,044,504,748	3.7450%
33915	0	0.0000%	9	0.0000%	0	0.0000%	537	0.0000%
33916	0	0.0000%	7,810,983	0.0747%	0	0.0000%	102,947,523	0.3691%
33917	0	0.0000%	33,449,753	0.3200%	0	0.0000%	372,107,854	1.3342%
33918	0	0.0000%	561	0.0000%	0	0.0000%	17,436	0.0001%
33919	0	0.0000%	45,124,009	0.4316%	0	0.0000%	768,823,841	2.7566%
33920	0	0.0000%	20,117,465	0.1924%	0	0.0000%	55,212,378	0.1980%
33921	0	0.0000%	5,478,767	0.0524%	0	0.0000%	401,097,352	1.4381%
33922	0	0.0000%	3,823,688	0.0366%	0	0.0000%	172,983,982	0.6202%
33924	0	0.0000%	2,976,193	0.0285%	0	0.0000%	177,312,754	0.6357%
33927	0	0.0000%	5,775	0.0001%	0	0.0000%	353,931	0.0013%
33928	0	0.0000%	48,101,403	0.4601%	0	0.0000%	198,506,963	0.7117%
33929	0	0.0000%	5,494	0.0001%	0	0.0000%	17,229	0.0001%
33930	0	0.0000%	989,946	0.0095%	0	0.0000%	579,158	0.0021%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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33931	0	0.0000%	19,631,678	0.1878%	0	0.0000%	239,482,213	0.8587%
33935	0	0.0000%	33,033,349	0.3160%	0	0.0000%	31,021,728	0.1112%
33936	0	0.0000%	54,963,621	0.5258%	0	0.0000%	122,437,037	0.4390%
33944	0	0.0000%	285,243	0.0027%	0	0.0000%	290,690	0.0010%
33945	0	0.0000%	3,933	0.0000%	0	0.0000%	145,089	0.0005%
33946	0	0.0000%	2,296,409	0.0220%	0	0.0000%	239,389,924	0.8583%
33947	0	0.0000%	3,542,739	0.0339%	0	0.0000%	404,517,528	1.4504%
33948	0	0.0000%	8,605,990	0.0823%	0	0.0000%	525,527,355	1.8843%
33950	0	0.0000%	30,718,129	0.2938%	0	0.0000%	813,695,860	2.9175%
33951	0	0.0000%	2,125	0.0000%	0	0.0000%	29,217	0.0001%
33952	0	0.0000%	18,341,789	0.1755%	0	0.0000%	748,288,320	2.6830%
33953	0	0.0000%	2,700,961	0.0258%	0	0.0000%	309,122,897	1.1083%
33954	0	0.0000%	4,975,523	0.0476%	0	0.0000%	263,666,371	0.9454%
33955	0	0.0000%	9,761,569	0.0934%	0	0.0000%	280,216,784	1.0047%
33956	0	0.0000%	4,322,121	0.0413%	0	0.0000%	156,486,777	0.5611%
33957	0	0.0000%	15,678,580	0.1500%	0	0.0000%	385,303,919	1.3815%
33960	0	0.0000%	1,395,986	0.0134%	0	0.0000%	2,570,627	0.0092%
33965	0	0.0000%	1,021	0.0000%	0	0.0000%	6,839	0.0000%
33966	0	0.0000%	12,803,865	0.1225%	0	0.0000%	172,035,548	0.6168%
33967	0	0.0000%	38,354,408	0.3669%	0	0.0000%	194,919,424	0.6989%
33970	0	0.0000%	2,255	0.0000%	0	0.0000%	7,008	0.0000%
33971	0	0.0000%	18,017,935	0.1724%	0	0.0000%	96,292,624	0.3453%
33972	0	0.0000%	22,800,994	0.2181%	0	0.0000%	53,677,616	0.1925%
33973	0	0.0000%	4,959,661	0.0474%	0	0.0000%	31,402,756	0.1126%
33974	0	0.0000%	15,513,520	0.1484%	0	0.0000%	27,484,392	0.0985%
33975	0	0.0000%	17,853	0.0002%	0	0.0000%	15,484	0.0001%
33976	0	0.0000%	10,561,865	0.1010%	0	0.0000%	39,649,118	0.1422%
33980	0	0.0000%	8,444,792	0.0808%	0	0.0000%	268,325,169	0.9621%
33981	0	0.0000%	5,084,297	0.0486%	0	0.0000%	499,252,862	1.7901%
33982	0	0.0000%	14,887,808	0.1424%	0	0.0000%	262,903,041	0.9426%
33983	0	0.0000%	16,406,008	0.1569%	0	0.0000%	483,225,375	1.7326%
33990	0	0.0000%	28,550,857	0.2731%	0	0.0000%	501,762,867	1.7991%
33991	0	0.0000%	13,079,807	0.1251%	0	0.0000%	363,127,889	1.3020%
33993	0	0.0000%	12,488,603	0.1195%	0	0.0000%	382,872,276	1.3728%
33994	0	0.0000%	53	0.0000%	0	0.0000%	1,280	0.0000%
34101	0	0.0000%	18,415	0.0002%	0	0.0000%	30,981	0.0001%
34102	0	0.0000%	54,226,734	0.5187%	0	0.0000%	84,539,849	0.3031%
34103	0	0.0000%	40,414,317	0.3866%	0	0.0000%	79,761,174	0.2860%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
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34104	0	0.0000%	44,368,786	0.4244%	0	0.0000%	46,997,791	0.1685%
34105	0	0.0000%	47,584,929	0.4552%	0	0.0000%	67,642,208	0.2425%
34108	0	0.0000%	72,714,355	0.6956%	0	0.0000%	177,659,307	0.6370%
34109	0	0.0000%	49,829,952	0.4767%	0	0.0000%	92,270,135	0.3308%
34110	0	0.0000%	64,093,321	0.6131%	0	0.0000%	166,557,891	0.5972%
34112	0	0.0000%	59,017,330	0.5645%	0	0.0000%	60,996,222	0.2187%
34113	0	0.0000%	58,727,399	0.5618%	0	0.0000%	42,381,598	0.1520%
34114	0	0.0000%	55,997,992	0.5357%	0	0.0000%	26,275,892	0.0942%
34116	0	0.0000%	41,612,684	0.3981%	0	0.0000%	38,240,137	0.1371%
34117	0	0.0000%	36,028,579	0.3446%	0	0.0000%	19,166,843	0.0687%
34119	0	0.0000%	86,295,473	0.8255%	0	0.0000%	114,729,396	0.4114%
34120	0	0.0000%	101,155,866	0.9676%	0	0.0000%	53,126,449	0.1905%
34133	0	0.0000%	5,481	0.0001%	0	0.0000%	15,935	0.0001%
34134	0	0.0000%	61,088,026	0.5844%	0	0.0000%	241,861,050	0.8672%
34135	0	0.0000%	87,248,657	0.8346%	0	0.0000%	237,028,182	0.8499%
34137	0	0.0000%	66,070	0.0006%	0	0.0000%	11,266	0.0000%
34138	0	0.0000%	1,220,667	0.0117%	0	0.0000%	122,159	0.0004%
34139	0	0.0000%	1,409,427	0.0135%	0	0.0000%	163,777	0.0006%
34140	0	0.0000%	1,262,893	0.0121%	0	0.0000%	356,279	0.0013%
34141	0	0.0000%	109,550	0.0010%	0	0.0000%	19,069	0.0001%
34142	0	0.0000%	26,295,532	0.2515%	0	0.0000%	10,429,109	0.0374%
34143	0	0.0000%	37,313	0.0004%	0	0.0000%	16,421	0.0001%
34145	0	0.0000%	142,857,185	1.3665%	0	0.0000%	67,648,595	0.2426%
34146	0	0.0000%	2,580	0.0000%	0	0.0000%	1,103	0.0000%
34201	0	0.0000%	1,375,201	0.0132%	0	0.0000%	22,165,361	0.0795%
34202	0	0.0000%	7,897,809	0.0755%	0	0.0000%	120,397,712	0.4317%
34203	0	0.0000%	4,773,334	0.0457%	0	0.0000%	66,877,080	0.2398%
34205	0	0.0000%	3,905,578	0.0374%	0	0.0000%	47,509,434	0.1703%
34207	0	0.0000%	2,487,243	0.0238%	0	0.0000%	37,821,140	0.1356%
34208	0	0.0000%	4,114,111	0.0394%	0	0.0000%	46,167,226	0.1655%
34209	0	0.0000%	11,312,355	0.1082%	0	0.0000%	122,568,001	0.4395%
34210	0	0.0000%	2,470,102	0.0236%	0	0.0000%	37,216,043	0.1334%
34211	0	0.0000%	4,982,268	0.0477%	0	0.0000%	60,557,040	0.2171%
34212	0	0.0000%	4,694,551	0.0449%	0	0.0000%	47,418,085	0.1700%
34215	0	0.0000%	269,609	0.0026%	0	0.0000%	3,323,456	0.0119%
34216	0	0.0000%	1,121,586	0.0107%	0	0.0000%	8,443,224	0.0303%
34217	0	0.0000%	3,131,720	0.0300%	0	0.0000%	28,640,902	0.1027%
34218	0	0.0000%	75	0.0000%	0	0.0000%	1,410	0.0000%

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34219	0	0.0000%	7,184,062	0.0687%	0	0.0000%	52,321,194	0.1876%
34220	0	0.0000%	2	0.0000%	0	0.0000%	27	0.0000%
34221	0	0.0000%	8,256,747	0.0790%	0	0.0000%	65,166,643	0.2337%
34222	0	0.0000%	2,604,748	0.0249%	0	0.0000%	22,007,482	0.0789%
34223	0	0.0000%	6,890,579	0.0659%	0	0.0000%	669,037,900	2.3988%
34224	0	0.0000%	4,955,540	0.0474%	0	0.0000%	598,790,250	2.1469%
34228	0	0.0000%	7,447,975	0.0712%	0	0.0000%	135,864,328	0.4871%
34229	0	0.0000%	2,986,117	0.0286%	0	0.0000%	91,766,452	0.3290%
34230	0	0.0000%	138	0.0000%	0	0.0000%	3,669	0.0000%
34231	0	0.0000%	7,508,494	0.0718%	0	0.0000%	209,707,005	0.7519%
34232	0	0.0000%	6,044,686	0.0578%	0	0.0000%	145,300,374	0.5210%
34233	0	0.0000%	3,193,398	0.0305%	0	0.0000%	94,668,069	0.3394%
34234	0	0.0000%	2,115,561	0.0202%	0	0.0000%	40,358,492	0.1447%
34235	0	0.0000%	3,065,953	0.0293%	0	0.0000%	73,880,478	0.2649%
34236	0	0.0000%	3,707,732	0.0355%	0	0.0000%	68,226,614	0.2446%
34237	0	0.0000%	1,417,193	0.0136%	0	0.0000%	32,961,087	0.1182%
34238	0	0.0000%	5,419,314	0.0518%	0	0.0000%	176,739,919	0.6337%
34239	0	0.0000%	3,914,222	0.0374%	0	0.0000%	84,977,180	0.3047%
34240	0	0.0000%	5,641,971	0.0540%	0	0.0000%	111,066,468	0.3982%
34241	0	0.0000%	5,886,140	0.0563%	0	0.0000%	158,345,577	0.5677%
34242	0	0.0000%	4,724,881	0.0452%	0	0.0000%	108,341,684	0.3885%
34243	0	0.0000%	5,548,970	0.0531%	0	0.0000%	97,218,332	0.3486%
34249	0	0.0000%	1	0.0000%	0	0.0000%	49	0.0000%
34250	0	0.0000%	275,476	0.0026%	0	0.0000%	2,084,864	0.0075%
34251	0	0.0000%	2,665,466	0.0255%	0	0.0000%	32,222,286	0.1155%
34265	0	0.0000%	5,006	0.0000%	0	0.0000%	60,387	0.0002%
34266	0	0.0000%	20,812,426	0.1991%	0	0.0000%	206,696,366	0.7411%
34267	0	0.0000%	12,540	0.0001%	0	0.0000%	165,900	0.0006%
34268	0	0.0000%	17,385	0.0002%	0	0.0000%	224,985	0.0008%
34269	0	0.0000%	4,661,954	0.0446%	0	0.0000%	137,735,067	0.4938%
34270	0	0.0000%	2,914	0.0000%	0	0.0000%	51,808	0.0002%
34272	0	0.0000%	328	0.0000%	0	0.0000%	11,820	0.0000%
34275	0	0.0000%	6,152,336	0.0589%	0	0.0000%	249,107,162	0.8932%
34276	0	0.0000%	5	0.0000%	0	0.0000%	238	0.0000%
34280	0	0.0000%	36	0.0000%	0	0.0000%	711	0.0000%
34281	0	0.0000%	941	0.0000%	0	0.0000%	14,168	0.0001%
34282	0	0.0000%	4	0.0000%	0	0.0000%	69	0.0000%
34285	0	0.0000%	4,237,353	0.0405%	0	0.0000%	221,026,783	0.7925%

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34286	0	0.0000%	4,531,538	0.0433%	0	0.0000%	310,034,561	1.1116%
34287	0	0.0000%	8,009,927	0.0766%	0	0.0000%	472,423,381	1.6939%
34288	0	0.0000%	2,891,091	0.0277%	0	0.0000%	232,426,764	0.8334%
34289	0	0.0000%	698,959	0.0067%	0	0.0000%	66,496,588	0.2384%
34291	0	0.0000%	1,471,541	0.0141%	0	0.0000%	87,072,302	0.3122%
34292	0	0.0000%	3,937,411	0.0377%	0	0.0000%	217,633,636	0.7803%
34293	0	0.0000%	11,195,341	0.1071%	0	0.0000%	765,648,426	2.7452%
34420	0	0.0000%	13,302,152	0.1272%	0	0.0000%	1,372,174	0.0049%
34421	0	0.0000%	11,944	0.0001%	0	0.0000%	1,213	0.0000%
34428	0	0.0000%	3,915,083	0.0375%	0	0.0000%	812,390	0.0029%
34429	0	0.0000%	5,312,269	0.0508%	0	0.0000%	1,178,458	0.0042%
34430	0	0.0000%	16,111	0.0002%	0	0.0000%	2,437	0.0000%
34431	0	0.0000%	4,194,313	0.0401%	0	0.0000%	659,137	0.0024%
34432	0	0.0000%	6,708,680	0.0642%	0	0.0000%	1,051,974	0.0038%
34433	0	0.0000%	2,630,184	0.0252%	0	0.0000%	525,374	0.0019%
34434	0	0.0000%	3,805,711	0.0364%	0	0.0000%	772,198	0.0028%
34436	0	0.0000%	5,098,988	0.0488%	0	0.0000%	998,815	0.0036%
34442	0	0.0000%	8,772,729	0.0839%	0	0.0000%	1,774,826	0.0064%
34445	0	0.0000%	15,314	0.0001%	0	0.0000%	2,807	0.0000%
34446	0	0.0000%	8,788,715	0.0841%	0	0.0000%	2,354,803	0.0084%
34447	0	0.0000%	2,659	0.0000%	0	0.0000%	603	0.0000%
34448	0	0.0000%	4,334,204	0.0415%	0	0.0000%	1,052,524	0.0038%
34449	0	0.0000%	760,714	0.0073%	0	0.0000%	113,965	0.0004%
34450	0	0.0000%	8,780,754	0.0840%	0	0.0000%	1,522,291	0.0055%
34452	0	0.0000%	9,069,881	0.0868%	0	0.0000%	1,642,000	0.0059%
34453	0	0.0000%	5,397,073	0.0516%	0	0.0000%	1,044,959	0.0037%
34460	0	0.0000%	2,325	0.0000%	0	0.0000%	478	0.0000%
34461	0	0.0000%	5,134,584	0.0491%	0	0.0000%	1,211,293	0.0043%
34464	0	0.0000%	7	0.0000%	0	0.0000%	1	0.0000%
34465	0	0.0000%	10,183,862	0.0974%	0	0.0000%	2,128,702	0.0076%
34470	0	0.0000%	12,698,749	0.1215%	0	0.0000%	1,188,617	0.0043%
34471	0	0.0000%	23,985,686	0.2294%	0	0.0000%	2,452,156	0.0088%
34472	0	0.0000%	21,567,607	0.2063%	0	0.0000%	2,155,324	0.0077%
34473	0	0.0000%	10,387,855	0.0994%	0	0.0000%	1,574,668	0.0056%
34474	0	0.0000%	4,937,871	0.0472%	0	0.0000%	610,223	0.0022%
34475	0	0.0000%	3,134,776	0.0300%	0	0.0000%	329,444	0.0012%
34476	0	0.0000%	16,361,827	0.1565%	0	0.0000%	2,305,897	0.0083%
34478	0	0.0000%	9,184	0.0001%	0	0.0000%	931	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
34479	0	0.0000%	9,985,014	0.0955%	0	0.0000%	887,232	0.0032%
34480	0	0.0000%	19,006,646	0.1818%	0	0.0000%	2,058,629	0.0074%
34481	0	0.0000%	11,663,169	0.1116%	0	0.0000%	1,785,808	0.0064%
34482	0	0.0000%	10,616,367	0.1016%	0	0.0000%	1,306,200	0.0047%
34484	0	0.0000%	2,685,490	0.0257%	0	0.0000%	455,963	0.0016%
34487	0	0.0000%	1,923	0.0000%	0	0.0000%	527	0.0000%
34488	0	0.0000%	5,332,831	0.0510%	0	0.0000%	431,981	0.0015%
34489	0	0.0000%	2,051	0.0000%	0	0.0000%	187	0.0000%
34491	0	0.0000%	26,728,348	0.2557%	0	0.0000%	3,062,062	0.0110%
34492	0	0.0000%	4,627	0.0000%	0	0.0000%	480	0.0000%
34498	0	0.0000%	372,395	0.0036%	0	0.0000%	74,720	0.0003%
34601	0	0.0000%	6,844,781	0.0655%	0	0.0000%	2,357,904	0.0085%
34602	0	0.0000%	4,723,190	0.0452%	0	0.0000%	1,731,025	0.0062%
34603	0	0.0000%	916	0.0000%	0	0.0000%	301	0.0000%
34604	0	0.0000%	2,547,913	0.0244%	0	0.0000%	1,354,616	0.0049%
34605	0	0.0000%	1,213	0.0000%	0	0.0000%	355	0.0000%
34606	0	0.0000%	8,668,540	0.0829%	0	0.0000%	4,827,987	0.0173%
34607	0	0.0000%	3,517,484	0.0336%	0	0.0000%	1,956,238	0.0070%
34608	0	0.0000%	9,869,283	0.0944%	0	0.0000%	5,136,325	0.0184%
34609	0	0.0000%	11,810,429	0.1130%	0	0.0000%	6,182,278	0.0222%
34610	0	0.0000%	2,968,126	0.0284%	0	0.0000%	2,142,338	0.0077%
34611	0	0.0000%	1,693	0.0000%	0	0.0000%	869	0.0000%
34613	0	0.0000%	7,887,394	0.0754%	0	0.0000%	2,994,251	0.0107%
34614	0	0.0000%	1,884,132	0.0180%	0	0.0000%	744,010	0.0027%
34636	0	0.0000%	8,230	0.0001%	0	0.0000%	1,880	0.0000%
34637	0	0.0000%	1,899,479	0.0182%	0	0.0000%	1,692,687	0.0061%
34638	0	0.0000%	4,763,283	0.0456%	0	0.0000%	4,868,658	0.0175%
34639	0	0.0000%	7,178,732	0.0687%	0	0.0000%	6,607,745	0.0237%
34652	0	0.0000%	3,971,770	0.0380%	0	0.0000%	5,178,262	0.0186%
34653	0	0.0000%	3,475,419	0.0332%	0	0.0000%	4,988,752	0.0179%
34654	0	0.0000%	3,030,034	0.0290%	0	0.0000%	3,422,593	0.0123%
34655	0	0.0000%	6,075,654	0.0581%	0	0.0000%	8,999,547	0.0323%
34660	0	0.0000%	3,444	0.0000%	0	0.0000%	7,222	0.0000%
34661	0	0.0000%	84,042	0.0008%	0	0.0000%	21,663	0.0001%
34667	0	0.0000%	7,931,746	0.0759%	0	0.0000%	6,267,760	0.0225%
34668	0	0.0000%	6,009,621	0.0575%	0	0.0000%	6,872,327	0.0246%
34669	0	0.0000%	2,114,665	0.0202%	0	0.0000%	1,878,100	0.0067%
34674	0	0.0000%	743	0.0000%	0	0.0000%	598	0.0000%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
34677	0	0.0000%	3,320,911	0.0318%	0	0.0000%	7,250,408	0.0260%
34679	0	0.0000%	853	0.0000%	0	0.0000%	550	0.0000%
34681	0	0.0000%	468,866	0.0045%	0	0.0000%	854,167	0.0031%
34682	0	0.0000%	0	0.0000%	0	0.0000%	2	0.0000%
34683	0	0.0000%	6,687,931	0.0640%	0	0.0000%	13,436,843	0.0482%
34684	0	0.0000%	4,106,325	0.0393%	0	0.0000%	8,651,198	0.0310%
34685	0	0.0000%	2,908,970	0.0278%	0	0.0000%	5,314,152	0.0191%
34688	0	0.0000%	1,702,469	0.0163%	0	0.0000%	2,799,633	0.0100%
34689	0	0.0000%	4,009,592	0.0384%	0	0.0000%	6,925,064	0.0248%
34690	0	0.0000%	1,538,388	0.0147%	0	0.0000%	2,216,381	0.0079%
34691	0	0.0000%	2,580,358	0.0247%	0	0.0000%	3,743,319	0.0134%
34695	0	0.0000%	3,844,667	0.0368%	0	0.0000%	9,249,234	0.0332%
34697	0	0.0000%	328	0.0000%	0	0.0000%	743	0.0000%
34698	0	0.0000%	6,505,607	0.0622%	0	0.0000%	14,204,278	0.0509%
34705	0	0.0000%	2,291,078	0.0219%	0	0.0000%	493,085	0.0018%
34711	0	0.0000%	41,340,715	0.3955%	0	0.0000%	14,872,928	0.0533%
34712	0	0.0000%	11,892	0.0001%	0	0.0000%	3,005	0.0000%
34714	0	0.0000%	9,207,282	0.0881%	0	0.0000%	4,663,412	0.0167%
34715	0	0.0000%	13,516,412	0.1293%	0	0.0000%	4,104,263	0.0147%
34729	0	0.0000%	29,859	0.0003%	0	0.0000%	9,237	0.0000%
34731	0	0.0000%	13,387,809	0.1281%	0	0.0000%	1,722,112	0.0062%
34734	200,997	0.0251%	2,513,898	0.0240%	0	0.0000%	1,264,491	0.0045%
34736	0	0.0000%	17,545,434	0.1678%	0	0.0000%	4,251,265	0.0152%
34737	0	0.0000%	4,380,749	0.0419%	0	0.0000%	937,351	0.0034%
34739	32,688	0.0041%	780,012	0.0075%	0	0.0000%	885,692	0.0032%
34740	1,337	0.0002%	29,804	0.0003%	0	0.0000%	14,472	0.0001%
34741	0	0.0000%	11,587,302	0.1108%	0	0.0000%	8,511,146	0.0305%
34743	0	0.0000%	18,222,795	0.1743%	0	0.0000%	14,819,109	0.0531%
34744	0	0.0000%	27,973,465	0.2676%	0	0.0000%	24,633,689	0.0883%
34746	0	0.0000%	27,220,477	0.2604%	0	0.0000%	22,829,381	0.0819%
34747	0	0.0000%	17,696,974	0.1693%	0	0.0000%	11,800,472	0.0423%
34748	0	0.0000%	50,452,043	0.4826%	0	0.0000%	8,127,951	0.0291%
34749	0	0.0000%	70,771	0.0007%	0	0.0000%	10,017	0.0000%
34753	0	0.0000%	3,116,316	0.0298%	0	0.0000%	761,230	0.0027%
34755	0	0.0000%	19,988	0.0002%	0	0.0000%	7,611	0.0000%
34756	0	0.0000%	4,483,124	0.0429%	0	0.0000%	1,707,794	0.0061%
34758	0	0.0000%	12,576,314	0.1203%	0	0.0000%	11,466,455	0.0411%
34759	0	0.0000%	15,731,290	0.1505%	0	0.0000%	16,895,604	0.0606%

	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
Zip Code	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
34760	78,843	0.0099%	1,295,334	0.0124%	0	0.0000%	593,089	0.0021%
34761	1,835,948	0.2296%	19,241,478	0.1841%	0	0.0000%	8,740,700	0.0313%
34762	0	0.0000%	1,235,695	0.0118%	0	0.0000%	246,489	0.0009%
34769	0	0.0000%	15,899,200	0.1521%	0	0.0000%	18,348,594	0.0658%
34770	1	0.0000%	34	0.0000%	0	0.0000%	35	0.0000%
34771	1,228,883	0.1537%	14,417,486	0.1379%	0	0.0000%	18,058,148	0.0647%
34772	0	0.0000%	15,269,716	0.1461%	0	0.0000%	17,658,568	0.0633%
34773	0	0.0000%	1,665,784	0.0159%	0	0.0000%	1,871,088	0.0067%
34778	0	0.0000%	19	0.0000%	0	0.0000%	7	0.0000%
34785	0	0.0000%	8,427,988	0.0806%	0	0.0000%	1,214,704	0.0044%
34786	0	0.0000%	38,577,195	0.3690%	0	0.0000%	20,161,080	0.0723%
34787	0	0.0000%	40,055,327	0.3832%	0	0.0000%	19,382,608	0.0695%
34788	1,027,018	0.1284%	25,482,166	0.2438%	0	0.0000%	3,564,219	0.0128%
34789	529	0.0001%	12,037	0.0001%	0	0.0000%	1,849	0.0000%
34797	0	0.0000%	2,975,613	0.0285%	0	0.0000%	581,757	0.0021%
34945	484,097	0.0605%	2,511,241	0.0240%	0	0.0000%	1,006,561	0.0036%
34946	627,850	0.0785%	2,065,981	0.0198%	0	0.0000%	676,085	0.0024%
34947	653,818	0.0818%	2,268,352	0.0217%	0	0.0000%	766,682	0.0027%
34948	927	0.0001%	3,372	0.0000%	0	0.0000%	1,072	0.0000%
34949	3,449,179	0.4313%	9,975,921	0.0954%	0	0.0000%	3,049,983	0.0109%
34950	926,480	0.1159%	3,484,188	0.0333%	0	0.0000%	1,087,933	0.0039%
34951	2,540,349	0.3177%	8,575,408	0.0820%	0	0.0000%	3,083,778	0.0111%
34952	4,381,767	0.5479%	20,978,777	0.2007%	0	0.0000%	6,023,059	0.0216%
34953	4,463,731	0.5582%	26,081,545	0.2495%	0	0.0000%	9,320,258	0.0334%
34956	112,477	0.0141%	2,232,578	0.0214%	0	0.0000%	917,081	0.0033%
34957	4,243,071	0.5306%	17,436,338	0.1668%	0	0.0000%	4,874,924	0.0175%
34972	0	0.0000%	11,979,463	0.1146%	0	0.0000%	8,133,258	0.0292%
34973	0	0.0000%	12,984	0.0001%	0	0.0000%	8,340	0.0000%
34974	0	0.0000%	40,554,102	0.3879%	0	0.0000%	28,739,991	0.1030%
34981	418,126	0.0523%	1,688,218	0.0161%	0	0.0000%	581,834	0.0021%
34982	3,014,367	0.3769%	12,328,789	0.1179%	0	0.0000%	3,669,397	0.0132%
34983	4,015,933	0.5022%	18,426,747	0.1763%	0	0.0000%	5,924,455	0.0212%
34984	1,646,598	0.2059%	8,893,540	0.0851%	0	0.0000%	2,837,179	0.0102%
34986	2,529,750	0.3163%	12,637,613	0.1209%	0	0.0000%	4,885,993	0.0175%
34987	1,440,221	0.1801%	8,275,917	0.0792%	0	0.0000%	3,647,200	0.0131%
34990	4,309,465	0.5389%	27,916,563	0.2670%	0	0.0000%	8,064,206	0.0289%
34991	191	0.0000%	827	0.0000%	0	0.0000%	253	0.0000%
34992	1,364	0.0002%	5,685	0.0001%	0	0.0000%	1,285	0.0000%

Zip Code	Hurricane Matthew (2016)		Hurricane Irma (2017)		Hurricane Michael (2018)		Hurricane Ian (2022)	
	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)	Personal & Commercial Residential Modeled Loss 2023 (\$)	Percent of Total Loss (%)
34994	1,410,291	0.1764%	6,791,309	0.0650%	0	0.0000%	1,666,753	0.0060%
34995	8	0.0000%	37	0.0000%	0	0.0000%	9	0.0000%
34996	3,505,457	0.4384%	13,670,744	0.1308%	0	0.0000%	3,445,445	0.0124%
34997	5,139,064	0.6426%	27,056,717	0.2588%	0	0.0000%	6,639,571	0.0238%

Figure 78: Percentage of residential hurricane losses 2023 FHCF from Hurricane Matthew (2016) by ZIP Code

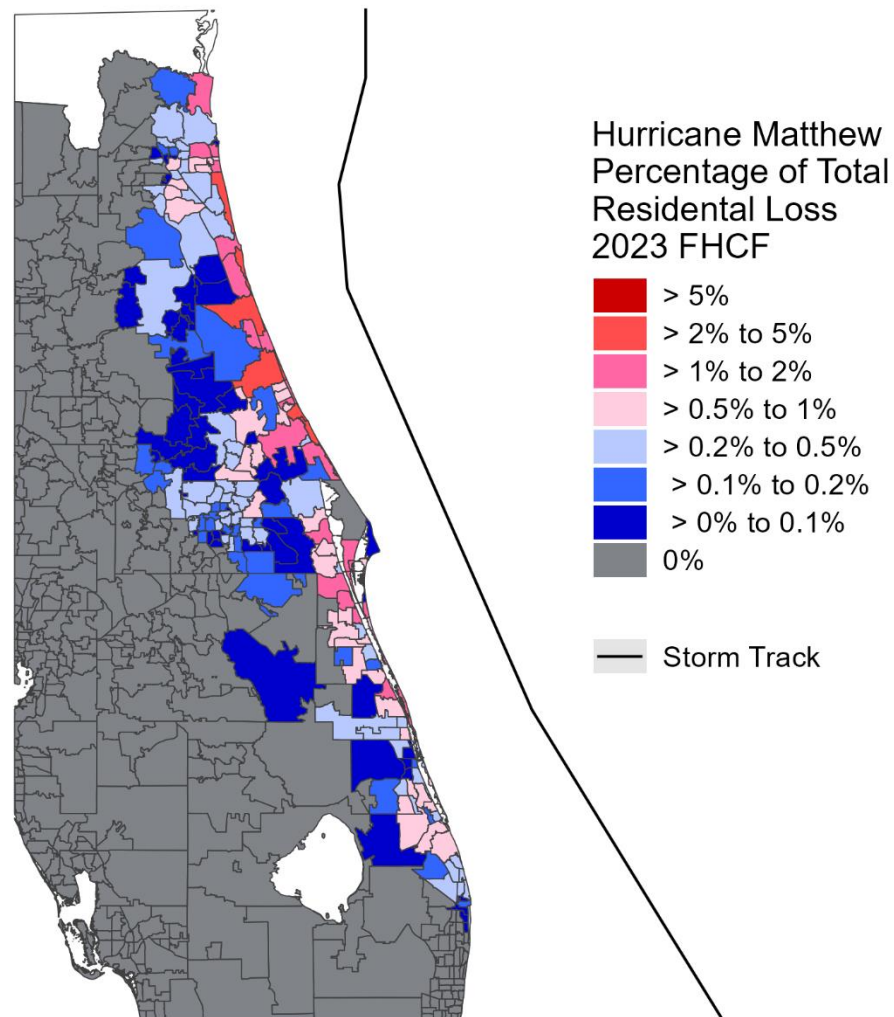


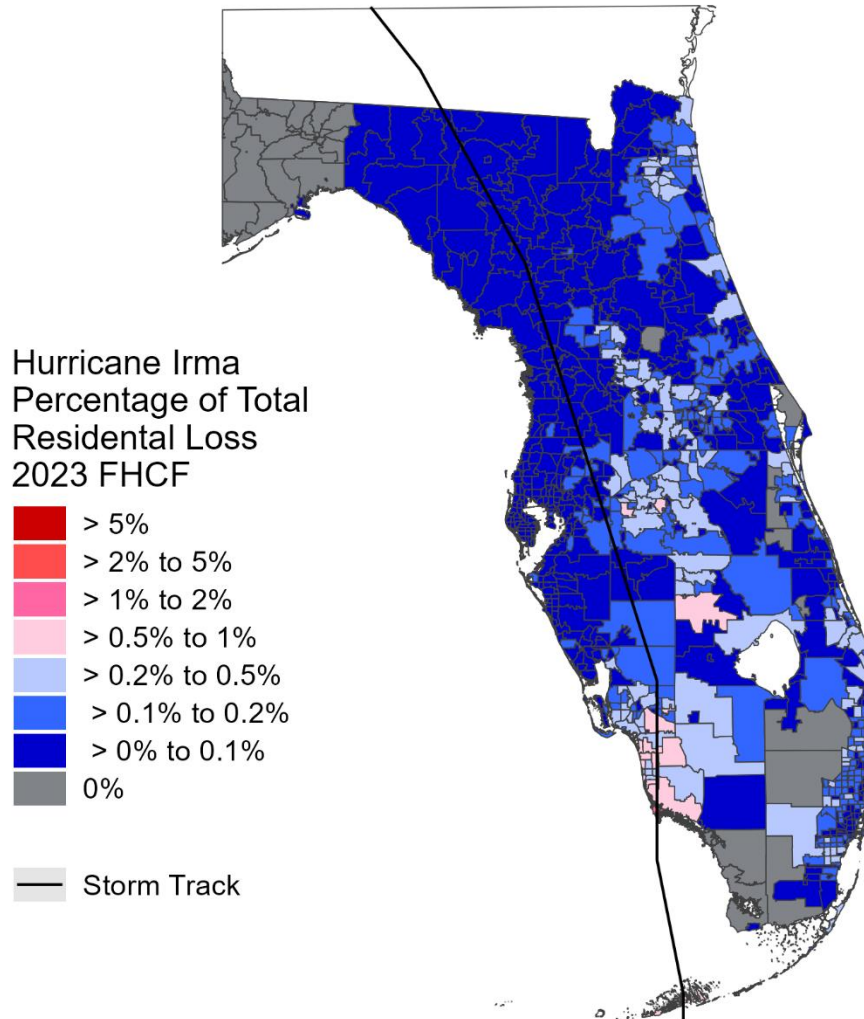
Figure 79: Percentage of residential hurricane losses 2023 FHCF from Hurricane Irma (2017) by ZIP Code

Figure 80: Percentage of residential hurricane losses 2023 FHCF from Hurricane Michael (2018) by ZIP Code

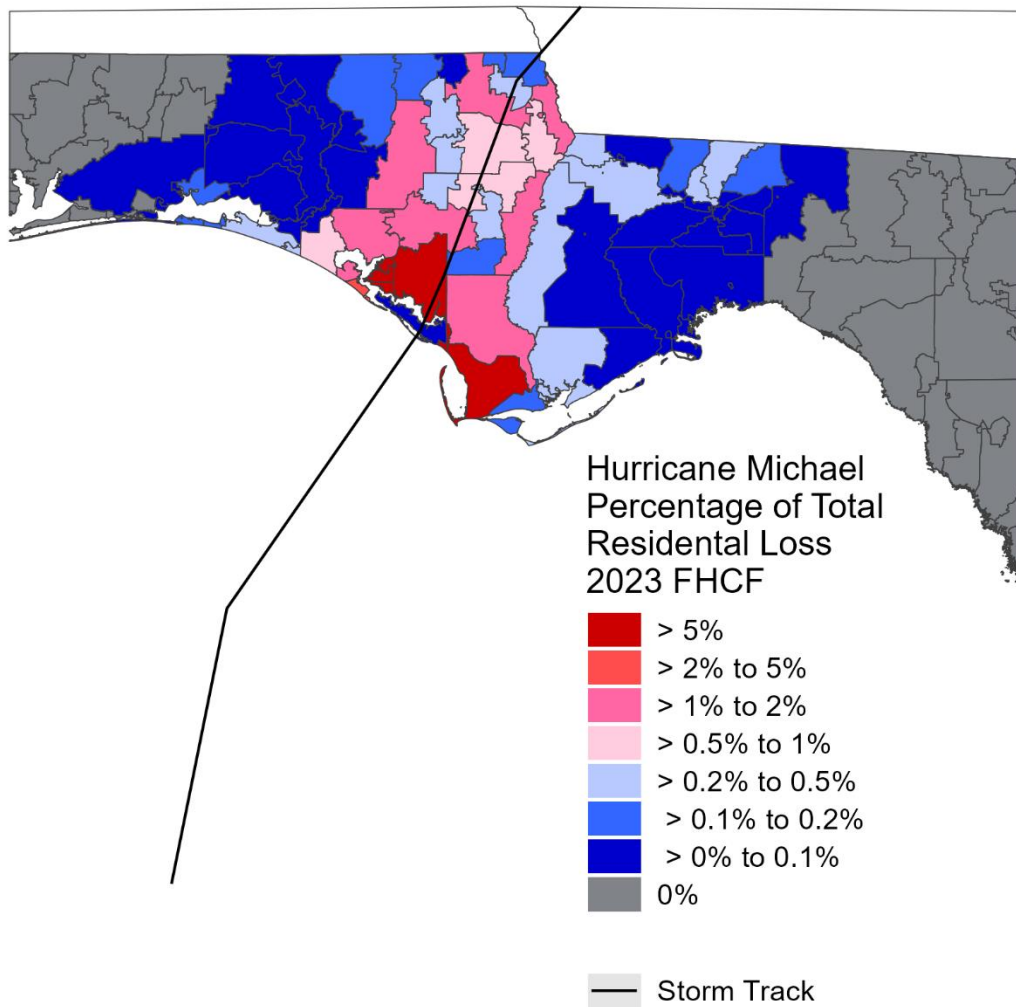
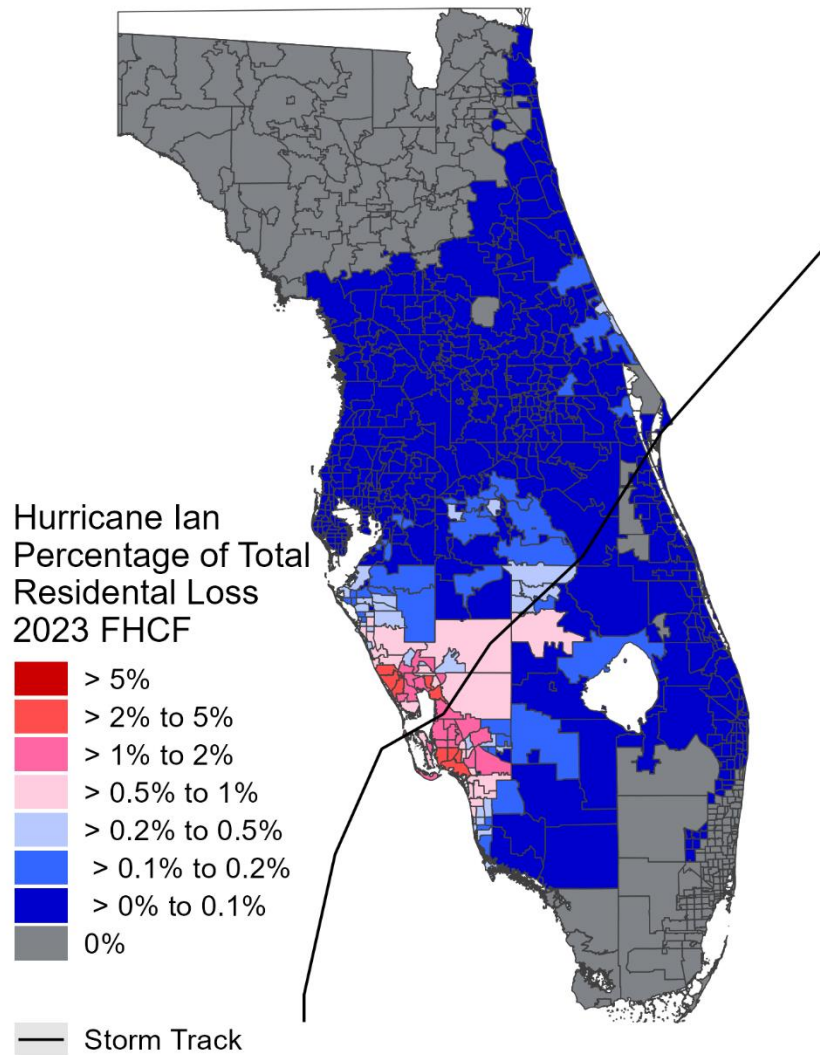


Figure 81: Percentage of residential hurricane losses 2023 FHCF from Hurricane Ian (2022) by ZIP Code

Form A-4: Hurricane Output Ranges

- A. One or more automated programs or scripts shall be used to generate the personal and commercial residential hurricane output ranges in the format shown in the file named “2023FormA4.xlsx.”**
- B. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form A-4, Hurricane Output Ranges, in a submission appendix.**
- C. Provide hurricane loss costs, rounded to three decimal places, by county (Figure 13). Within each county, hurricane loss costs should be shall separately per \$1,000 of exposure for frame owners, masonry owners, frame renters, masonry renters, frame condo unit owners, masonry condo unit owners, manufactured homes, and commercial residential. For each of these categories using ZIP Code centroids, the hurricane output range should show the highest hurricane loss cost, the lowest hurricane loss cost, and the weighted average hurricane loss cost.**

The aggregate personal and commercial residential exposure data is to be developed from the 2017 FHCF exposure data for Part A and from the 2023 FHCF exposure data for Part B, except for insured values and deductibles information. Insured values are to be based on the hurricane output range specifications given below. Deductible amounts of 0% and as specified in the hurricane output range specifications are to be assumed to be uniformly applied to all risks.

When calculating the weighted average hurricane loss costs, weight the hurricane loss costs by the total insured value calculated above. Include the statewide range of hurricane loss costs (i.e., low, high, and weighted average).

- D. If a modeling organization has hurricane loss costs for a ZIP Code for which there is no exposure, give the hurricane loss costs zero weight (i.e., assume the exposure in that ZIP Code is zero). Provide a list of those ZIP Codes where this occurs.**
- E. If a modeling organization does not have hurricane loss costs for a ZIP Code for which there is some exposure, do not assume such hurricane loss costs are zero, but use only the exposures for which there are hurricane loss costs in calculating the weighted average hurricane loss costs. Provide a list of the ZIP Codes where this occurs.**
- F. NA shall be used in cells to signify no exposure.**
- G. Indicate if per diem is used in producing hurricane loss costs for Coverage D (Time Element) in the personal residential hurricane output ranges. If a per diem rate is used, a rate of \$300 per day per policy shall be used.**
- H. Describe how Law and Ordinance is included in the hurricane output ranges.**

The impacts of law and ordinance coverage, such as the roof replacement rule in the Florida Building Code, is implicitly included in the base vulnerability functions for personal residential properties. In addition, the impact of the statutory required 25 percent and 50 percent coverage options for personal residential properties is factored into the post-event loss amplification (PLA).

- I. List assumptions are necessary to complete Form A-4. Provide the rationale for assumptions and a detailed description of how the assumptions are implemented.**

No additional assumption was necessary to complete this form.

The required file is provided in Excel format in the file Moodys23FormA4.xlsx at the link provided to the FCHLPM and appears below. There are no instances of loss costs for a ZIP Code for which there is no

exposure in the submitted output ranges. The gross (non-zero deductible) loss costs have been calculated with the assumption that an insurer will not elect to apply an all other perils deductible to subsequent hurricane losses. There are no instances where we have a zero loss cost for a ZIP Code for which there is some exposure in the submitted output ranges.

Hurricane Output Range Specifications

<u>Policy Type</u>	<u>Assumptions</u>
Owners	Coverage A = Building • Coverage A limit = \$100,000 • Replacement Cost included subject to Coverage A limit • Law and Ordinance included* <i>*If data are not available, 25% shall be assumed</i> Coverage B = Appurtenant Structure • Coverage B limit = 10% of Coverage A limit • Replacement Cost included subject to Coverage B limit • Law and Ordinance included* <i>*If data are not available, 25% shall be assumed</i> Coverage C = Contents • Coverage C limit = 50% of Coverage A limit • Replacement Cost included subject to Coverage C limit Coverage D = Time Element • Coverage D limit = 20% of Coverage A limit • Time limit = 12 months • Per diem = \$300/day per policy, if used ✧ Dominant Coverage = A ✧ Hurricane loss costs per \$1,000 shall be related to the Coverage A limit ✧ Hurricane loss costs for the various specified deductibles shall be determined based on annual deductibles ✧ 2% Deductible of Coverage A ✧ All-other perils deductible = \$500
Renters	Coverage C = Contents • Coverage C limit = \$50,000 • Replacement Cost included subject to Coverage C limit Coverage D = Time Element • Coverage D limit = 40% of Coverage C limit • Time limit = 12 months • Per diem = \$300/day per policy, if used ✧ Dominate Coverage = C ✧ Hurricane loss costs per \$1,000 shall be related to the Coverage C limit ✧ Hurricane loss costs for the various specified deductibles shall be determined based on annual deductibles ✧ 2% Deductible of Coverage C ✧ All-other perils deductible = \$500
Condo Unit Owners	Coverage A = Building • Coverage A limit = 10% of Coverage C limit • Replacement Cost included subject to Coverage A limit Coverage C = Contents • Coverage C limit = \$50,000 • Replacement Cost included subject to Coverage C limit Coverage D = Time Element • Coverage D limit = 40% of Coverage C limit • Time limit = 12 months • Per diem = \$300/day per policy, if used ✧ Dominant Coverage = C ✧ Hurricane loss costs per \$1,000 shall be related to the Coverage C limit ✧ Hurricane loss costs for the various specified deductibles shall be determined based on annual deductibles ✧ 2% Deductible of Coverage C ✧ All-other perils deductible = \$500
Manufactured Homes	Coverage A = Building

- Coverage A limit = \$50,000
- Replacement Cost included subject to Coverage A limit

Coverage B = Appurtenant Structure

- Coverage B limit = 10% of Coverage A limit
- Replacement Cost included subject to Coverage B limit

Coverage C = Contents

- Coverage C limit = 50% of Coverage A limit
- Replacement Cost included subject to Coverage C limit

Coverage D = Time Element

- Coverage D limit = 20% of Coverage A limit
- Time limit = 12 months
- Per diem = \$300/day per policy, if used
 - ✧ Dominant Coverage = A
 - ✧ Hurricane loss costs per \$1,000 shall be related to the Coverage A limit
 - ✧ Hurricane loss costs for the various specified deductibles shall be determined based on annual deductibles
 - ✧ 2% Deductible of Coverage A
 - ✧ All-other perils deductible = \$500

Commercial Residential

Coverage A = Building

- Coverage A limit = \$25,000,000
- Replacement Cost included subject to Coverage A limit

Coverage C = Contents

- Coverage C limit = 5% of Coverage A limit
- Replacement Cost included subject to Coverage C limit

Coverage D = Time Element

- Coverage D limit = 20% of Coverage A limit
- Time limit = 12 months
- Per diem = \$300/day per policy, if used
 - ✧ Dominant Coverage = A
 - ✧ Hurricane loss costs per \$1,000 shall be related to the Coverage A limit
 - ✧ Hurricane loss costs for the various specified deductibles shall be determined based on annual deductibles
 - ✧ 3% Deductible of Coverage A
 - ✧ All-other perils deductible = \$5,000

Table 42: Hurricane loss costs per \$1000 for 0% deductible using 2017 FHCF exposure data

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Alachua	LOW	0.259	0.208	3.129	0.091	0.056	0.114	0.073	0.212
	AVERAGE	1.374	1.718	4.287	0.274	0.281	0.397	0.377	0.685
	HIGH	3.304	3.061	6.912	0.774	0.718	0.872	0.809	1.527
Baker	LOW	0.166	0.175	2.113	0.051	0.057	NA	NA	0.336
	AVERAGE	0.774	0.886	2.338	0.204	0.187	NA	NA	0.336
	HIGH	1.448	1.325	3.365	0.259	0.240	NA	NA	0.336
Bay	LOW	0.384	0.416	3.939	0.240	0.206	0.343	0.249	0.503
	AVERAGE	2.535	2.848	6.075	0.693	0.688	1.493	0.831	2.109
	HIGH	6.128	5.777	11.831	1.874	1.742	2.187	2.128	3.097
Bradford	LOW	0.220	0.229	2.736	0.083	0.078	NA	NA	NA
	AVERAGE	1.303	1.467	3.080	0.303	0.265	NA	NA	NA
	HIGH	1.960	1.798	4.475	0.384	0.356	NA	NA	NA
Brevard	LOW	0.585	0.565	7.935	0.342	0.278	0.472	0.308	0.754
	AVERAGE	3.811	3.007	12.175	1.279	1.295	1.861	2.150	3.501
	HIGH	9.490	8.979	22.926	3.921	3.661	4.884	4.571	6.912
Broward	LOW	0.856	0.705	16.606	0.550	0.399	0.703	0.477	0.960
	AVERAGE	5.562	4.471	20.184	1.709	1.898	2.983	2.497	4.568
	HIGH	12.698	11.705	30.031	5.903	5.704	7.396	7.146	10.464
Calhoun	LOW	0.266	0.327	3.107	0.097	0.107	NA	NA	NA
	AVERAGE	1.549	1.627	3.653	0.340	0.316	NA	NA	NA
	HIGH	2.456	2.261	5.425	0.500	0.465	NA	NA	NA
Charlotte	LOW	0.687	0.643	12.926	0.438	0.359	0.610	0.387	0.863
	AVERAGE	5.029	3.509	15.048	1.454	1.393	2.745	1.720	3.105
	HIGH	10.566	9.999	20.089	3.787	3.534	4.737	4.421	7.317
Citrus	LOW	0.507	0.446	6.270	0.229	0.172	0.338	0.321	0.527
	AVERAGE	3.526	2.497	7.372	0.729	0.692	1.227	1.153	2.210
	HIGH	5.317	4.951	11.552	1.312	1.216	1.638	1.520	2.803
Clay	LOW	0.172	0.159	2.564	0.059	0.056	0.072	0.074	0.177
	AVERAGE	0.909	1.216	3.203	0.233	0.231	0.223	0.216	0.510
	HIGH	2.724	2.504	5.614	0.487	0.451	0.594	0.551	1.130

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Collier	LOW	0.992	0.978	14.304	0.670	0.444	0.851	0.416	1.099
	AVERAGE	5.476	3.726	19.219	1.843	1.840	3.229	2.787	4.064
	HIGH	16.740	15.964	28.581	7.461	7.167	9.501	9.061	12.079
Columbia	LOW	0.207	0.176	2.414	0.062	0.076	0.362	0.138	0.261
	AVERAGE	1.117	1.218	3.279	0.246	0.250	0.385	0.342	0.261
	HIGH	2.333	2.149	5.126	0.489	0.453	0.409	0.379	0.261
DeSoto	LOW	0.614	0.573	8.740	0.360	0.294	0.602	0.410	0.872
	AVERAGE	3.753	3.120	10.137	1.128	0.868	1.114	1.245	2.230
	HIGH	5.880	5.496	15.584	1.568	1.461	1.979	1.845	3.535
Dixie	LOW	0.410	0.399	4.237	0.176	0.491	0.254	0.242	0.491
	AVERAGE	2.237	2.006	4.684	0.576	0.615	0.526	0.508	1.010
	HIGH	5.501	5.165	10.055	0.685	0.689	0.907	0.695	3.022
Duval	LOW	0.162	0.157	2.155	0.055	0.060	0.086	0.062	0.171
	AVERAGE	1.273	1.470	3.221	0.272	0.281	0.280	0.313	0.545
	HIGH	3.335	3.093	7.028	0.814	1.082	1.007	0.935	1.676
Escambia	LOW	0.314	0.298	3.839	0.142	0.157	0.359	0.263	0.581
	AVERAGE	3.131	3.620	7.034	1.035	1.053	1.996	1.409	2.637
	HIGH	8.697	8.212	15.066	2.976	2.804	3.648	3.433	4.981
Flagler	LOW	0.311	0.287	3.945	0.145	0.119	0.180	0.126	0.318
	AVERAGE	2.112	1.318	6.027	0.434	0.382	1.087	0.541	0.864
	HIGH	5.051	4.700	10.106	1.296	1.204	1.602	1.490	2.574
Franklin	LOW	0.937	0.889	8.131	0.641	0.675	0.700	0.672	1.938
	AVERAGE	4.031	5.167	9.359	1.619	1.658	1.235	1.901	2.416
	HIGH	8.087	7.602	14.652	2.587	2.043	3.171	2.957	4.464
Gadsden	LOW	0.154	0.146	1.916	0.060	0.066	NA	NA	0.188
	AVERAGE	0.906	1.012	2.194	0.251	0.236	NA	NA	0.525
	HIGH	1.577	1.447	3.623	0.321	0.279	NA	NA	0.673
Gilchrist	LOW	0.391	0.365	4.210	0.156	0.204	NA	NA	NA
	AVERAGE	1.720	1.889	4.624	0.523	0.527	NA	NA	NA
	HIGH	3.099	2.873	6.481	0.716	0.664	NA	NA	NA
Glades	LOW	1.062	0.980	12.972	0.638	0.703	NA	NA	2.381
	AVERAGE	6.111	4.020	14.813	2.167	1.802	NA	NA	3.671
	HIGH	7.850	7.367	19.994	2.337	2.178	NA	NA	4.960

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Gulf	LOW	0.357	0.377	3.997	0.182	0.521	0.715	0.454	1.158
	AVERAGE	2.847	3.952	5.927	1.375	1.391	1.145	0.786	2.113
	HIGH	6.146	5.747	11.656	1.825	1.694	2.254	2.098	3.220
Hamilton	LOW	0.152	0.148	1.903	0.057	0.069	NA	NA	NA
	AVERAGE	0.926	1.055	2.281	0.243	0.231	NA	NA	NA
	HIGH	1.531	1.406	3.472	0.301	0.279	NA	NA	NA
Hardee	LOW	0.568	0.462	7.964	0.230	0.219	1.217	NA	NA
	AVERAGE	3.285	2.747	8.685	0.854	0.785	1.217	NA	NA
	HIGH	4.790	4.463	13.198	1.226	1.143	1.217	NA	NA
Hendry	LOW	0.821	0.769	12.321	0.445	0.425	1.179	1.122	5.491
	AVERAGE	5.651	4.603	14.771	1.973	1.543	3.379	2.467	5.750
	HIGH	9.011	8.476	22.406	2.844	2.650	3.582	3.342	5.837
Hernando	LOW	0.459	0.416	6.424	0.189	0.180	0.600	0.225	0.663
	AVERAGE	2.726	2.102	7.931	0.546	0.563	0.999	0.979	1.756
	HIGH	4.279	3.989	11.740	1.091	1.018	1.371	1.280	2.488
Highlands	LOW	0.701	0.577	9.556	0.333	0.318	0.463	0.441	0.762
	AVERAGE	3.809	3.289	10.585	1.152	1.076	1.575	1.424	2.540
	HIGH	6.354	5.949	16.619	1.821	1.698	2.184	2.039	3.774
Hillsborough	LOW	0.444	0.393	7.344	0.179	0.146	0.238	0.178	0.435
	AVERAGE	2.486	2.504	9.260	0.638	0.642	0.818	0.898	1.594
	HIGH	6.610	6.208	15.777	1.947	2.162	2.454	2.289	3.958
Holmes	LOW	0.261	0.246	3.050	0.095	0.105	NA	NA	0.792
	AVERAGE	1.425	1.597	3.336	0.396	0.368	NA	NA	0.792
	HIGH	2.379	2.201	5.040	0.533	0.494	NA	NA	0.792
Indian River	LOW	0.792	0.747	10.205	0.546	0.256	0.689	0.454	0.933
	AVERAGE	4.397	2.233	11.993	1.772	1.381	2.627	2.257	3.622
	HIGH	6.525	6.150	22.795	3.720	3.480	4.641	4.335	6.611
Jackson	LOW	0.234	0.245	2.818	0.093	0.089	NA	NA	0.218
	AVERAGE	1.447	1.561	3.284	0.347	0.333	NA	NA	0.563
	HIGH	2.271	2.094	4.973	0.494	0.459	NA	NA	0.841
Jefferson	LOW	0.173	0.164	1.816	0.067	0.075	NA	NA	NA
	AVERAGE	0.772	0.811	1.917	0.226	0.222	NA	NA	NA
	HIGH	1.395	1.290	2.740	0.279	0.268	NA	NA	NA

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Lafayette	LOW	0.248	0.235	2.649	0.385	0.105	NA	NA	NA
	AVERAGE	1.241	1.267	3.000	0.385	0.306	NA	NA	NA
	HIGH	1.805	1.663	4.007	0.385	0.356	NA	NA	NA
Lake	LOW	0.312	0.289	4.559	0.155	0.079	0.236	0.191	0.375
	AVERAGE	2.023	1.625	8.013	0.460	0.451	1.005	0.811	1.369
	HIGH	4.579	4.262	12.778	1.146	1.068	1.323	1.235	2.430
Lee	LOW	0.877	0.838	13.802	0.498	0.353	0.653	0.393	0.893
	AVERAGE	5.316	3.165	16.679	1.204	1.278	3.175	1.878	3.045
	HIGH	14.937	14.187	32.820	9.916	9.293	13.708	12.806	17.684
Leon	LOW	0.155	0.144	1.896	0.062	0.050	0.077	0.049	0.142
	AVERAGE	0.898	0.960	2.538	0.185	0.175	0.178	0.208	0.299
	HIGH	2.078	1.928	4.318	0.425	0.394	0.371	0.401	0.706
Levy	LOW	0.479	0.405	4.243	0.239	0.227	1.107	1.063	1.688
	AVERAGE	2.790	2.398	5.786	0.746	0.787	2.257	2.154	2.285
	HIGH	7.777	7.333	13.685	2.603	2.420	3.231	2.996	4.571
Liberty	LOW	0.296	0.273	3.086	0.123	0.404	NA	NA	NA
	AVERAGE	1.339	1.468	3.345	0.340	0.404	NA	NA	NA
	HIGH	2.072	1.906	4.641	0.435	0.404	NA	NA	NA
Madison	LOW	0.152	0.140	1.692	0.054	0.063	NA	NA	NA
	AVERAGE	0.947	0.982	2.166	0.209	0.214	NA	NA	NA
	HIGH	1.599	1.471	3.588	0.330	0.306	NA	NA	NA
Manatee	LOW	0.666	0.642	10.308	0.379	0.293	0.480	0.255	0.701
	AVERAGE	4.305	2.835	12.079	1.119	1.115	2.357	1.923	1.961
	HIGH	12.577	11.942	30.159	5.491	5.212	6.864	6.972	10.026
Marion	LOW	0.357	0.297	4.108	0.151	0.129	0.193	0.155	0.349
	AVERAGE	2.557	1.665	5.948	0.466	0.418	0.728	0.632	1.015
	HIGH	5.253	4.856	8.603	1.149	0.786	1.063	0.984	1.892
Martin	LOW	1.001	0.982	13.056	0.775	0.632	0.982	0.496	1.278
	AVERAGE	6.273	4.094	17.246	1.878	2.035	4.083	3.064	4.953
	HIGH	11.062	10.491	22.573	4.295	4.013	5.350	5.001	7.702
Miami-Dade	LOW	0.864	0.739	17.182	0.583	0.419	0.789	0.516	0.991
	AVERAGE	5.721	4.617	19.272	2.062	2.514	3.676	3.434	5.575
	HIGH	14.417	13.772	25.381	13.375	12.847	16.473	15.845	21.043

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Monroe	LOW	2.216	2.144	33.291	2.475	2.203	3.035	2.213	2.951
	AVERAGE	5.934	6.044	35.327	6.635	6.429	8.077	7.468	10.536
	HIGH	12.133	11.596	49.942	10.336	10.624	12.803	12.876	15.897
Nassau	LOW	0.156	0.145	1.991	0.050	0.048	0.293	0.177	0.435
	AVERAGE	1.305	1.335	3.036	0.382	0.353	0.707	0.653	0.930
	HIGH	3.456	3.211	7.032	0.888	0.824	1.101	1.021	1.777
Okaloosa	LOW	0.279	0.301	3.420	0.128	0.149	0.207	0.350	0.407
	AVERAGE	3.091	3.217	4.941	1.022	0.982	1.978	1.278	2.613
	HIGH	8.076	7.621	14.146	2.678	2.551	3.277	3.125	4.599
Okeechobee	LOW	0.958	0.885	12.893	0.670	0.638	0.736	1.106	1.773
	AVERAGE	5.598	4.499	15.192	2.045	1.734	2.022	3.008	4.151
	HIGH	8.533	8.033	20.942	2.771	2.583	3.480	3.249	5.584
Orange	LOW	0.388	0.356	6.664	0.161	0.086	0.205	0.117	0.381
	AVERAGE	1.856	2.047	7.926	0.416	0.435	0.577	0.597	1.145
	HIGH	6.398	5.986	16.841	1.799	1.677	1.209	1.181	2.259
Osceola	LOW	0.386	0.342	5.561	0.155	0.147	0.207	0.184	0.376
	AVERAGE	1.671	1.875	8.945	0.398	0.449	0.542	0.493	0.969
	HIGH	4.884	4.563	13.080	1.353	1.196	1.555	1.451	2.934
Palm Beach	LOW	0.697	0.598	12.915	0.495	0.299	0.593	0.371	0.987
	AVERAGE	5.274	3.449	18.369	1.649	1.646	3.215	2.403	3.851
	HIGH	11.102	10.534	28.305	5.406	5.372	6.733	6.691	9.683
Pasco	LOW	0.498	0.463	8.239	0.234	0.223	0.295	0.232	0.572
	AVERAGE	2.166	2.459	10.001	0.505	0.641	0.858	1.087	2.147
	HIGH	5.025	4.690	13.518	1.297	1.210	1.609	1.503	2.791
Pinellas	LOW	0.483	0.462	9.140	0.243	0.218	0.353	0.221	0.592
	AVERAGE	4.462	4.135	10.621	1.003	1.202	2.046	1.800	3.011
	HIGH	9.124	8.601	19.182	6.208	5.944	7.736	7.410	10.989
Polk	LOW	0.400	0.378	7.514	0.175	0.158	0.219	0.113	0.422
	AVERAGE	2.601	2.194	9.124	0.567	0.653	0.739	0.834	1.308
	HIGH	6.136	5.744	14.081	1.725	1.609	1.857	1.734	3.075
Putnam	LOW	0.299	0.249	3.420	0.105	0.095	0.153	0.144	0.231
	AVERAGE	1.973	1.935	4.489	0.414	0.396	0.531	0.454	0.875
	HIGH	3.513	3.231	7.783	0.675	0.626	0.836	0.776	1.509

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
St. Johns	LOW	0.238	0.224	3.420	0.097	0.048	0.120	0.074	0.226
	AVERAGE	1.181	1.499	4.698	0.427	0.400	0.657	0.745	1.057
	HIGH	4.332	4.028	8.760	1.103	1.025	1.364	1.268	2.200
St. Lucie	LOW	0.766	0.748	11.241	0.496	0.474	0.628	0.418	0.968
	AVERAGE	4.825	2.302	13.225	1.182	1.139	2.880	3.017	3.923
	HIGH	8.345	7.856	28.960	5.924	5.669	7.320	7.023	9.745
Santa Rosa	LOW	0.330	0.361	4.001	0.179	0.201	0.626	0.386	0.393
	AVERAGE	2.664	2.853	6.483	1.199	1.112	2.908	1.664	2.482
	HIGH	10.864	10.323	20.111	3.705	3.473	4.537	4.259	6.172
Sarasota	LOW	0.638	0.616	10.595	0.358	0.250	0.453	0.282	0.824
	AVERAGE	4.676	3.061	13.108	1.238	1.209	2.427	2.179	2.578
	HIGH	9.437	8.892	26.805	6.462	6.188	8.035	7.700	11.281
Seminole	LOW	0.331	0.311	6.692	0.137	0.116	0.171	0.128	0.357
	AVERAGE	2.084	2.001	7.073	0.444	0.430	0.587	0.601	1.079
	HIGH	3.633	5.128	10.278	0.885	1.435	1.105	1.032	2.025
Sumter	LOW	0.350	0.323	6.203	0.145	0.093	0.181	0.117	0.342
	AVERAGE	0.748	0.709	7.270	0.243	0.229	0.578	0.324	0.584
	HIGH	3.892	3.614	11.128	0.922	0.859	0.847	0.791	1.665
Suwannee	LOW	0.223	0.210	2.650	0.080	0.069	NA	NA	0.193
	AVERAGE	1.235	1.252	3.085	0.286	0.300	NA	NA	0.632
	HIGH	2.442	2.255	5.285	0.533	0.495	NA	NA	1.140
Taylor	LOW	0.243	0.262	1.830	0.112	0.092	0.124	NA	NA
	AVERAGE	1.487	1.551	3.103	0.354	0.356	0.165	NA	NA
	HIGH	2.166	2.002	4.656	0.501	0.464	0.186	NA	NA
Union	LOW	0.209	0.230	2.555	0.085	0.094	NA	NA	NA
	AVERAGE	1.061	1.202	3.036	0.248	0.280	NA	NA	NA
	HIGH	2.063	1.895	4.650	0.350	0.324	NA	NA	NA
Volusia	LOW	0.346	0.305	4.744	0.144	0.137	0.198	0.140	0.323
	AVERAGE	2.651	2.041	6.842	0.584	0.610	1.362	1.149	1.544
	HIGH	6.611	6.234	12.925	2.267	2.205	2.805	2.727	4.246
Wakulla	LOW	0.284	0.271	2.863	0.144	0.137	0.206	1.896	0.345
	AVERAGE	1.263	1.604	3.490	0.435	0.581	1.047	1.896	1.100
	HIGH	5.412	5.072	10.166	1.660	1.545	2.030	1.896	2.935

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Walton	LOW	0.362	0.503	3.799	0.247	0.233	0.502	0.525	0.811
	AVERAGE	2.692	2.646	6.464	1.165	1.095	2.622	1.540	2.808
	HIGH	9.113	8.615	15.610	3.157	2.975	3.841	3.628	5.248
Washington	LOW	0.325	0.300	3.170	0.158	0.150	0.316	NA	0.395
	AVERAGE	1.771	2.118	4.288	0.595	0.565	0.316	NA	0.610
	HIGH	3.370	3.137	6.776	0.858	0.796	0.316	NA	1.157
Statewide	LOW	0.152	0.140	1.692	0.050	0.048	0.072	0.049	0.142
	AVERAGE	2.502	2.992	9.153	0.699	1.139	1.414	2.203	3.117
	HIGH	16.740	15.964	49.942	13.375	12.847	16.473	15.845	21.043

Table 43: Hurricane loss costs per \$1000 with specified deductibles using 2017 FHCF exposure data

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Alachua	LOW	0.184	0.140	2.734	0.063	0.036	0.083	0.049	0.150
	AVERAGE	1.159	1.463	3.789	0.225	0.231	0.336	0.317	0.566
	HIGH	2.886	2.668	6.222	0.679	0.627	0.770	0.711	1.317
Baker	LOW	0.113	0.119	1.839	0.033	0.038	NA	NA	0.263
	AVERAGE	0.635	0.735	2.040	0.165	0.149	NA	NA	0.263
	HIGH	1.226	1.117	2.975	0.212	0.195	NA	NA	0.263
Bay	LOW	0.292	0.321	3.459	0.197	0.165	0.289	0.206	0.403
	AVERAGE	2.208	2.493	5.432	0.611	0.604	1.360	0.734	1.847
	HIGH	5.476	5.159	10.749	1.706	1.582	2.004	1.944	2.751
Bradford	LOW	0.150	0.160	2.388	0.057	0.053	NA	NA	NA
	AVERAGE	1.093	1.239	2.695	0.250	0.215	NA	NA	NA
	HIGH	1.676	1.533	3.965	0.323	0.298	NA	NA	NA
Brevard	LOW	0.437	0.427	7.128	0.278	0.222	0.395	0.252	0.608
	AVERAGE	3.321	2.605	11.098	1.141	1.157	1.688	1.960	3.106
	HIGH	8.578	8.108	21.281	3.636	3.386	4.568	4.265	6.286
Broward	LOW	0.672	0.544	15.261	0.460	0.328	0.599	0.394	0.791
	AVERAGE	4.905	3.916	18.675	1.537	1.710	2.738	2.278	4.089
	HIGH	11.635	10.703	28.109	5.520	5.322	6.968	6.719	9.620
Calhoun	LOW	0.189	0.239	2.711	0.069	0.078	NA	NA	NA
	AVERAGE	1.305	1.377	3.200	0.284	0.262	NA	NA	NA
	HIGH	2.105	1.934	4.802	0.427	0.395	NA	NA	NA
Charlotte	LOW	0.515	0.484	11.756	0.358	0.289	0.510	0.311	0.688
	AVERAGE	4.403	3.025	13.736	1.285	1.228	2.497	1.535	2.712
	HIGH	9.568	9.043	18.571	3.474	3.233	4.387	4.085	6.625
Citrus	LOW	0.378	0.333	5.594	0.179	0.131	0.273	0.259	0.413
	AVERAGE	3.062	2.144	6.605	0.631	0.597	1.089	1.019	1.915
	HIGH	4.703	4.368	10.530	1.170	1.080	1.476	1.365	2.458
Clay	LOW	0.112	0.104	2.239	0.038	0.035	0.048	0.050	0.124
	AVERAGE	0.753	1.025	2.809	0.190	0.187	0.181	0.175	0.414
	HIGH	2.341	2.146	4.985	0.411	0.378	0.517	0.476	0.953

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Collier	LOW	0.762	0.759	13.083	0.558	0.369	0.722	0.337	0.886
	AVERAGE	4.843	3.248	17.748	1.656	1.651	2.969	2.550	3.608
	HIGH	15.497	14.768	26.782	7.020	6.729	9.015	8.579	11.146
Columbia	LOW	0.145	0.119	2.104	0.041	0.053	0.306	0.106	0.196
	AVERAGE	0.934	1.027	2.887	0.202	0.205	0.327	0.287	0.196
	HIGH	2.010	1.847	4.573	0.418	0.386	0.347	0.320	0.196
DeSoto	LOW	0.459	0.425	7.811	0.286	0.228	0.503	0.332	0.700
	AVERAGE	3.224	2.665	9.108	0.983	0.747	0.972	1.092	1.907
	HIGH	5.150	4.801	14.235	1.381	1.283	1.767	1.642	3.091
Dixie	LOW	0.314	0.305	3.779	0.140	0.428	0.209	0.197	0.399
	AVERAGE	1.949	1.735	4.186	0.501	0.536	0.461	0.443	0.858
	HIGH	4.966	4.657	9.187	0.596	0.609	0.813	0.617	2.685
Duval	LOW	0.107	0.102	1.876	0.035	0.039	0.061	0.041	0.119
	AVERAGE	1.073	1.248	2.840	0.225	0.232	0.233	0.262	0.443
	HIGH	2.921	2.703	6.305	0.715	0.962	0.895	0.828	1.446
Escambia	LOW	0.227	0.216	3.377	0.108	0.122	0.303	0.218	0.471
	AVERAGE	2.736	3.194	6.333	0.928	0.942	1.832	1.269	2.323
	HIGH	7.914	7.468	13.857	2.751	2.583	3.399	3.188	4.487
Flagler	LOW	0.223	0.203	3.469	0.109	0.086	0.139	0.093	0.239
	AVERAGE	1.820	1.115	5.378	0.371	0.323	0.971	0.469	0.722
	HIGH	4.476	4.159	9.144	1.161	1.075	1.451	1.346	2.263
Franklin	LOW	0.780	0.738	7.332	0.565	0.593	0.621	0.595	1.683
	AVERAGE	3.576	4.616	8.466	1.475	1.509	1.121	1.745	2.121
	HIGH	7.299	6.856	13.405	2.379	1.866	2.940	2.735	3.998
Gadsden	LOW	0.100	0.093	1.670	0.041	0.047	NA	NA	0.137
	AVERAGE	0.756	0.851	1.913	0.206	0.193	NA	NA	0.425
	HIGH	1.338	1.223	3.190	0.266	0.229	NA	NA	0.550
Gilchrist	LOW	0.300	0.278	3.738	0.123	0.164	NA	NA	NA
	AVERAGE	1.471	1.622	4.117	0.451	0.454	NA	NA	NA
	HIGH	2.706	2.503	5.837	0.624	0.577	NA	NA	NA
Glades	LOW	0.834	0.768	11.738	0.534	0.592	NA	NA	2.047
	AVERAGE	5.362	3.483	13.458	1.945	1.607	NA	NA	3.226
	HIGH	6.949	6.509	18.354	2.102	1.955	NA	NA	4.405

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Gulf	LOW	0.268	0.292	3.511	0.145	0.449	0.631	0.392	0.985
	AVERAGE	2.492	3.490	5.280	1.247	1.260	1.034	0.698	1.849
	HIGH	5.483	5.123	10.565	1.667	1.542	2.077	1.928	2.853
Hamilton	LOW	0.103	0.099	1.656	0.039	0.048	NA	NA	NA
	AVERAGE	0.772	0.886	1.996	0.200	0.189	NA	NA	NA
	HIGH	1.304	1.193	3.079	0.251	0.231	NA	NA	NA
Hardee	LOW	0.426	0.331	7.099	0.173	0.164	1.069	NA	NA
	AVERAGE	2.816	2.341	7.766	0.734	0.671	1.069	NA	NA
	HIGH	4.168	3.874	11.969	1.073	0.997	1.069	NA	NA
Hendry	LOW	0.631	0.588	11.113	0.360	0.342	1.029	0.977	4.904
	AVERAGE	4.938	4.012	13.414	1.767	1.370	3.094	2.234	5.144
	HIGH	8.035	7.546	20.633	2.582	2.399	3.287	3.058	5.224
Hernando	LOW	0.339	0.303	5.691	0.141	0.133	0.508	0.172	0.527
	AVERAGE	2.330	1.779	7.090	0.461	0.477	0.875	0.856	1.504
	HIGH	3.715	3.454	10.652	0.958	0.890	1.219	1.134	2.164
Highlands	LOW	0.534	0.428	8.583	0.264	0.250	0.380	0.360	0.607
	AVERAGE	3.295	2.834	9.543	1.010	0.939	1.403	1.263	2.206
	HIGH	5.589	5.221	15.196	1.624	1.510	1.968	1.832	3.322
Hillsborough	LOW	0.324	0.283	6.555	0.132	0.106	0.183	0.131	0.332
	AVERAGE	2.124	2.139	8.337	0.546	0.549	0.710	0.782	1.360
	HIGH	5.864	5.496	14.459	1.746	1.944	2.225	2.071	3.505
Holmes	LOW	0.185	0.176	2.666	0.068	0.076	NA	NA	0.652
	AVERAGE	1.198	1.353	2.929	0.335	0.310	NA	NA	0.652
	HIGH	2.059	1.901	4.501	0.460	0.424	NA	NA	0.652
Indian River	LOW	0.618	0.581	9.255	0.464	0.207	0.595	0.383	0.771
	AVERAGE	3.865	1.912	10.950	1.606	1.241	2.416	2.068	3.233
	HIGH	5.843	5.499	21.235	3.445	3.215	4.335	4.040	6.011
Jackson	LOW	0.157	0.170	2.454	0.065	0.063	NA	NA	0.155
	AVERAGE	1.214	1.318	2.872	0.289	0.276	NA	NA	0.451
	HIGH	1.952	1.796	4.410	0.422	0.389	NA	NA	0.692
Jefferson	LOW	0.121	0.116	1.588	0.049	0.056	NA	NA	NA
	AVERAGE	0.649	0.685	1.682	0.190	0.186	NA	NA	NA
	HIGH	1.206	1.113	2.432	0.238	0.227	NA	NA	NA

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Lafayette	LOW	0.177	0.169	2.324	0.327	0.078	NA	NA	NA
	AVERAGE	1.049	1.074	2.641	0.327	0.256	NA	NA	NA
	HIGH	1.551	1.424	3.561	0.327	0.301	NA	NA	NA
Lake	LOW	0.221	0.199	4.001	0.111	0.049	0.179	0.141	0.275
	AVERAGE	1.699	1.351	7.132	0.379	0.371	0.874	0.697	1.149
	HIGH	3.969	3.687	11.550	0.999	0.928	1.165	1.083	2.099
Lee	LOW	0.676	0.650	12.496	0.409	0.283	0.550	0.316	0.717
	AVERAGE	4.658	2.718	15.259	1.058	1.124	2.914	1.685	2.656
	HIGH	13.668	12.965	30.743	9.353	8.751	13.035	12.156	16.415
Leon	LOW	0.102	0.095	1.663	0.044	0.035	0.057	0.033	0.100
	AVERAGE	0.757	0.815	2.240	0.153	0.144	0.147	0.173	0.236
	HIGH	1.816	1.682	3.859	0.368	0.340	0.319	0.348	0.593
Levy	LOW	0.359	0.299	3.763	0.189	0.179	0.995	0.953	1.460
	AVERAGE	2.439	2.078	5.174	0.655	0.693	2.087	1.987	2.015
	HIGH	7.094	6.684	12.619	2.404	2.229	3.010	2.785	4.142
Liberty	LOW	0.214	0.196	2.702	0.091	0.339	NA	NA	NA
	AVERAGE	1.124	1.241	2.930	0.283	0.339	NA	NA	NA
	HIGH	1.770	1.624	4.104	0.368	0.339	NA	NA	NA
Madison	LOW	0.105	0.096	1.474	0.037	0.044	NA	NA	NA
	AVERAGE	0.794	0.827	1.895	0.172	0.176	NA	NA	NA
	HIGH	1.367	1.253	3.183	0.277	0.255	NA	NA	NA
Manatee	LOW	0.506	0.490	9.310	0.304	0.235	0.399	0.200	0.557
	AVERAGE	3.767	2.448	10.996	0.989	0.985	2.154	1.743	1.697
	HIGH	11.499	10.905	28.290	5.106	4.839	6.436	6.540	9.189
Marion	LOW	0.263	0.208	3.592	0.109	0.090	0.144	0.113	0.259
	AVERAGE	2.182	1.398	5.266	0.391	0.347	0.629	0.543	0.843
	HIGH	4.580	4.224	7.686	1.008	0.685	0.942	0.869	1.634
Martin	LOW	0.792	0.787	11.904	0.669	0.541	0.861	0.418	1.073
	AVERAGE	5.568	3.594	15.901	1.701	1.847	3.792	2.824	4.449
	HIGH	10.075	9.544	20.991	3.987	3.718	5.006	4.671	7.015
Miami-Dade	LOW	0.680	0.577	15.824	0.492	0.348	0.679	0.431	0.813
	AVERAGE	5.049	4.047	17.823	1.873	2.293	3.402	3.171	5.030
	HIGH	13.137	12.552	23.658	12.692	12.172	15.722	15.102	19.639

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Monroe	LOW	1.912	1.850	31.300	2.279	2.008	2.815	2.016	2.605
	AVERAGE	5.247	5.349	33.276	6.226	6.024	7.633	7.040	9.671
	HIGH	11.030	10.546	47.506	9.779	10.065	12.191	12.262	14.737
Nassau	LOW	0.102	0.095	1.733	0.033	0.031	0.243	0.139	0.340
	AVERAGE	1.107	1.138	2.678	0.327	0.300	0.625	0.573	0.784
	HIGH	3.037	2.817	6.335	0.788	0.728	0.988	0.913	1.546
Okaloosa	LOW	0.199	0.221	3.017	0.098	0.116	0.169	0.295	0.325
	AVERAGE	2.724	2.851	4.425	0.918	0.879	1.817	1.151	2.309
	HIGH	7.333	6.916	13.006	2.468	2.341	3.044	2.892	4.133
Okeechobee	LOW	0.749	0.691	11.708	0.567	0.538	0.629	0.967	1.510
	AVERAGE	4.930	3.938	13.862	1.842	1.553	1.829	2.751	3.686
	HIGH	7.625	7.168	19.304	2.519	2.342	3.197	2.977	5.005
Orange	LOW	0.274	0.247	5.894	0.115	0.056	0.151	0.079	0.277
	AVERAGE	1.555	1.725	7.065	0.340	0.357	0.485	0.502	0.950
	HIGH	5.611	5.242	15.364	1.598	1.486	1.059	1.037	1.944
Osceola	LOW	0.268	0.240	4.902	0.110	0.103	0.153	0.128	0.267
	AVERAGE	1.396	1.577	8.014	0.325	0.370	0.453	0.409	0.795
	HIGH	4.275	3.986	11.879	1.195	1.046	1.383	1.286	2.566
Palm Beach	LOW	0.532	0.452	11.809	0.410	0.240	0.501	0.302	0.809
	AVERAGE	4.645	2.997	16.954	1.480	1.475	2.956	2.187	3.425
	HIGH	10.132	9.603	26.415	5.038	4.995	6.322	6.270	8.850
Pasco	LOW	0.371	0.343	7.348	0.181	0.171	0.233	0.179	0.449
	AVERAGE	1.836	2.096	9.006	0.424	0.548	0.746	0.956	1.853
	HIGH	4.386	4.084	12.307	1.140	1.060	1.432	1.333	2.428
Pinellas	LOW	0.358	0.346	8.241	0.191	0.170	0.288	0.171	0.469
	AVERAGE	3.907	3.610	9.635	0.882	1.065	1.860	1.626	2.651
	HIGH	8.150	7.671	17.766	5.799	5.540	7.282	6.961	10.109
Polk	LOW	0.279	0.265	6.685	0.126	0.114	0.163	0.075	0.314
	AVERAGE	2.217	1.858	8.176	0.477	0.554	0.635	0.720	1.101
	HIGH	5.397	5.044	12.803	1.535	1.427	1.665	1.549	2.690
Putnam	LOW	0.213	0.174	2.989	0.072	0.064	0.111	0.104	0.162
	AVERAGE	1.675	1.643	3.944	0.346	0.329	0.451	0.382	0.727
	HIGH	3.028	2.779	6.945	0.582	0.536	0.731	0.675	1.291

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
St. Johns	LOW	0.165	0.156	3.008	0.070	0.031	0.089	0.051	0.165
	AVERAGE	0.997	1.280	4.165	0.366	0.342	0.577	0.658	0.897
	HIGH	3.826	3.553	7.904	0.984	0.911	1.230	1.140	1.926
St. Lucie	LOW	0.596	0.587	10.230	0.418	0.398	0.540	0.347	0.801
	AVERAGE	4.246	1.978	12.107	1.053	1.015	2.661	2.791	3.518
	HIGH	7.450	7.005	27.147	5.561	5.309	6.918	6.625	8.967
Santa Rosa	LOW	0.240	0.274	3.532	0.141	0.162	0.546	0.329	0.306
	AVERAGE	2.325	2.510	5.830	1.082	1.001	2.697	1.521	2.194
	HIGH	9.909	9.410	18.614	3.432	3.211	4.235	3.968	5.577
Sarasota	LOW	0.482	0.467	9.591	0.289	0.198	0.372	0.223	0.660
	AVERAGE	4.096	2.643	11.963	1.098	1.070	2.215	1.981	2.251
	HIGH	8.425	7.927	25.062	6.043	5.773	7.569	7.239	10.380
Seminole	LOW	0.227	0.214	5.939	0.096	0.079	0.123	0.088	0.259
	AVERAGE	1.757	1.684	6.293	0.368	0.355	0.496	0.508	0.893
	HIGH	3.130	4.481	9.255	0.766	1.265	0.969	0.902	1.736
Sumter	LOW	0.244	0.222	5.479	0.102	0.060	0.131	0.079	0.247
	AVERAGE	0.590	0.558	6.457	0.188	0.176	0.488	0.259	0.458
	HIGH	3.351	3.105	10.026	0.795	0.738	0.730	0.678	1.419
Suwannee	LOW	0.155	0.147	2.325	0.057	0.047	NA	NA	0.138
	AVERAGE	1.041	1.059	2.719	0.237	0.249	NA	NA	0.518
	HIGH	2.114	1.947	4.724	0.459	0.424	NA	NA	0.971
Taylor	LOW	0.173	0.193	1.598	0.086	0.069	0.095	NA	NA
	AVERAGE	1.271	1.331	2.738	0.301	0.303	0.131	NA	NA
	HIGH	1.879	1.734	4.156	0.433	0.399	0.150	NA	NA
Union	LOW	0.147	0.164	2.230	0.059	0.067	NA	NA	NA
	AVERAGE	0.882	1.009	2.661	0.203	0.230	NA	NA	NA
	HIGH	1.766	1.618	4.129	0.292	0.270	NA	NA	NA
Volusia	LOW	0.244	0.211	4.176	0.105	0.099	0.152	0.102	0.236
	AVERAGE	2.283	1.745	6.122	0.506	0.528	1.227	1.026	1.328
	HIGH	5.915	5.569	11.819	2.068	2.005	2.581	2.503	3.793
Wakulla	LOW	0.207	0.199	2.525	0.115	0.109	0.170	1.739	0.273
	AVERAGE	1.084	1.393	3.099	0.380	0.514	0.948	1.739	0.952
	HIGH	4.846	4.539	9.241	1.513	1.405	1.867	1.739	2.606

County	Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Walton	LOW	0.269	0.399	3.352	0.203	0.190	0.436	0.461	0.679
	AVERAGE	2.372	2.333	5.830	1.055	0.987	2.431	1.398	2.501
	HIGH	8.312	7.854	14.387	2.924	2.747	3.584	3.376	4.739
Washington	LOW	0.242	0.222	2.783	0.123	0.116	0.264	NA	0.307
	AVERAGE	1.511	1.825	3.795	0.517	0.489	0.264	NA	0.497
	HIGH	2.967	2.758	6.097	0.759	0.702	0.264	NA	0.976
Statewide	LOW	0.100	0.093	1.474	0.033	0.031	0.048	0.033	0.100
	AVERAGE	2.163	2.585	8.270	0.608	1.011	1.277	2.005	2.751
	HIGH	15.497	14.768	47.506	12.692	12.172	15.722	15.102	19.639

Table 44: Hurricane loss costs per \$1000 with 0% deductible using 2023 FHCF exposure data

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Alachua	LOW	0.206	0.173	1.285	0.079	0.047	0.114	0.080	0.179
	AVERAGE	1.259	1.647	3.044	0.247	0.228	0.389	0.380	0.798
	HIGH	3.304	3.061	13.220	0.774	0.718	0.872	0.809	1.527
Baker	LOW	0.130	0.135	0.862	0.051	0.050	NA	NA	0.568
	AVERAGE	0.688	0.758	1.518	0.178	0.179	NA	NA	0.568
	HIGH	1.419	1.299	6.790	0.259	0.240	NA	NA	0.568
Bay	LOW	0.316	0.326	1.699	0.172	0.132	0.275	0.249	0.456
	AVERAGE	2.165	2.742	3.677	0.665	0.621	1.294	0.762	1.709
	HIGH	5.750	5.777	14.986	1.748	1.661	2.187	2.028	3.097
Bradford	LOW	0.167	0.157	1.124	0.070	0.068	NA	NA	0.763
	AVERAGE	1.194	1.413	2.212	0.268	0.245	NA	NA	0.793
	HIGH	1.960	1.798	8.840	0.384	0.356	NA	NA	0.822
Brevard	LOW	0.472	0.347	3.595	0.308	0.252	0.447	0.245	0.605
	AVERAGE	3.606	2.656	11.705	1.145	1.259	1.834	2.026	3.014
	HIGH	9.490	8.979	42.915	3.921	3.661	4.884	4.571	6.912
Broward	LOW	0.761	0.444	6.629	0.508	0.350	0.703	0.423	0.918
	AVERAGE	4.341	4.070	18.178	1.581	1.749	2.975	2.488	4.335
	HIGH	12.698	11.705	53.563	5.903	5.704	7.396	7.146	10.464
Calhoun	LOW	0.216	0.291	1.303	0.097	0.153	NA	NA	NA
	AVERAGE	1.415	1.589	2.297	0.333	0.337	NA	NA	NA
	HIGH	2.456	2.261	8.767	0.500	0.476	NA	NA	NA
Charlotte	LOW	0.523	0.347	5.789	0.335	0.321	0.591	0.313	0.933
	AVERAGE	4.487	2.988	11.195	1.167	1.231	2.324	1.635	3.001
	HIGH	10.566	9.999	37.996	3.787	3.534	4.737	4.421	7.317
Citrus	LOW	0.362	0.344	2.668	0.191	0.169	0.338	0.281	0.719
	AVERAGE	3.148	2.264	5.905	0.655	0.618	1.237	1.144	2.169
	HIGH	5.832	4.951	19.818	1.312	1.216	1.638	1.520	2.803
Clay	LOW	0.133	0.123	0.973	0.051	0.048	0.072	0.068	0.177
	AVERAGE	0.844	1.159	2.215	0.212	0.214	0.211	0.206	0.423
	HIGH	2.724	2.504	11.592	0.487	0.451	0.482	0.446	0.811

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Collier	LOW	0.800	0.540	6.677	0.602	0.288	0.764	0.384	1.151
	AVERAGE	4.660	3.054	16.480	1.817	1.605	2.778	2.704	4.542
	HIGH	16.740	15.964	46.912	7.461	7.167	9.501	9.061	12.079
Columbia	LOW	0.149	0.151	0.990	0.071	0.067	0.362	0.336	NA
	AVERAGE	1.014	1.195	2.131	0.245	0.218	0.383	0.360	NA
	HIGH	2.333	2.149	10.546	0.489	0.453	0.409	0.379	NA
DeSoto	LOW	0.558	0.448	4.190	0.309	0.288	0.602	0.331	1.079
	AVERAGE	3.500	2.732	8.103	1.010	0.850	1.250	1.261	2.149
	HIGH	5.880	5.496	31.983	1.568	1.461	1.979	1.845	3.535
Dixie	LOW	0.331	0.279	1.853	0.173	0.151	0.250	0.224	0.491
	AVERAGE	2.000	1.935	3.330	0.589	0.490	0.518	0.412	1.101
	HIGH	5.501	5.165	14.145	1.726	0.619	0.725	0.695	3.022
Duval	LOW	0.125	0.097	0.887	0.047	0.039	0.068	0.056	0.133
	AVERAGE	1.151	1.415	2.031	0.231	0.251	0.269	0.310	0.631
	HIGH	3.335	3.093	12.063	1.166	1.082	1.007	0.935	1.676
Escambia	LOW	0.253	0.298	1.655	0.142	0.157	0.285	0.263	0.609
	AVERAGE	2.826	3.350	4.453	0.989	0.988	1.675	1.352	2.611
	HIGH	8.697	8.212	20.818	2.976	2.804	3.648	3.433	4.981
Flagler	LOW	0.248	0.229	1.662	0.111	0.106	0.180	0.144	0.318
	AVERAGE	1.634	1.155	3.919	0.368	0.364	1.011	0.524	1.445
	HIGH	5.051	4.700	14.446	1.296	1.204	1.602	1.490	2.574
Franklin	LOW	0.799	0.889	3.871	0.582	0.675	0.700	0.672	1.121
	AVERAGE	3.459	4.926	6.681	1.371	1.479	0.966	1.895	1.166
	HIGH	8.087	7.602	16.887	2.587	2.409	3.171	2.957	1.168
Gadsden	LOW	0.134	0.141	0.811	0.053	0.057	0.353	0.315	NA
	AVERAGE	0.828	0.970	1.672	0.233	0.213	0.353	0.315	NA
	HIGH	1.577	1.447	5.154	0.321	0.279	0.353	0.315	NA
Gilchrist	LOW	0.310	0.251	1.809	0.140	0.149	NA	0.359	NA
	AVERAGE	1.421	1.755	3.125	0.441	0.486	NA	0.359	NA
	HIGH	3.099	2.873	13.207	0.716	0.664	NA	0.359	NA
Glades	LOW	0.674	0.788	5.767	0.638	0.609	NA	NA	NA
	AVERAGE	5.302	3.723	11.960	1.901	1.225	NA	NA	NA
	HIGH	7.850	7.367	40.328	2.337	2.178	NA	NA	NA

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Gulf	LOW	0.294	0.355	1.725	0.144	0.138	0.672	0.394	0.784
	AVERAGE	2.027	3.250	3.556	1.020	1.119	0.873	0.746	1.112
	HIGH	6.146	5.747	16.461	1.825	1.694	2.254	2.098	1.206
Hamilton	LOW	0.120	0.145	0.780	0.063	0.076	NA	NA	NA
	AVERAGE	0.843	1.012	1.462	0.225	0.200	NA	NA	NA
	HIGH	1.531	1.406	7.088	0.301	0.279	NA	NA	NA
Hardee	LOW	0.468	0.360	3.376	0.230	0.219	1.217	NA	NA
	AVERAGE	3.126	2.470	6.893	0.742	0.721	1.217	NA	NA
	HIGH	4.790	4.463	23.640	1.226	1.143	1.217	NA	NA
Hendry	LOW	0.627	0.606	5.513	0.445	0.381	1.179	0.537	NA
	AVERAGE	4.953	3.017	10.764	1.684	1.483	3.266	2.518	NA
	HIGH	9.011	8.476	44.638	2.844	2.650	3.582	3.342	NA
Hernando	LOW	0.359	0.256	2.675	0.166	0.159	0.237	0.225	0.726
	AVERAGE	2.492	1.947	7.975	0.549	0.545	1.066	0.940	2.026
	HIGH	4.279	3.989	21.966	1.091	1.018	1.371	1.280	2.488
Highlands	LOW	0.556	0.457	4.075	0.297	0.276	0.410	0.233	0.669
	AVERAGE	3.644	3.014	11.275	1.027	1.064	1.465	1.386	2.568
	HIGH	6.354	5.949	33.720	1.821	1.623	2.184	2.039	3.547
Hillsborough	LOW	0.322	0.228	2.783	0.157	0.101	0.224	0.180	0.395
	AVERAGE	2.138	2.227	7.431	0.621	0.568	0.783	0.850	1.625
	HIGH	6.610	6.208	32.028	2.321	2.162	2.454	2.289	3.604
Holmes	LOW	0.206	0.246	1.285	0.084	0.150	NA	NA	0.337
	AVERAGE	1.322	1.546	2.148	0.325	0.331	NA	NA	0.337
	HIGH	2.379	2.201	9.753	0.533	0.494	NA	NA	0.337
Indian River	LOW	0.630	0.459	4.708	0.535	0.294	0.630	0.454	0.970
	AVERAGE	4.107	1.945	10.792	1.492	1.289	2.527	2.188	4.062
	HIGH	6.525	6.150	29.813	3.720	3.480	4.641	4.335	6.611
Jackson	LOW	0.206	0.200	1.178	0.088	0.089	NA	NA	0.218
	AVERAGE	1.345	1.540	2.233	0.311	0.289	NA	NA	0.235
	HIGH	2.271	2.094	7.121	0.494	0.420	NA	NA	0.253
Jefferson	LOW	0.127	0.134	0.798	0.061	0.108	NA	NA	NA
	AVERAGE	0.669	0.783	1.295	0.214	0.218	NA	NA	NA
	HIGH	1.395	1.290	5.285	0.279	0.268	NA	NA	NA

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Lafayette	LOW	0.200	0.235	1.226	0.095	0.151	NA	NA	NA
	AVERAGE	1.124	1.242	2.010	0.347	0.288	NA	NA	NA
	HIGH	1.805	1.663	8.143	0.385	0.356	NA	NA	NA
Lake	LOW	0.285	0.204	1.882	0.141	0.095	0.200	0.145	0.492
	AVERAGE	1.812	1.406	8.498	0.429	0.432	0.914	0.734	1.807
	HIGH	4.579	4.262	26.454	1.146	1.068	1.323	1.235	2.430
Lee	LOW	0.702	0.454	5.801	0.447	0.273	0.606	0.354	0.847
	AVERAGE	4.301	2.710	15.881	1.238	1.120	2.637	1.832	3.426
	HIGH	14.937	14.187	61.071	11.003	10.313	13.708	12.806	17.684
Leon	LOW	0.126	0.111	0.770	0.055	0.038	0.072	0.049	0.114
	AVERAGE	0.855	0.938	1.955	0.152	0.145	0.176	0.194	0.326
	HIGH	2.078	1.928	7.265	0.425	0.394	0.432	0.401	0.659
Levy	LOW	0.339	0.316	1.829	0.181	0.164	1.107	1.063	0.426
	AVERAGE	2.395	2.236	3.854	0.639	0.654	2.152	1.757	3.419
	HIGH	7.777	7.333	18.999	2.603	2.420	3.231	2.996	4.571
Liberty	LOW	0.261	0.273	1.314	0.109	0.387	NA	NA	NA
	AVERAGE	1.242	1.472	2.213	0.365	0.401	NA	NA	NA
	HIGH	2.072	1.906	9.426	0.435	0.404	NA	NA	NA
Madison	LOW	0.143	0.148	0.713	0.054	0.074	NA	NA	NA
	AVERAGE	0.858	0.934	1.474	0.194	0.206	NA	NA	NA
	HIGH	1.599	1.471	7.294	0.330	0.255	NA	NA	NA
Manatee	LOW	0.531	0.305	4.426	0.337	0.201	0.430	0.247	0.681
	AVERAGE	3.319	2.340	12.934	1.046	1.031	1.876	1.792	3.211
	HIGH	12.577	11.942	55.424	5.491	5.212	6.965	6.972	9.958
Marion	LOW	0.302	0.196	1.677	0.116	0.096	0.164	0.157	0.349
	AVERAGE	2.319	1.392	5.094	0.398	0.377	0.705	0.564	1.188
	HIGH	5.253	4.856	17.983	0.849	0.786	1.063	0.984	1.790
Martin	LOW	0.861	0.572	6.115	0.674	0.591	0.856	0.496	1.415
	AVERAGE	5.784	3.611	17.044	2.169	2.014	4.019	3.038	4.751
	HIGH	11.062	10.491	38.556	4.295	4.013	5.350	5.001	7.702
Miami-Dade	LOW	0.772	0.427	7.164	0.546	0.305	0.772	0.516	0.843
	AVERAGE	5.055	4.151	16.020	1.896	1.958	3.392	3.279	5.287
	HIGH	14.417	13.772	44.178	13.375	12.847	16.473	15.845	21.043

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Monroe	LOW	2.086	1.492	14.174	2.395	1.447	3.035	1.875	2.854
	AVERAGE	5.290	5.081	40.625	5.788	6.144	7.581	7.420	9.377
	HIGH	12.133	11.596	80.965	10.336	10.135	12.803	12.876	15.897
Nassau	LOW	0.120	0.112	0.815	0.048	0.048	0.268	0.177	0.435
	AVERAGE	1.061	1.161	2.021	0.330	0.361	0.701	0.559	1.194
	HIGH	3.456	3.211	10.024	0.888	0.824	1.101	1.021	1.777
Okaloosa	LOW	0.225	0.214	1.489	0.128	0.144	0.207	0.231	0.651
	AVERAGE	2.688	3.157	2.844	0.918	0.924	1.827	1.155	3.260
	HIGH	8.076	7.621	19.569	2.678	2.551	3.277	3.125	4.599
Okeechobee	LOW	0.762	0.685	5.892	0.580	0.503	0.736	0.964	1.933
	AVERAGE	5.222	4.052	14.493	2.143	1.816	1.713	2.863	5.113
	HIGH	8.533	8.033	41.328	2.771	2.583	3.480	3.249	5.584
Orange	LOW	0.303	0.231	2.581	0.141	0.092	0.179	0.120	0.290
	AVERAGE	1.647	1.870	7.135	0.405	0.371	0.543	0.563	1.144
	HIGH	6.398	5.986	24.315	1.799	1.677	1.209	1.181	2.118
Osceola	LOW	0.298	0.220	2.291	0.145	0.099	0.184	0.133	0.300
	AVERAGE	1.310	1.537	7.997	0.399	0.405	0.465	0.448	0.970
	HIGH	4.884	4.563	26.412	1.353	1.262	1.555	1.451	2.587
Palm Beach	LOW	0.614	0.365	5.856	0.456	0.245	0.581	0.413	0.838
	AVERAGE	4.821	3.049	15.937	1.534	1.593	3.040	2.349	4.364
	HIGH	11.102	10.534	47.985	5.406	5.372	6.733	6.691	9.683
Pasco	LOW	0.383	0.293	3.376	0.207	0.115	0.274	0.166	0.549
	AVERAGE	1.723	2.199	9.130	0.523	0.554	0.764	1.042	1.865
	HIGH	5.025	4.690	27.891	1.297	1.210	1.609	1.444	2.791
Pinellas	LOW	0.438	0.280	3.592	0.216	0.166	0.333	0.186	0.496
	AVERAGE	4.253	3.996	13.328	1.049	1.130	1.924	1.775	3.112
	HIGH	9.124	8.601	37.421	6.208	5.944	7.736	7.410	10.989
Polk	LOW	0.309	0.222	2.831	0.153	0.114	0.192	0.113	0.356
	AVERAGE	2.135	1.799	8.748	0.502	0.543	0.577	0.742	1.314
	HIGH	6.136	5.744	28.540	1.725	1.609	1.792	1.734	3.075
Putnam	LOW	0.211	0.217	1.402	0.087	0.087	0.124	0.173	0.358
	AVERAGE	1.833	1.838	3.791	0.393	0.362	0.535	0.477	0.964
	HIGH	3.513	3.231	14.947	0.675	0.626	0.687	0.637	1.238

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
St. Johns	LOW	0.189	0.159	1.303	0.086	0.073	0.107	0.086	0.191
	AVERAGE	0.929	1.285	3.172	0.307	0.330	0.616	0.731	1.020
	HIGH	4.332	4.028	12.485	1.103	1.025	1.364	1.268	2.200
St. Lucie	LOW	0.630	0.398	5.183	0.452	0.317	0.572	0.418	0.967
	AVERAGE	4.494	1.925	11.905	1.205	1.117	2.717	2.919	4.504
	HIGH	8.345	7.856	31.113	5.924	5.669	7.320	7.023	9.745
Santa Rosa	LOW	0.267	0.254	1.739	0.153	0.132	0.389	0.386	0.845
	AVERAGE	2.242	2.605	4.370	1.063	0.906	2.848	1.568	3.680
	HIGH	10.864	10.323	21.786	3.705	3.473	4.537	4.259	6.172
Sarasota	LOW	0.519	0.359	4.267	0.319	0.184	0.445	0.258	0.691
	AVERAGE	4.067	2.638	14.856	1.021	1.060	2.291	2.073	3.598
	HIGH	9.437	8.892	44.979	6.462	6.188	8.035	7.700	11.281
Seminole	LOW	0.283	0.268	2.324	0.120	0.087	0.171	0.128	0.338
	AVERAGE	1.979	1.873	6.915	0.436	0.411	0.589	0.581	0.929
	HIGH	3.633	3.376	20.078	0.885	0.827	1.105	1.032	1.773
Sumter	LOW	0.270	0.186	2.425	0.127	0.121	0.185	0.165	0.420
	AVERAGE	0.695	0.617	6.842	0.230	0.239	0.585	0.339	0.800
	HIGH	3.892	3.614	22.693	0.897	0.859	0.847	1.044	2.114
Suwannee	LOW	0.159	0.164	1.110	0.080	0.070	0.100	NA	0.705
	AVERAGE	1.110	1.220	2.016	0.259	0.264	0.100	NA	0.705
	HIGH	2.442	2.255	10.807	0.521	0.495	0.100	NA	0.705
Taylor	LOW	0.246	0.215	0.777	0.096	0.143	0.186	NA	NA
	AVERAGE	1.390	1.517	1.918	0.343	0.321	0.186	NA	NA
	HIGH	2.166	2.002	6.656	0.501	0.464	0.186	NA	NA
Union	LOW	0.191	0.230	1.050	0.067	0.074	NA	NA	NA
	AVERAGE	0.929	1.193	1.896	0.225	0.235	NA	NA	NA
	HIGH	2.063	1.895	8.630	0.350	0.324	NA	NA	NA
Volusia	LOW	0.234	0.138	1.979	0.126	0.120	0.198	0.145	0.361
	AVERAGE	2.457	1.797	6.553	0.545	0.600	1.320	1.076	1.798
	HIGH	6.611	6.234	18.541	2.267	2.205	2.805	2.727	4.246
Wakulla	LOW	0.236	0.226	1.402	0.132	0.137	0.164	0.589	0.345
	AVERAGE	1.026	1.590	2.694	0.391	0.421	0.437	1.777	1.047
	HIGH	5.412	5.072	14.215	1.660	1.545	2.030	1.896	2.935

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Walton	LOW	0.362	0.355	1.901	0.226	0.233	0.404	0.417	0.976
	AVERAGE	2.055	2.030	3.992	1.011	0.901	2.042	1.397	3.851
	HIGH	9.113	8.615	21.479	3.157	2.975	3.841	3.628	5.248
Washington	LOW	0.223	0.300	1.345	0.158	0.174	NA	NA	1.157
	AVERAGE	1.596	2.053	2.685	0.536	0.562	NA	NA	1.157
	HIGH	3.370	3.137	13.508	0.858	0.796	NA	NA	1.157
Statewide	LOW	0.120	0.097	0.713	0.047	0.038	0.068	0.049	0.114
	AVERAGE	2.151	2.641	8.333	0.762	1.074	1.357	2.156	3.620
	HIGH	16.740	15.964	80.965	13.375	12.847	16.473	15.845	21.043

Table 45: Hurricane loss costs per \$1000 with specified deductibles using 2023 FHCF exposure data

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Alachua	LOW	0.142	0.112	1.065	0.054	0.029	0.083	0.054	0.124
	AVERAGE	1.057	1.401	2.645	0.201	0.184	0.329	0.320	0.665
	HIGH	2.886	2.668	12.217	0.679	0.627	0.770	0.711	1.317
Baker	LOW	0.085	0.087	0.706	0.033	0.032	NA	NA	0.464
	AVERAGE	0.561	0.624	1.291	0.142	0.143	NA	NA	0.464
	HIGH	1.202	1.096	6.186	0.212	0.195	NA	NA	0.464
Bay	LOW	0.236	0.247	1.424	0.136	0.103	0.230	0.206	0.365
	AVERAGE	1.876	2.398	3.224	0.586	0.544	1.175	0.670	1.487
	HIGH	5.155	5.159	13.761	1.593	1.507	2.004	1.857	2.751
Bradford	LOW	0.109	0.099	0.929	0.047	0.045	NA	NA	0.630
	AVERAGE	0.998	1.192	1.902	0.219	0.198	NA	NA	0.657
	HIGH	1.676	1.533	8.052	0.323	0.298	NA	NA	0.685
Brevard	LOW	0.345	0.241	3.101	0.250	0.203	0.379	0.198	0.482
	AVERAGE	3.133	2.288	10.648	1.017	1.124	1.664	1.844	2.661
	HIGH	8.578	8.108	40.588	3.636	3.386	4.568	4.265	6.286
Broward	LOW	0.601	0.325	5.887	0.426	0.285	0.599	0.347	0.752
	AVERAGE	3.786	3.541	16.822	1.418	1.572	2.731	2.270	3.875
	HIGH	11.635	10.703	51.074	5.520	5.322	6.968	6.719	9.620
Calhoun	LOW	0.150	0.211	1.077	0.069	0.118	NA	NA	NA
	AVERAGE	1.187	1.343	1.963	0.277	0.281	NA	NA	NA
	HIGH	2.105	1.934	7.973	0.427	0.405	NA	NA	NA
Charlotte	LOW	0.380	0.239	5.038	0.269	0.258	0.497	0.247	0.755
	AVERAGE	3.911	2.558	10.099	1.023	1.081	2.103	1.456	2.617
	HIGH	9.568	9.043	35.806	3.474	3.233	4.387	4.085	6.625
Citrus	LOW	0.259	0.249	2.263	0.149	0.126	0.273	0.220	0.579
	AVERAGE	2.725	1.937	5.236	0.565	0.530	1.098	1.011	1.878
	HIGH	5.172	4.368	18.450	1.170	1.080	1.476	1.365	2.458
Clay	LOW	0.081	0.075	0.802	0.032	0.030	0.048	0.045	0.124
	AVERAGE	0.696	0.975	1.905	0.171	0.173	0.170	0.167	0.338
	HIGH	2.341	2.146	10.611	0.411	0.378	0.411	0.378	0.680

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Collier	LOW	0.606	0.393	5.870	0.499	0.228	0.645	0.310	0.940
	AVERAGE	4.091	2.634	15.155	1.631	1.433	2.542	2.470	4.050
	HIGH	15.497	14.768	44.360	7.020	6.729	9.015	8.579	11.146
Columbia	LOW	0.097	0.102	0.812	0.049	0.047	0.306	0.282	NA
	AVERAGE	0.844	1.006	1.832	0.201	0.177	0.324	0.303	NA
	HIGH	2.010	1.847	9.694	0.418	0.386	0.347	0.320	NA
DeSoto	LOW	0.420	0.322	3.579	0.241	0.223	0.503	0.262	0.878
	AVERAGE	2.998	2.322	7.201	0.876	0.730	1.097	1.107	1.836
	HIGH	5.150	4.801	30.044	1.381	1.283	1.767	1.642	3.091
Dixie	LOW	0.246	0.203	1.570	0.138	0.120	0.206	0.188	0.399
	AVERAGE	1.734	1.670	2.927	0.513	0.422	0.453	0.358	0.937
	HIGH	4.966	4.657	13.075	1.580	0.538	0.645	0.617	2.685
Duval	LOW	0.077	0.056	0.726	0.030	0.024	0.046	0.036	0.088
	AVERAGE	0.965	1.200	1.748	0.189	0.206	0.223	0.259	0.519
	HIGH	2.921	2.703	11.097	1.041	0.962	0.895	0.828	1.446
Escambia	LOW	0.178	0.216	1.387	0.108	0.122	0.238	0.218	0.492
	AVERAGE	2.461	2.949	3.937	0.886	0.883	1.531	1.215	2.301
	HIGH	7.914	7.468	19.319	2.751	2.583	3.399	3.188	4.487
Flagler	LOW	0.171	0.156	1.397	0.081	0.077	0.138	0.108	0.239
	AVERAGE	1.395	0.970	3.433	0.311	0.308	0.901	0.453	1.244
	HIGH	4.476	4.159	13.222	1.161	1.075	1.451	1.346	2.263
Franklin	LOW	0.660	0.738	3.390	0.511	0.593	0.621	0.595	0.954
	AVERAGE	3.048	4.394	5.973	1.244	1.343	0.868	1.739	0.994
	HIGH	7.299	6.856	15.530	2.379	2.210	2.940	2.735	0.995
Gadsden	LOW	0.085	0.091	0.668	0.037	0.038	0.297	0.266	NA
	AVERAGE	0.688	0.814	1.434	0.190	0.173	0.297	0.266	NA
	HIGH	1.338	1.223	4.589	0.266	0.229	0.297	0.266	NA
Gilchrist	LOW	0.232	0.183	1.526	0.109	0.117	NA	0.300	NA
	AVERAGE	1.205	1.503	2.729	0.377	0.417	NA	0.300	NA
	HIGH	2.706	2.503	12.236	0.624	0.577	NA	0.300	NA
Glades	LOW	0.502	0.608	4.992	0.534	0.508	NA	NA	NA
	AVERAGE	4.627	3.216	10.777	1.700	1.075	NA	NA	NA
	HIGH	6.949	6.509	38.009	2.102	1.955	NA	NA	NA

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Gulf	LOW	0.217	0.270	1.450	0.112	0.107	0.594	0.338	0.648
	AVERAGE	1.751	2.854	3.104	0.917	1.008	0.778	0.661	0.944
	HIGH	5.483	5.123	15.083	1.667	1.542	2.077	1.928	1.028
Hamilton	LOW	0.078	0.100	0.638	0.043	0.055	NA	NA	NA
	AVERAGE	0.698	0.848	1.245	0.184	0.162	NA	NA	NA
	HIGH	1.304	1.193	6.476	0.251	0.231	NA	NA	NA
Hardee	LOW	0.344	0.248	2.869	0.173	0.165	1.069	NA	NA
	AVERAGE	2.673	2.097	6.095	0.633	0.614	1.069	NA	NA
	HIGH	4.168	3.874	21.988	1.073	0.997	1.069	NA	NA
Hendry	LOW	0.463	0.452	4.749	0.360	0.305	1.029	0.441	NA
	AVERAGE	4.306	2.592	9.645	1.500	1.315	2.988	2.283	NA
	HIGH	8.035	7.546	42.141	2.582	2.399	3.287	3.058	NA
Hernando	LOW	0.252	0.168	2.252	0.122	0.116	0.182	0.172	0.578
	AVERAGE	2.123	1.644	7.125	0.464	0.461	0.937	0.821	1.747
	HIGH	3.715	3.454	20.458	0.958	0.890	1.219	1.134	2.164
Highlands	LOW	0.413	0.329	3.500	0.234	0.216	0.334	0.178	0.524
	AVERAGE	3.147	2.587	10.182	0.896	0.929	1.302	1.229	2.231
	HIGH	5.589	5.221	31.673	1.624	1.441	1.968	1.832	3.114
Hillsborough	LOW	0.220	0.148	2.351	0.115	0.067	0.171	0.134	0.296
	AVERAGE	1.815	1.894	6.626	0.531	0.482	0.678	0.739	1.387
	HIGH	5.864	5.496	30.140	2.093	1.944	2.225	2.071	3.179
Holmes	LOW	0.141	0.176	1.061	0.059	0.116	NA	NA	0.257
	AVERAGE	1.108	1.309	1.839	0.272	0.277	NA	NA	0.257
	HIGH	2.059	1.901	8.930	0.460	0.424	NA	NA	0.257
Indian River	LOW	0.479	0.345	4.116	0.455	0.240	0.544	0.383	0.806
	AVERAGE	3.593	1.651	9.808	1.344	1.154	2.322	2.003	3.638
	HIGH	5.843	5.499	28.024	3.445	3.215	4.335	4.040	6.011
Jackson	LOW	0.138	0.135	0.967	0.063	0.063	NA	NA	0.155
	AVERAGE	1.124	1.300	1.909	0.257	0.238	NA	NA	0.170
	HIGH	1.952	1.796	6.394	0.422	0.352	NA	NA	0.184
Jefferson	LOW	0.084	0.092	0.663	0.044	0.085	NA	NA	NA
	AVERAGE	0.558	0.661	1.111	0.179	0.182	NA	NA	NA
	HIGH	1.206	1.113	4.799	0.238	0.227	NA	NA	NA

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Lafayette	LOW	0.141	0.169	1.023	0.070	0.118	NA	NA	NA
	AVERAGE	0.945	1.052	1.733	0.294	0.240	NA	NA	NA
	HIGH	1.551	1.424	7.444	0.327	0.301	NA	NA	NA
Lake	LOW	0.192	0.129	1.570	0.099	0.061	0.148	0.101	0.373
	AVERAGE	1.514	1.160	7.572	0.351	0.354	0.791	0.627	1.541
	HIGH	3.969	3.687	24.638	0.999	0.928	1.165	1.083	2.099
Lee	LOW	0.531	0.332	5.028	0.365	0.211	0.509	0.283	0.679
	AVERAGE	3.735	2.310	14.499	1.090	0.980	2.405	1.642	3.003
	HIGH	13.668	12.965	58.258	10.391	9.722	13.035	12.156	16.415
Leon	LOW	0.080	0.069	0.637	0.039	0.025	0.054	0.033	0.077
	AVERAGE	0.719	0.796	1.701	0.124	0.117	0.145	0.161	0.260
	HIGH	1.816	1.682	6.625	0.368	0.340	0.376	0.348	0.551
Levy	LOW	0.246	0.226	1.547	0.141	0.130	0.995	0.953	0.331
	AVERAGE	2.082	1.934	3.382	0.556	0.569	1.987	1.611	3.076
	HIGH	7.094	6.684	17.676	2.404	2.229	3.010	2.785	4.142
Liberty	LOW	0.185	0.196	1.097	0.079	0.326	NA	NA	NA
	AVERAGE	1.039	1.243	1.897	0.306	0.337	NA	NA	NA
	HIGH	1.770	1.624	8.579	0.368	0.339	NA	NA	NA
Madison	LOW	0.097	0.102	0.588	0.037	0.053	NA	NA	NA
	AVERAGE	0.716	0.784	1.261	0.159	0.169	NA	NA	NA
	HIGH	1.367	1.253	6.662	0.277	0.212	NA	NA	NA
Manatee	LOW	0.396	0.210	3.833	0.270	0.155	0.356	0.193	0.543
	AVERAGE	2.880	2.003	11.808	0.921	0.907	1.701	1.620	2.840
	HIGH	11.499	10.905	52.866	5.106	4.839	6.531	6.540	9.125
Marion	LOW	0.206	0.127	1.390	0.079	0.064	0.121	0.115	0.259
	AVERAGE	1.973	1.160	4.472	0.330	0.311	0.608	0.481	0.996
	HIGH	4.580	4.224	16.592	0.742	0.685	0.942	0.869	1.529
Martin	LOW	0.687	0.436	5.383	0.578	0.505	0.746	0.419	1.202
	AVERAGE	5.108	3.147	15.705	1.975	1.827	3.732	2.799	4.264
	HIGH	10.075	9.544	36.484	3.987	3.718	5.006	4.671	7.015
Miami-Dade	LOW	0.605	0.321	6.399	0.461	0.247	0.668	0.431	0.691
	AVERAGE	4.437	3.615	14.757	1.716	1.772	3.133	3.024	4.763
	HIGH	13.137	12.552	41.942	12.692	12.172	15.722	15.102	19.639

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Monroe	LOW	1.786	1.274	13.098	2.208	1.304	2.815	1.706	2.521
	AVERAGE	4.652	4.470	38.426	5.423	5.754	7.155	6.994	8.585
	HIGH	11.030	10.546	77.754	9.779	9.568	12.191	12.262	14.737
Nassau	LOW	0.074	0.069	0.668	0.031	0.031	0.221	0.139	0.340
	AVERAGE	0.890	0.984	1.746	0.280	0.307	0.618	0.487	1.021
	HIGH	3.037	2.817	9.138	0.788	0.728	0.988	0.913	1.546
Okaloosa	LOW	0.155	0.149	1.253	0.097	0.114	0.169	0.190	0.543
	AVERAGE	2.358	2.794	2.492	0.821	0.826	1.674	1.035	2.902
	HIGH	7.333	6.916	18.161	2.468	2.341	3.044	2.892	4.133
Okeechobee	LOW	0.589	0.521	5.153	0.486	0.420	0.629	0.837	1.653
	AVERAGE	4.580	3.529	13.201	1.933	1.629	1.538	2.615	4.570
	HIGH	7.625	7.168	39.010	2.519	2.342	3.197	2.977	5.005
Orange	LOW	0.201	0.149	2.173	0.099	0.059	0.131	0.081	0.201
	AVERAGE	1.373	1.569	6.325	0.331	0.300	0.455	0.472	0.950
	HIGH	5.611	5.242	22.479	1.598	1.485	1.059	1.037	1.816
Osceola	LOW	0.196	0.140	1.917	0.102	0.065	0.134	0.092	0.210
	AVERAGE	1.079	1.279	7.124	0.326	0.331	0.384	0.369	0.798
	HIGH	4.275	3.986	24.629	1.195	1.111	1.383	1.286	2.246
Palm Beach	LOW	0.471	0.263	5.178	0.378	0.193	0.491	0.338	0.681
	AVERAGE	4.220	2.629	14.684	1.372	1.425	2.789	2.137	3.895
	HIGH	10.132	9.603	45.621	5.038	4.995	6.322	6.270	8.850
Pasco	LOW	0.274	0.199	2.870	0.158	0.080	0.217	0.122	0.434
	AVERAGE	1.446	1.867	8.191	0.442	0.470	0.660	0.916	1.601
	HIGH	4.386	4.084	26.119	1.141	1.060	1.432	1.279	2.428
Pinellas	LOW	0.321	0.189	3.076	0.168	0.123	0.271	0.141	0.387
	AVERAGE	3.717	3.482	12.203	0.926	0.998	1.745	1.602	2.745
	HIGH	8.150	7.671	35.440	5.799	5.540	7.282	6.961	10.109
Polk	LOW	0.204	0.136	2.386	0.108	0.078	0.141	0.075	0.259
	AVERAGE	1.807	1.510	7.814	0.419	0.455	0.488	0.637	1.105
	HIGH	5.397	5.044	26.650	1.535	1.427	1.602	1.549	2.690
Putnam	LOW	0.137	0.148	1.161	0.059	0.058	0.088	0.127	0.265
	AVERAGE	1.551	1.558	3.301	0.327	0.299	0.455	0.402	0.803
	HIGH	3.028	2.779	13.719	0.582	0.536	0.594	0.548	1.044

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
St. Johns	LOW	0.125	0.105	1.089	0.062	0.052	0.079	0.061	0.138
	AVERAGE	0.775	1.090	2.765	0.259	0.279	0.540	0.645	0.865
	HIGH	3.826	3.553	11.394	0.984	0.911	1.230	1.140	1.926
St. Lucie	LOW	0.483	0.293	4.563	0.379	0.259	0.491	0.347	0.801
	AVERAGE	3.938	1.637	10.850	1.075	0.995	2.505	2.698	4.055
	HIGH	7.450	7.005	29.293	5.561	5.309	6.918	6.625	8.967
Santa Rosa	LOW	0.189	0.182	1.461	0.119	0.102	0.331	0.330	0.698
	AVERAGE	1.944	2.284	3.864	0.956	0.809	2.640	1.431	3.289
	HIGH	9.909	9.410	20.214	3.432	3.211	4.235	3.968	5.577
Sarasota	LOW	0.385	0.248	3.686	0.255	0.141	0.372	0.206	0.549
	AVERAGE	3.545	2.263	13.621	0.897	0.933	2.088	1.881	3.192
	HIGH	8.425	7.927	42.610	6.043	5.773	7.569	7.239	10.380
Seminole	LOW	0.193	0.183	1.946	0.083	0.057	0.123	0.088	0.248
	AVERAGE	1.665	1.573	6.136	0.361	0.338	0.497	0.490	0.761
	HIGH	3.130	2.901	18.634	0.766	0.712	0.969	0.902	1.508
Sumter	LOW	0.179	0.109	2.032	0.088	0.083	0.135	0.118	0.313
	AVERAGE	0.544	0.478	6.049	0.177	0.185	0.494	0.272	0.650
	HIGH	3.351	3.105	21.096	0.774	0.738	0.730	0.909	1.818
Suwannee	LOW	0.103	0.110	0.918	0.057	0.049	0.073	NA	0.582
	AVERAGE	0.931	1.030	1.734	0.213	0.217	0.073	NA	0.582
	HIGH	2.114	1.947	9.947	0.448	0.424	0.073	NA	0.582
Taylor	LOW	0.180	0.153	0.641	0.073	0.111	0.149	NA	NA
	AVERAGE	1.185	1.302	1.650	0.291	0.271	0.149	NA	NA
	HIGH	1.879	1.734	6.012	0.433	0.399	0.149	NA	NA
Union	LOW	0.130	0.164	0.865	0.045	0.050	NA	NA	NA
	AVERAGE	0.768	1.002	1.619	0.182	0.190	NA	NA	NA
	HIGH	1.766	1.618	7.877	0.292	0.270	NA	NA	NA
Volusia	LOW	0.154	0.078	1.660	0.090	0.085	0.150	0.112	0.270
	AVERAGE	2.110	1.529	5.847	0.470	0.519	1.188	0.959	1.556
	HIGH	5.915	5.569	17.217	2.068	2.005	2.581	2.503	3.793
Wakulla	LOW	0.169	0.164	1.190	0.105	0.109	0.134	0.520	0.273
	AVERAGE	0.871	1.381	2.361	0.340	0.366	0.385	1.628	0.903
	HIGH	4.846	4.539	13.047	1.513	1.405	1.866	1.739	2.606

County	Hurricane Loss Costs	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Walton	LOW	0.269	0.268	1.614	0.186	0.190	0.349	0.359	0.825
	AVERAGE	1.794	1.774	3.532	0.911	0.807	1.884	1.263	3.455
	HIGH	8.312	7.854	19.971	2.924	2.747	3.584	3.376	4.739
Washington	LOW	0.160	0.222	1.119	0.123	0.137	NA	NA	0.976
	AVERAGE	1.357	1.767	2.322	0.464	0.487	NA	NA	0.976
	HIGH	2.967	2.758	12.470	0.759	0.702	NA	NA	0.976
Statewide	LOW	0.074	0.056	0.588	0.030	0.024	0.046	0.033	0.077
	AVERAGE	1.848	2.267	7.505	0.666	0.951	1.223	1.961	3.215
	HIGH	15.497	14.768	77.754	12.692	12.172	15.722	15.102	19.639

Form A-5: Percentage Change in Hurricane Output Ranges

- A. *One or more automated programs or scripts shall be used to generate and arrange the data in Form A-5.*
- B. *Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include all tables and maps in Form A-5 in a submission appendix.*
- C. *Provide summaries of the percentage change in average hurricane loss cost output range data compiled in Form A-4, Part A, , relative to the equivalent data compiled from the currently accepted hurricane model in the format shown below and in the file named "2023FormA5.xlsx."*

For the percentage change in hurricane output range, provide the summary:

- *Statewide (overall percentage change),*
 - *By region, as defined in Figure 14 – North, Central and South, and*
 - *By county, as defined in Figure 15 – Coastal and Inland.*
- D. *Provide color-coded maps by county reflecting the percentage changes in the average hurricane loss costs with specified deductibles for frame owners, masonry owners, frame renters, masonry renters, frame condo unit owners, masonry condo unit owners, manufactured homes, and commercial residential from the hurricane output ranges from the currently accepted hurricane model.***

Counties with a negative percentage change (reduction in hurricane loss costs) shall be indicated with shades of blue, counties with a positive percentage change (increase in hurricane loss costs) shall be indicated with shades of red, and counties with no percentage change shall be grey. The larger the percentage change in the county, the more intense the color-shade.

Figure 14

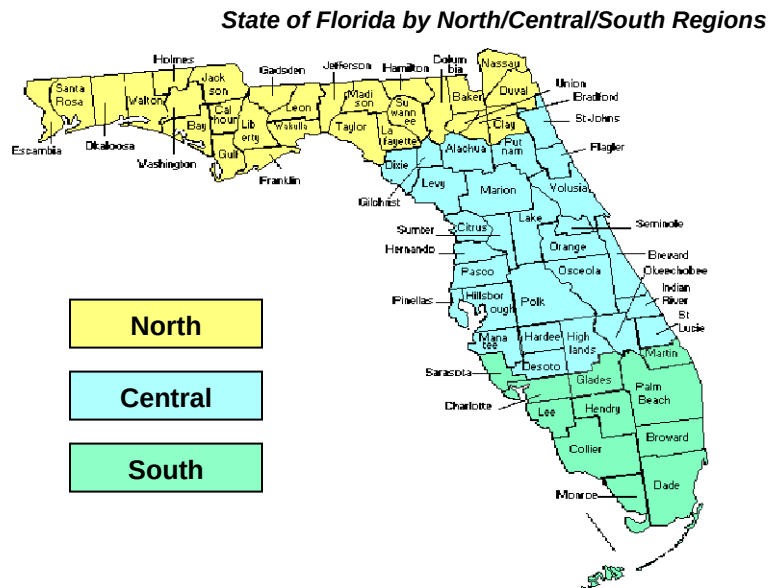
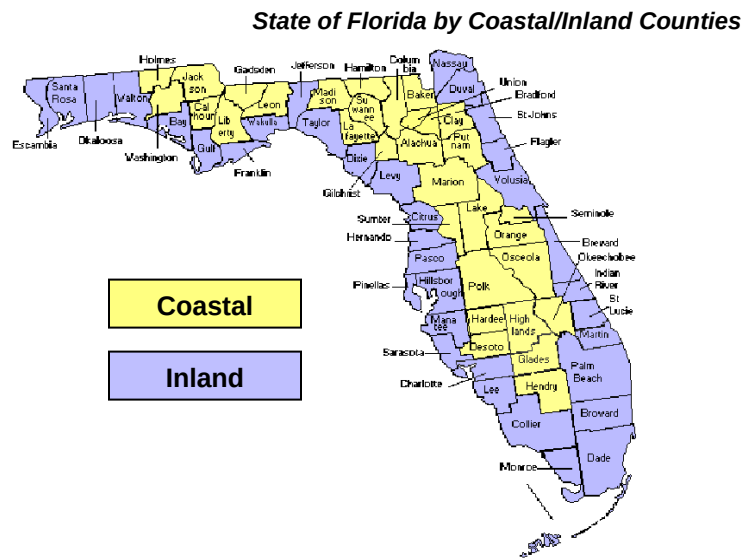


Figure 15

The percentage change in the weighted average loss costs from the output ranges supplied in the previously-accepted model are shown in the file Moodys23FormA5.xlsx at the link provided to the FCHLPM and appears below.

Table 46: Percentage change in \$0 deductible hurricane output ranges

Region	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Coastal	1.48%	1.20%	2.13%	1.79%	0.75%	1.94%	0.98%	1.92%
Inland	1.57%	1.35%	1.72%	0.88%	0.88%	0.82%	1.07%	1.16%
North	1.17%	1.34%	0.98%	1.39%	1.40%	1.64%	1.25%	1.70%
Central	1.83%	2.11%	2.13%	2.03%	1.87%	1.81%	1.80%	2.88%
South	1.24%	0.49%	1.88%	0.97%	0.19%	1.89%	0.78%	1.62%
Statewide	1.50%	1.22%	1.98%	1.62%	0.76%	1.82%	0.98%	1.90%

Table 47: Percentage change in specified deductible hurricane output ranges

Region	Frame Owners	Masonry Owners	Manufactured Homes	Frame Renters	Masonry Renters	Frame Condo Unit	Masonry Condo Unit	Commercial Residential
Coastal	1.47%	1.17%	2.17%	1.78%	0.71%	1.95%	0.97%	1.92%
Inland	1.54%	1.32%	1.70%	0.77%	0.78%	0.71%	0.99%	1.12%
North	1.19%	1.34%	1.00%	1.38%	1.40%	1.67%	1.27%	1.76%
Central	1.79%	2.09%	2.14%	2.02%	1.85%	1.78%	1.78%	2.90%
South	1.26%	0.47%	1.94%	0.95%	0.15%	1.92%	0.77%	1.63%
Statewide	1.49%	1.19%	2.00%	1.60%	0.72%	1.82%	0.97%	1.90%

Figure 82: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for frame owners from the output ranges from the previously-accepted hurricane model

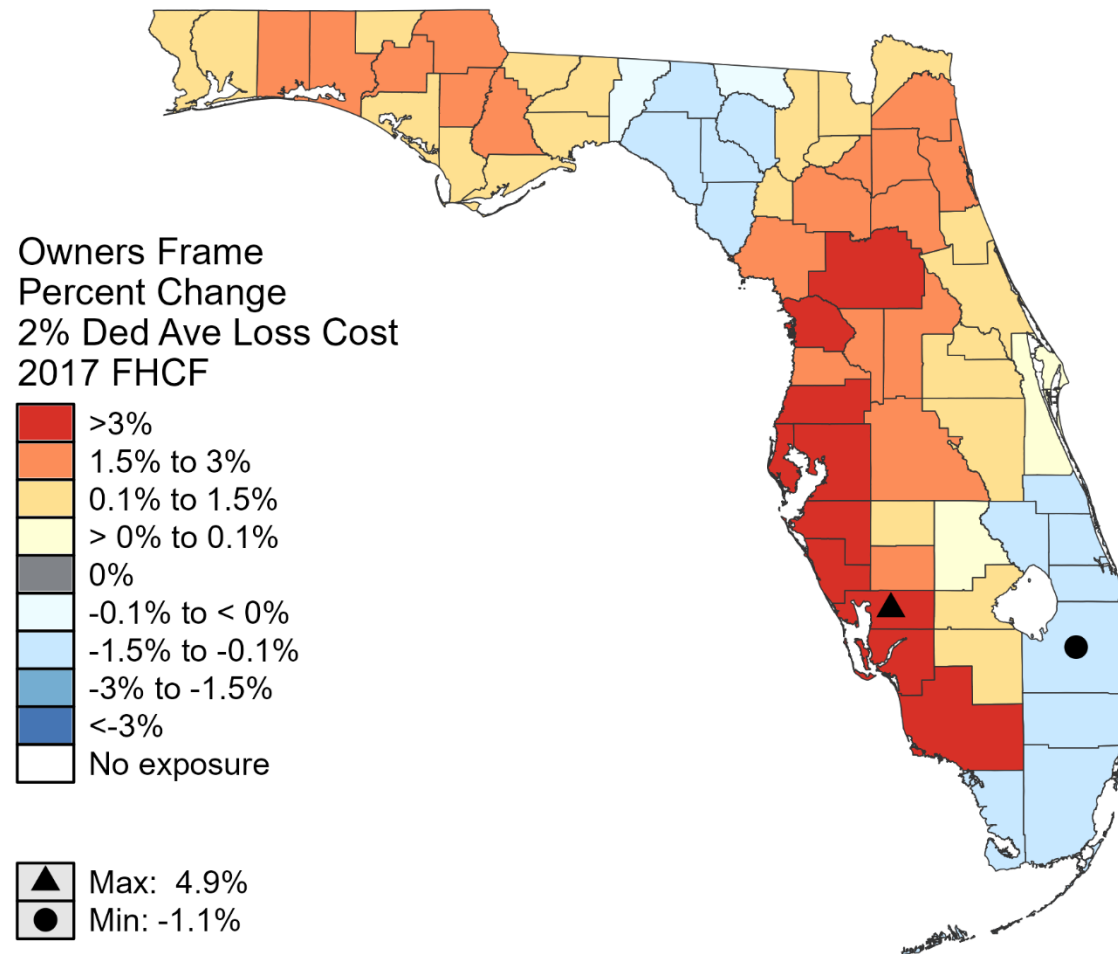


Figure 83: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for masonry owners from the output ranges from the previously-accepted hurricane model

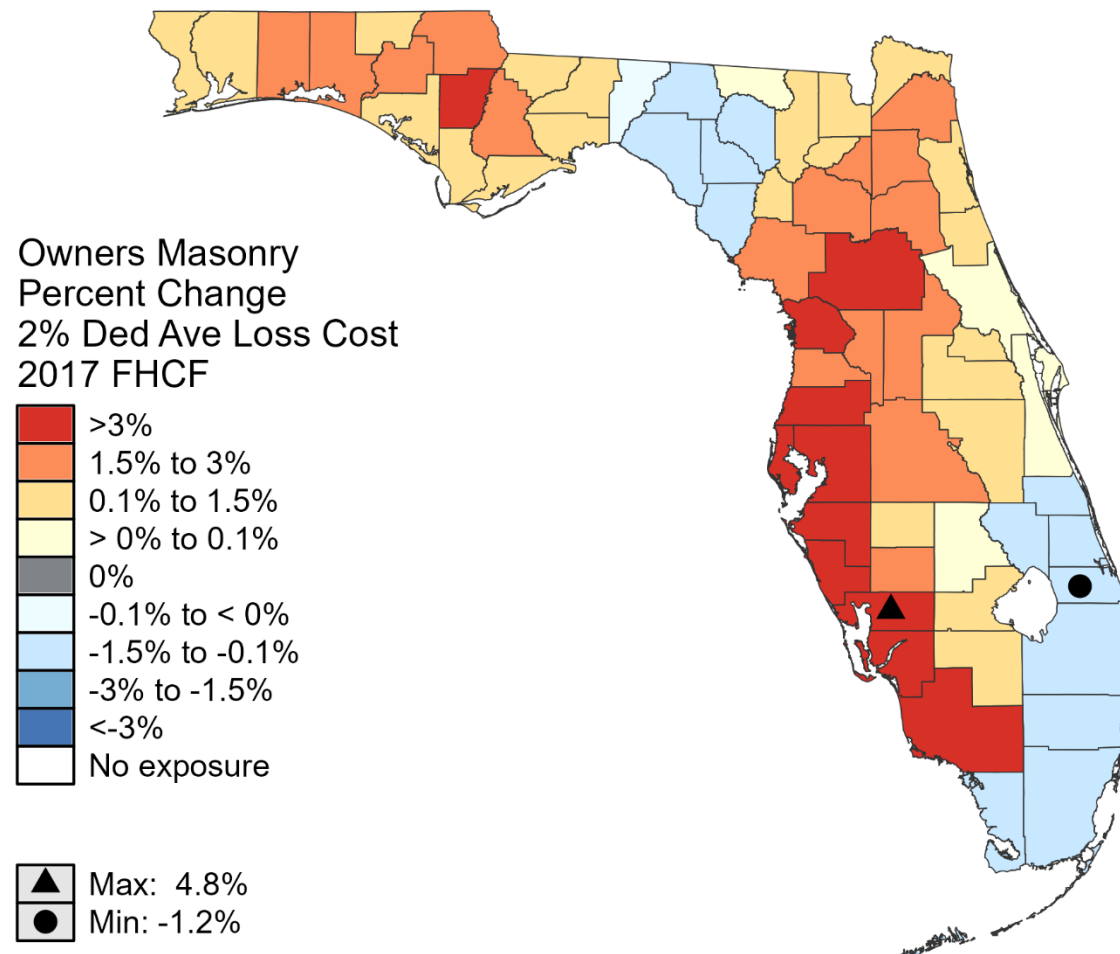


Figure 84: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for manufactured home from the output ranges from the previously-accepted hurricane model

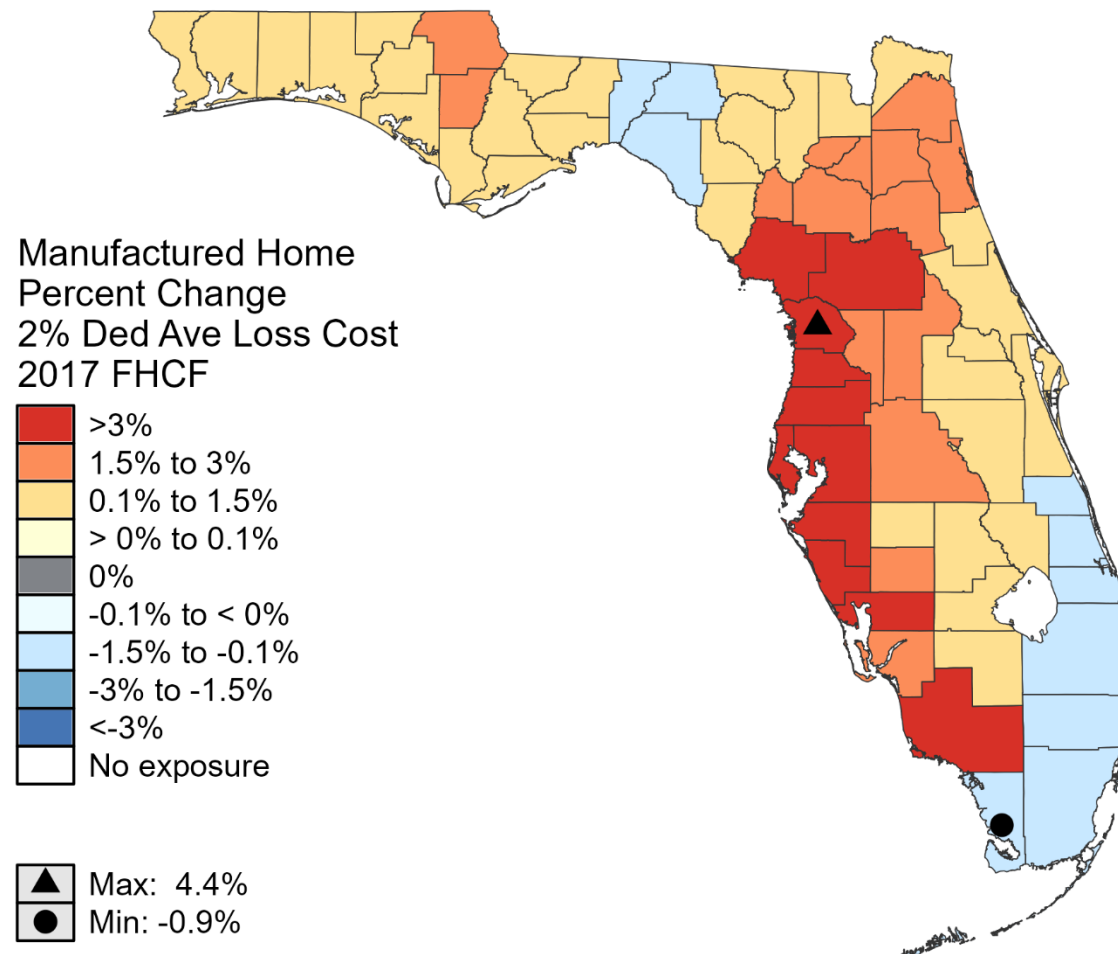


Figure 85: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for frame renters from the output ranges from the previously-accepted hurricane model

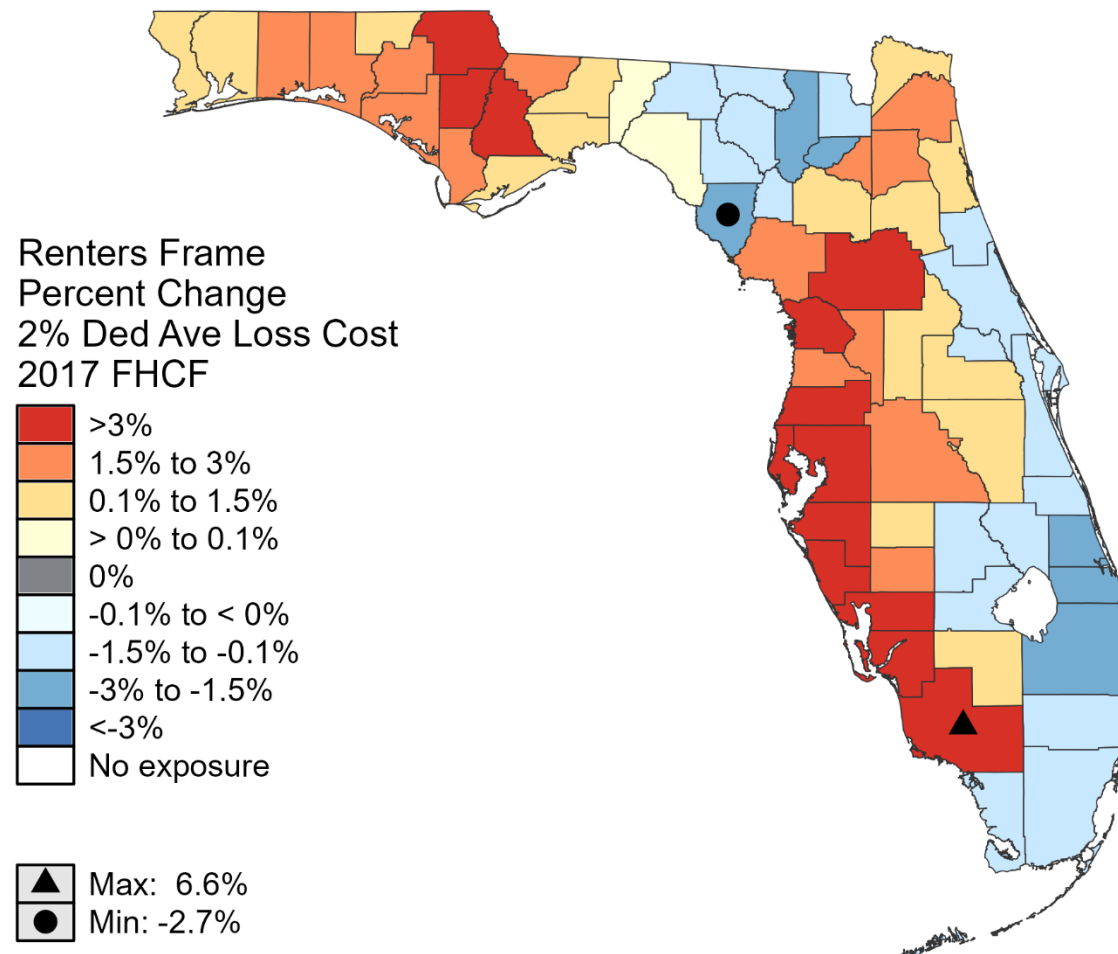


Figure 86: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for masonry renters from the output ranges from the previously-accepted hurricane model

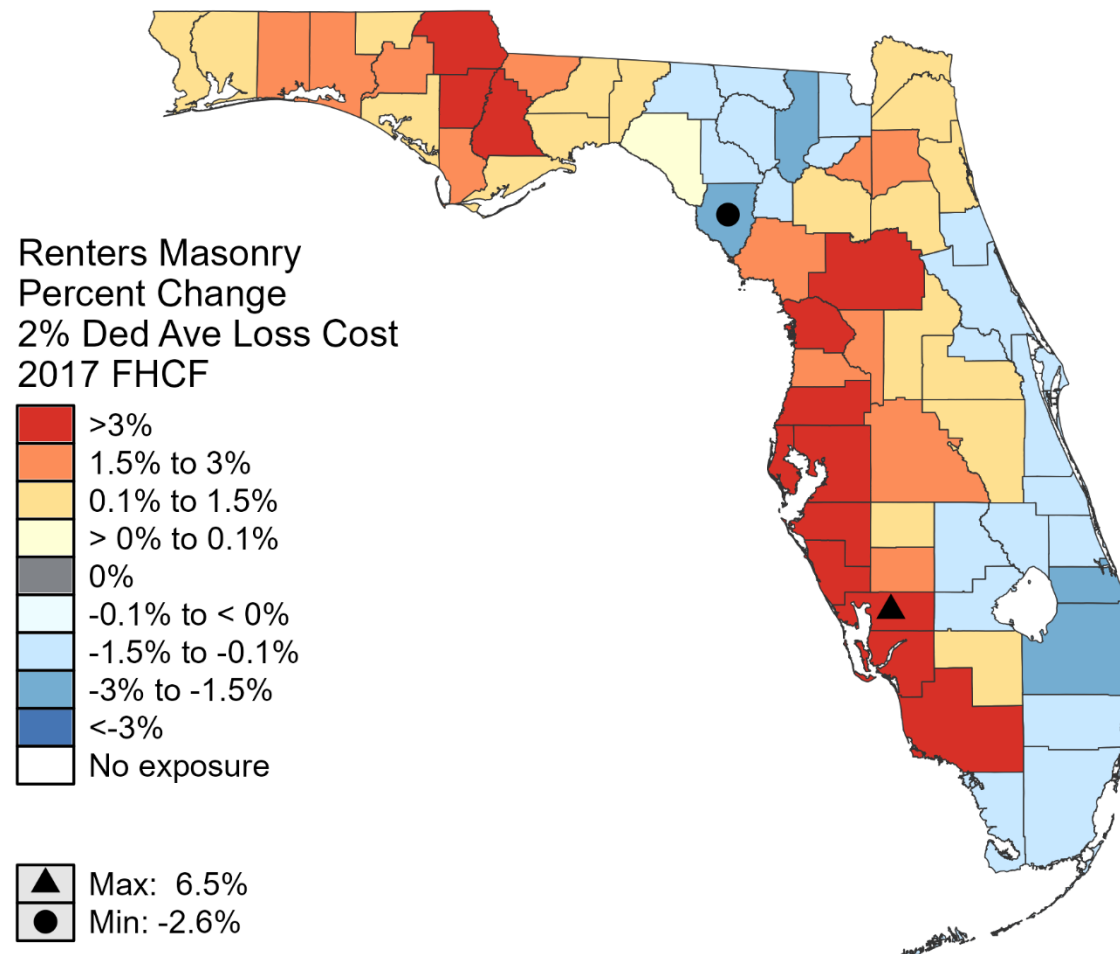


Figure 87: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for frame condo unit owners from the output ranges from the previously-accepted hurricane model

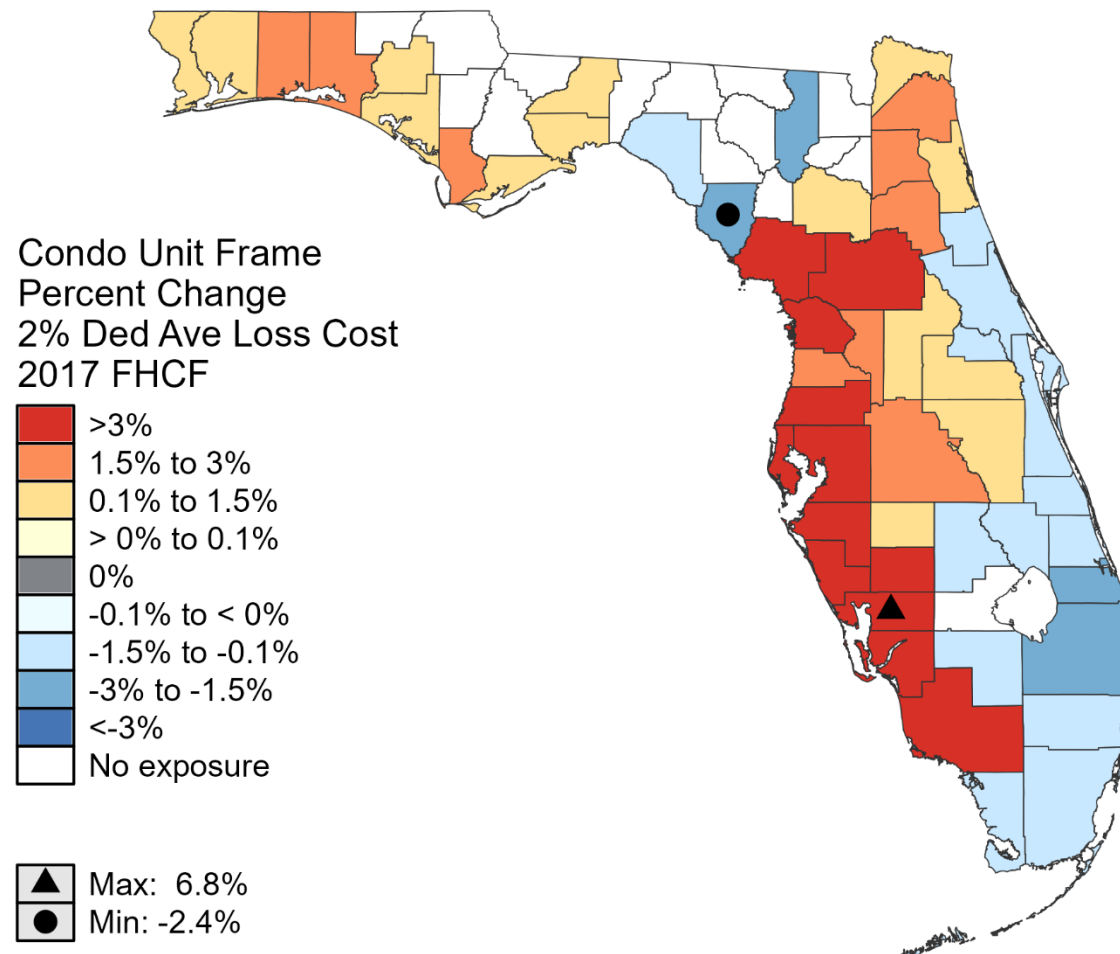


Figure 88: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for masonry condo unit owners from the output ranges from the previously-accepted hurricane model

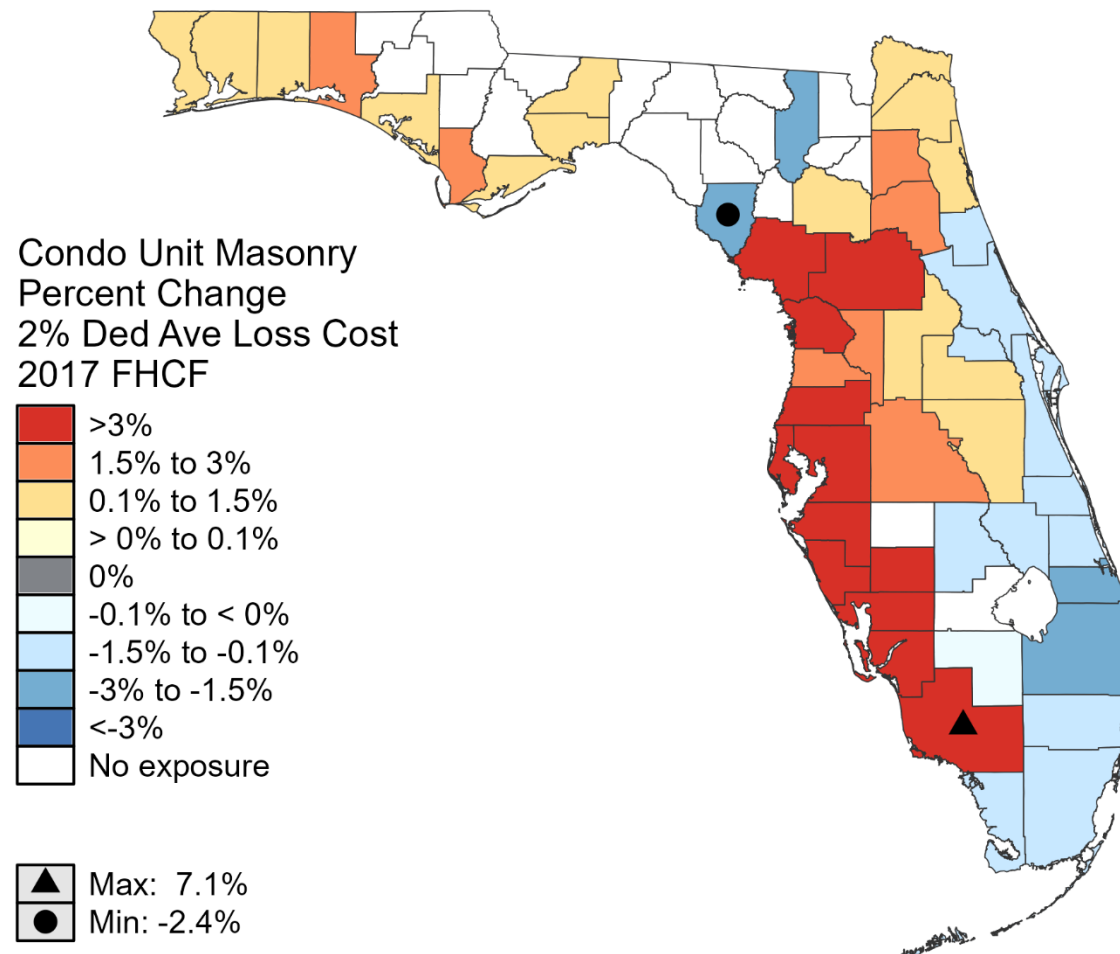
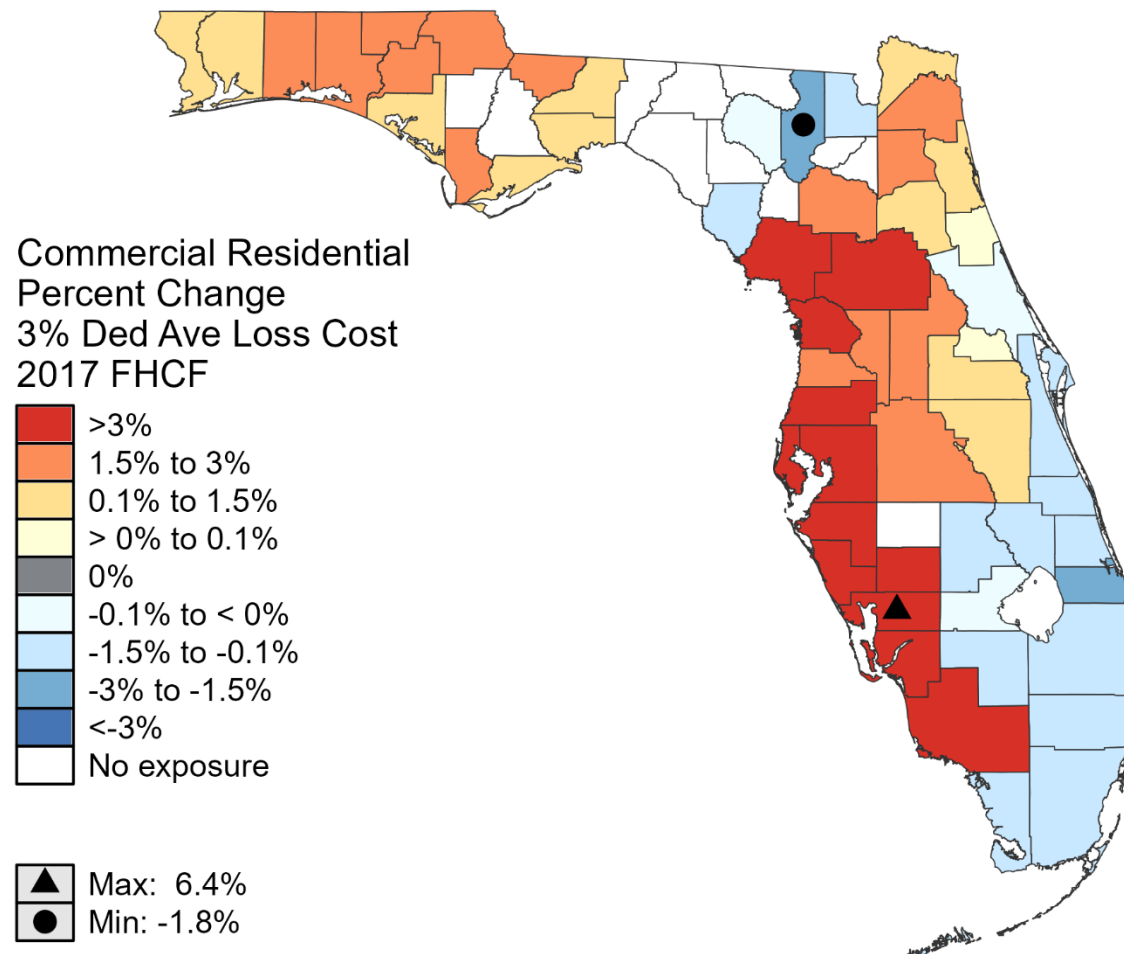


Figure 89: Map by county reflecting the percentage changes in the average loss costs with specified deductibles for commercial residential from the output ranges from the previously-accepted hurricane model



Form A-6: Logical Relationships to Hurricane Risk (Trade Secret Item)

This form will be provided during the professional team on-site review as well as the closed meeting portion of the commission meeting.

Form A-8: Hurricane Probable Maximum Loss for Florida

- A. One or more automated programs or scripts shall be used to generate and arrange the data in Form A-8.***
- B. Provide a detailed explanation of how the Expected Annual Hurricane Losses and Return Periods are calculated.***
- C. Complete Part A using the 2017 FHCF exposure data and Part B using the 2023 FHCF exposure data***
- D. For the Expected Annual Hurricane Losses column in Part A.1 and Part B.1, provide personal and commercial residential, zero deductible statewide hurricane loss.***

In the column, Return Period (Years), provide the return period associated with the average hurricane loss within the ranges indicated on a cumulative basis.

For example, if the average hurricane loss is \$4,705 million for the range \$4,501 - \$5,000 million, provide the return period associated with a hurricane loss that is \$4,705 million or greater.

For each hurricane loss range in millions (\$1,001-\$1,500, \$1,501-\$2,000, \$2,001-\$2,500) the average hurricane loss within that range shall be identified and then the return period associated with that hurricane loss calculated. The return period is then the reciprocal of the probability of the hurricane loss equaling or exceeding this average hurricane loss size.

The probability of equaling or exceeding the average of each range shall be smaller as the ranges increase (and the average hurricane losses within the ranges increase). Therefore, the return period associated with each range and average hurricane loss within that range shall be larger as the ranges increase. Return periods shall be based on cumulative probabilities.

A return period for an average hurricane loss of \$4,705 million within the \$4,501-\$5,000 million range shall be lower than the return period for an average hurricane loss of \$5,455 million associated with the \$5,001- \$6,000 million range.

- E. Provide a graphical comparison of the current hurricane model under review Residential Return Periods hurricane loss curve to the currently accepted hurricane model Residential Return Periods hurricane loss curve. Residential Return Period (Years) shall be shown on the y-axis on a log-10 scale with Hurricane Losses in Billions shown on the x-axis. The legend should indicate the corresponding hurricane model with a solid line representing the current year and a dotted line representing the currently accepted hurricane model.***
- F. Provide the expected hurricane loss and 10% (lower bound) and 90% (upper bound) hurricane loss levels for each of the Personal and Commercial Residential Return Periods given in Part A.2 and Part B.2, Annual Aggregate, and Part A.3 and Part B.3, Annual Occurrence. Describe how the uncertainty in hurricane vulnerability functions has been propagated to the uncertainty in portfolio loss and how it relates to the 10% and 90% hurricane loss levels.***
- G. List additional assumptions necessary to complete Form A-8. Provide the rationale for the assumptions as well as a detailed description of how the assumptions are implemented.***

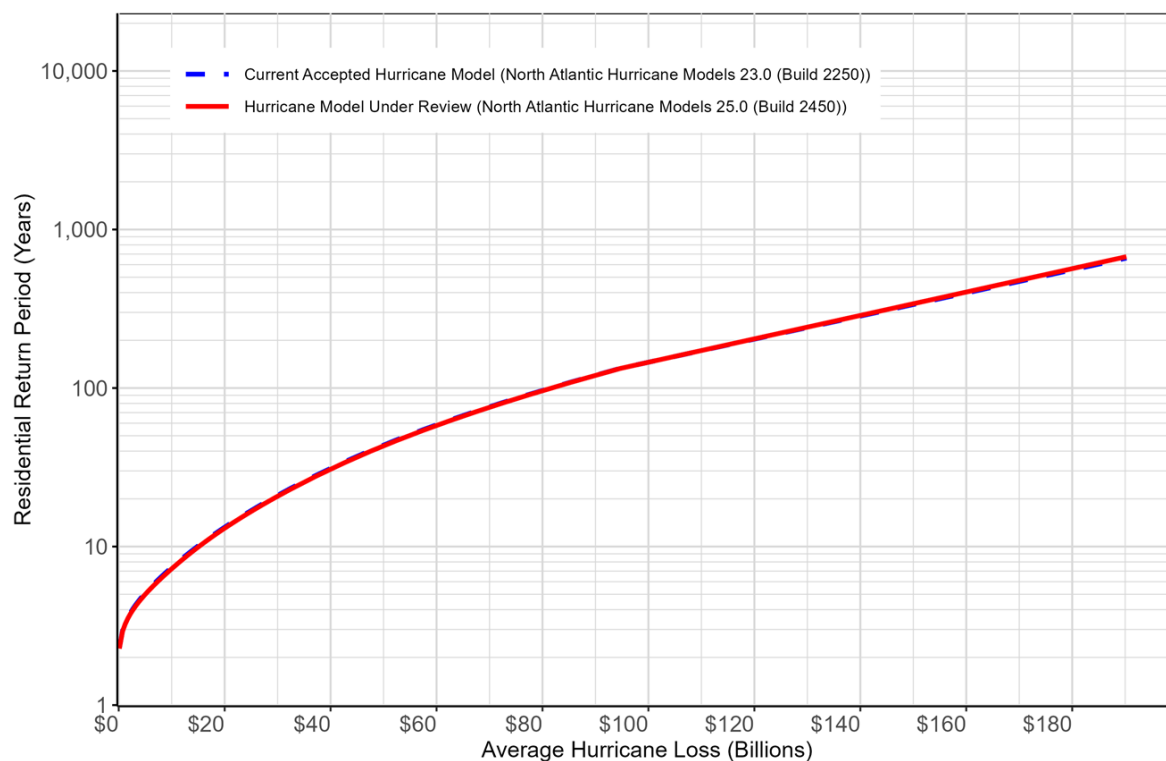
No additional assumption was necessary to complete this form.
- H. Provide this form in Excel format. The file name shall include the abbreviated name of the modeling organization, the hurricane standards year, and the form name. Also include Form A-8 in a submission appendix.***

To calculate the expected annual hurricane losses, the loss for each event in the range is multiplied by its annual rate of occurrence, and the products are summed across the range. The return time is calculated as the reciprocal of the exceedance probability of the average loss in each range. The return time is rounded to the nearest year.

The 10 percent / 90 percent uncertainty interval for each return period was derived from the beta distribution of the event with the mean loss closest to the "estimated loss level" for that return period.

The results of the calculations are shown in the file *Moody's23FormA8.xlsx* at the link provided to the FCHLPM and appear in the following tables.

Figure 90: Comparison of current submission return times to the prior year's submission return time



**Part A.1: Personal and Commercial Residential Hurricane Probable Maximum Loss for Florida
(2017 FHCF Exposure Data)**

Table 48: Distribution of hurricanes by size of loss for the 2017 FHCF combined personal and commercial residential aggregate exposure data

HURRICANE LOSS RANGE (MILLIONS)			TOTAL HURRICANE LOSS	AVERAGE HURRICANE LOSS (MILLIONS)	NUMBER OF HURRICANES	EXPECTED ANNUAL HURRICANE LOSSES*	RETURN PERIOD (YEARS)
\$ ->0	to	\$ 500	\$741,007	\$114	6,528	\$48,835,700	2
\$ 501	to	\$ 1,000	\$917,837	\$724	1,267	\$59,827,359	3
\$ 1,001	to	\$ 1,500	\$1,003,745	\$1,235	813	\$51,621,246	4
\$ 1,501	to	\$ 2,000	\$1,087,447	\$1,743	624	\$64,174,620	4
\$ 2,001	to	\$ 2,500	\$1,279,676	\$2,245	570	\$66,854,465	4
\$ 2,501	to	\$ 3,000	\$1,454,678	\$2,760	527	\$79,151,245	4
\$ 3,001	to	\$ 3,500	\$1,454,736	\$3,240	449	\$59,475,589	5
\$ 3,501	to	\$ 4,000	\$1,801,735	\$3,746	481	\$55,554,342	5
\$ 4,001	to	\$ 4,500	\$1,749,182	\$4,246	412	\$47,892,445	5
\$ 4,501	to	\$ 5,000	\$1,700,339	\$4,750	358	\$49,057,711	6
\$ 5,001	to	\$ 6,000	\$3,507,808	\$5,498	638	\$91,025,882	6
\$ 6,001	to	\$ 7,000	\$3,346,705	\$6,498	515	\$128,047,061	7
\$ 7,001	to	\$ 8,000	\$3,377,095	\$7,521	449	\$193,637,115	7
\$ 8,001	to	\$ 9,000	\$3,807,941	\$8,500	448	\$158,238,813	8
\$ 9,001	to	\$ 10,000	\$4,083,301	\$9,496	430	\$78,215,270	9
\$ 10,001	to	\$ 11,000	\$3,708,057	\$10,475	354	\$116,875,455	10
\$ 11,001	to	\$ 12,000	\$3,402,415	\$11,495	296	\$105,763,687	10
\$ 12,001	to	\$ 13,000	\$3,467,166	\$12,472	278	\$79,349,983	11
\$ 13,001	to	\$ 14,000	\$2,870,216	\$13,539	212	\$59,797,375	12
\$ 14,001	to	\$ 15,000	\$3,330,087	\$14,479	230	\$74,414,362	13
\$ 15,001	to	\$ 16,000	\$3,006,597	\$15,498	194	\$72,425,167	14
\$ 16,001	to	\$ 17,000	\$3,166,327	\$16,491	192	\$72,623,380	15
\$ 17,001	to	\$ 18,000	\$2,882,040	\$17,467	165	\$61,483,032	16
\$ 18,001	to	\$ 19,000	\$3,090,075	\$18,503	167	\$52,901,176	17
\$ 19,001	to	\$ 20,000	\$2,968,874	\$19,532	152	\$60,414,585	18
\$ 20,001	to	\$ 21,000	\$3,033,607	\$20,497	148	\$90,176,516	19
\$ 21,001	to	\$ 22,000	\$2,860,146	\$21,505	133	\$104,691,564	21
\$ 22,001	to	\$ 23,000	\$2,883,414	\$22,527	128	\$76,477,665	22
\$ 23,001	to	\$ 24,000	\$2,610,704	\$23,520	111	\$46,486,334	23
\$ 24,001	to	\$ 25,000	\$2,700,726	\$24,552	110	\$44,056,394	25
\$ 25,001	to	\$ 26,000	\$2,677,765	\$25,503	105	\$35,898,041	26
\$ 26,001	to	\$ 27,000	\$2,484,456	\$26,430	94	\$37,869,129	27
\$ 27,001	to	\$ 28,000	\$2,531,157	\$27,513	92	\$41,009,879	29

HURRICANE LOSS RANGE (MILLIONS)			TOTAL HURRICANE LOSS	AVERAGE HURRICANE LOSS (MILLIONS)	NUMBER OF HURRICANES	EXPECTED ANNUAL HURRICANE LOSSES*	RETURN PERIOD (YEARS)
\$ 28,001	to	\$ 29,000	\$2,253,282	\$28,523	79	\$47,891,778	30
\$ 29,001	to	\$ 30,000	\$2,391,394	\$29,523	81	\$36,659,386	32
\$ 30,001	to	\$ 35,000	\$12,496,214	\$32,458	385	\$199,638,197	37
\$ 35,001	to	\$ 40,000	\$10,709,170	\$37,445	286	\$155,293,030	46
\$ 40,001	to	\$ 45,000	\$10,458,233	\$42,513	246	\$122,041,651	57
\$ 45,001	to	\$ 50,000	\$9,418,535	\$47,329	199	\$85,928,024	68
\$ 50,001	to	\$ 55,000	\$9,062,670	\$52,385	173	\$104,692,868	81
\$ 55,001	to	\$ 60,000	\$7,351,118	\$57,431	128	\$94,566,017	96
\$ 60,001	to	\$ 65,000	\$8,069,979	\$62,558	129	\$67,325,753	113
\$ 65,001	to	\$ 70,000	\$5,744,403	\$67,581	85	\$72,689,943	132
\$ 70,001	to	\$ 75,000	\$5,644,691	\$72,368	78	\$52,744,800	151
\$ 75,001	to	\$ 80,000	\$5,411,806	\$77,312	70	\$44,174,369	174
\$ 80,001	to	\$ 90,000	\$10,174,063	\$84,784	120	\$67,708,008	212
\$ 90,001	to	\$ 100,000	\$8,992,592	\$94,659	95	\$48,682,800	273
\$ 100,001	to	\$ Maximum	\$78,300,852	\$172,469	454	\$355,313,008	1,274
Total			\$271,466,062	\$13,387	20,278	\$4,019,672,223	12

Part A.2 – Personal and Commercial Residential Hurricane Probable Maximum Loss for Florida - Annual Aggregate (2017 FHCF Exposure Data)

Table 49: Estimated loss for each of the return periods given for the 2017 FHCF combined personal and commercial residential aggregate exposure data

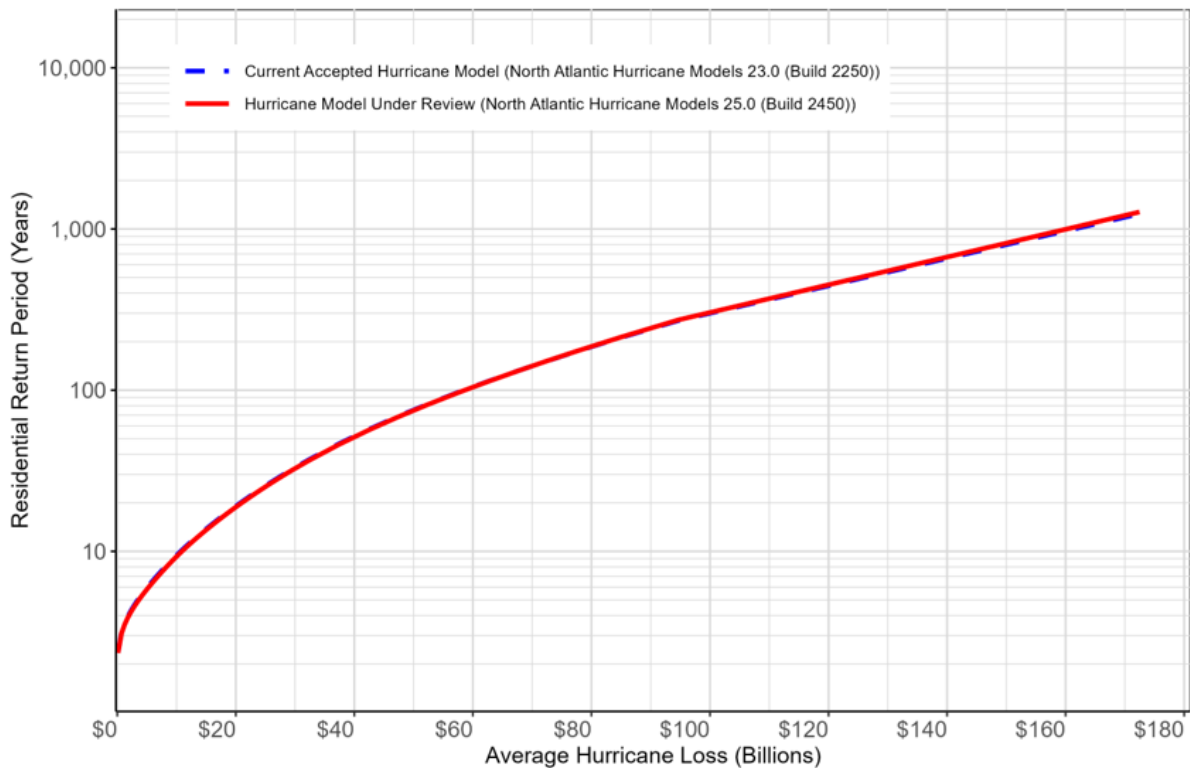
Return Period (Years)	Expected Hurricane Loss Level	10% Loss Level	90% Loss Level
Top Event	778,130,482,468	601,945,169,638	962,145,386,336
1,000	157,772,029,630	102,879,432,377	218,304,115,453
500	121,212,003,381	74,694,171,422	173,043,214,118
250	91,172,844,323	58,320,698,607	128,019,546,180
100	58,636,565,599	44,438,553,078	73,814,167,766
50	39,390,719,483	19,690,509,658	62,198,037,893
20	21,011,127,538	11,106,078,978	32,421,602,939
10	10,902,271,069	3,487,927,648	20,178,500,870
5	3,640,279,428	1,089,326,126	6,863,654,162

**Part A.3 – Personal and Commercial Residential Hurricane Probable Maximum Loss for Florida
- Annual Occurrence (2017 FHCF Exposure Data)**

Table 50: Estimated loss for each of the return periods given for the 2017 FHCF combined personal and commercial residential occurrence exposure data

Return Period (Years)	Expected Hurricane Loss Level	10% Loss Level	90% Loss Level
Top Event	778,130,482,468	601,945,169,638	962,145,386,336
1,000	152,506,463,286	100,944,868,677	209,495,693,237
500	116,292,945,528	77,589,938,178	158,984,192,308
250	86,735,982,775	51,963,065,079	125,686,704,977
100	54,855,219,203	29,477,307,110	83,832,427,385
50	36,329,067,697	16,976,298,298	59,094,342,252
20	19,210,792,925	7,739,404,035	33,029,514,751
10	9,984,206,295	3,762,797,552	17,560,099,003
5	3,368,994,747	2,028,441,325	4,870,057,354

Figure 91: Graphical comparison of the current accepted North Atlantic Hurricane Models 23.0 (Build 2250) with North Atlantic Hurricane Models 25.0 (Build 2450) under review (FHCF 2017)



**Part B.1 – Personal and Commercial Residential Hurricane Probable Maximum Loss for Florida
(2023 FHCF Exposure Data)**

Table 51: Distribution of hurricanes by size of loss for the 2023 FHCF combined personal and commercial residential aggregate exposure data

HURRICANE LOSS RANGE (MILLIONS)			TOTAL HURRICANE LOSS	AVERAGE HURRICANE LOSS (MILLIONS)	NUMBER OF HURRICANES	EXPECTED ANNUAL HURRICANE LOSSES*	RETURN PERIOD (YEARS)
\$	->0	to \$ 500	\$704,445	\$119	5,928	\$49,136,214	2
\$	501	to \$ 1,000	\$861,437	\$721	1,195	\$49,285,603	3
\$	1,001	to \$ 1,500	\$983,928	\$1,230	800	\$65,335,675	3
\$	1,501	to \$ 2,000	\$994,719	\$1,745	570	\$45,866,647	4
\$	2,001	to \$ 2,500	\$1,031,651	\$2,243	460	\$70,575,714	4
\$	2,501	to \$ 3,000	\$1,217,409	\$2,748	443	\$55,791,322	4
\$	3,001	to \$ 3,500	\$1,285,429	\$3,246	396	\$71,421,515	4
\$	3,501	to \$ 4,000	\$1,416,153	\$3,756	377	\$93,388,807	4
\$	4,001	to \$ 4,500	\$1,521,802	\$4,251	358	\$62,566,061	5
\$	4,501	to \$ 5,000	\$1,473,682	\$4,769	309	\$48,607,550	5
\$	5,001	to \$ 6,000	\$3,643,683	\$5,487	664	\$110,939,046	5
\$	6,001	to \$ 7,000	\$3,324,340	\$6,480	513	\$91,662,010	6
\$	7,001	to \$ 8,000	\$3,508,097	\$7,480	469	\$98,121,664	6
\$	8,001	to \$ 9,000	\$3,509,085	\$8,476	414	\$125,763,009	7
\$	9,001	to \$ 10,000	\$3,295,084	\$9,496	347	\$122,334,691	7
\$	10,001	to \$ 11,000	\$3,332,853	\$10,514	317	\$175,698,408	7
\$	11,001	to \$ 12,000	\$3,723,847	\$11,493	324	\$210,440,993	8
\$	12,001	to \$ 13,000	\$4,233,828	\$12,489	339	\$96,630,894	9
\$	13,001	to \$ 14,000	\$3,878,825	\$13,515	287	\$80,305,894	9
\$	14,001	to \$ 15,000	\$3,656,166	\$14,451	253	\$100,022,452	10
\$	15,001	to \$ 16,000	\$3,559,198	\$15,475	230	\$151,237,377	10
\$	16,001	to \$ 17,000	\$3,450,582	\$16,510	209	\$110,230,780	11
\$	17,001	to \$ 18,000	\$3,493,622	\$17,468	200	\$50,569,806	11
\$	18,001	to \$ 19,000	\$2,716,714	\$18,481	147	\$53,316,720	12
\$	19,001	to \$ 20,000	\$3,569,511	\$19,506	183	\$93,164,749	13
\$	20,001	to \$ 21,000	\$2,993,378	\$20,503	146	\$62,346,329	13
\$	21,001	to \$ 22,000	\$3,054,686	\$21,512	142	\$68,893,145	14
\$	22,001	to \$ 23,000	\$3,078,997	\$22,474	137	\$71,970,536	15
\$	23,001	to \$ 24,000	\$3,146,254	\$23,480	134	\$60,022,945	15
\$	24,001	to \$ 25,000	\$2,600,582	\$24,534	106	\$61,065,883	16
\$	25,001	to \$ 26,000	\$3,241,632	\$25,525	127	\$58,808,806	17
\$	26,001	to \$ 27,000	\$2,915,969	\$26,509	110	\$44,001,228	18
\$	27,001	to \$ 28,000	\$2,997,812	\$27,503	109	\$76,675,316	19

HURRICANE LOSS RANGE (MILLIONS)			TOTAL HURRICANE LOSS	AVERAGE HURRICANE LOSS (MILLIONS)	NUMBER OF HURRICANES	EXPECTED ANNUAL HURRICANE LOSSES*	RETURN PERIOD (YEARS)
\$ 28,001	to	\$ 29,000	\$3,049,502	\$28,500	107	\$111,775,426	19
\$ 29,001	to	\$ 30,000	\$3,127,597	\$29,506	106	\$79,826,485	20
\$ 30,001	to	\$ 35,000	\$13,674,227	\$32,403	422	\$300,606,812	23
\$ 35,001	to	\$ 40,000	\$11,818,165	\$37,281	317	\$200,195,814	28
\$ 40,001	to	\$ 45,000	\$12,943,824	\$42,439	305	\$198,747,566	34
\$ 45,001	to	\$ 50,000	\$11,589,330	\$47,497	244	\$173,959,382	40
\$ 50,001	to	\$ 55,000	\$10,491,914	\$52,460	200	\$166,332,368	47
\$ 55,001	to	\$ 60,000	\$10,759,384	\$57,537	187	\$120,101,584	54
\$ 60,001	to	\$ 65,000	\$10,251,268	\$62,508	164	\$113,692,897	62
\$ 65,001	to	\$ 70,000	\$8,492,757	\$67,403	126	\$70,617,170	71
\$ 70,001	to	\$ 75,000	\$9,337,851	\$72,386	129	\$130,109,769	80
\$ 75,001	to	\$ 80,000	\$9,276,333	\$77,303	120	\$99,152,400	90
\$ 80,001	to	\$ 90,000	\$13,718,044	\$85,205	161	\$134,241,532	108
\$ 90,001	to	\$ 100,000	\$13,060,971	\$94,645	138	\$140,984,569	133
\$ 100,001	to	\$ Maximum	\$151,804,375	\$190,231	798	\$760,945,345	674
Total			\$381,810,942	\$18,839	20,267	\$5,587,486,908	12

**Part B.2 – Personal and Commercial Residential Hurricane Probable Maximum Loss for Florida
- Annual Aggregate (2023 FHCF Exposure Data)**

Table 52: Estimated loss for each of the return periods given for the 2023 FHCF combined personal and commercial residential aggregate exposure data

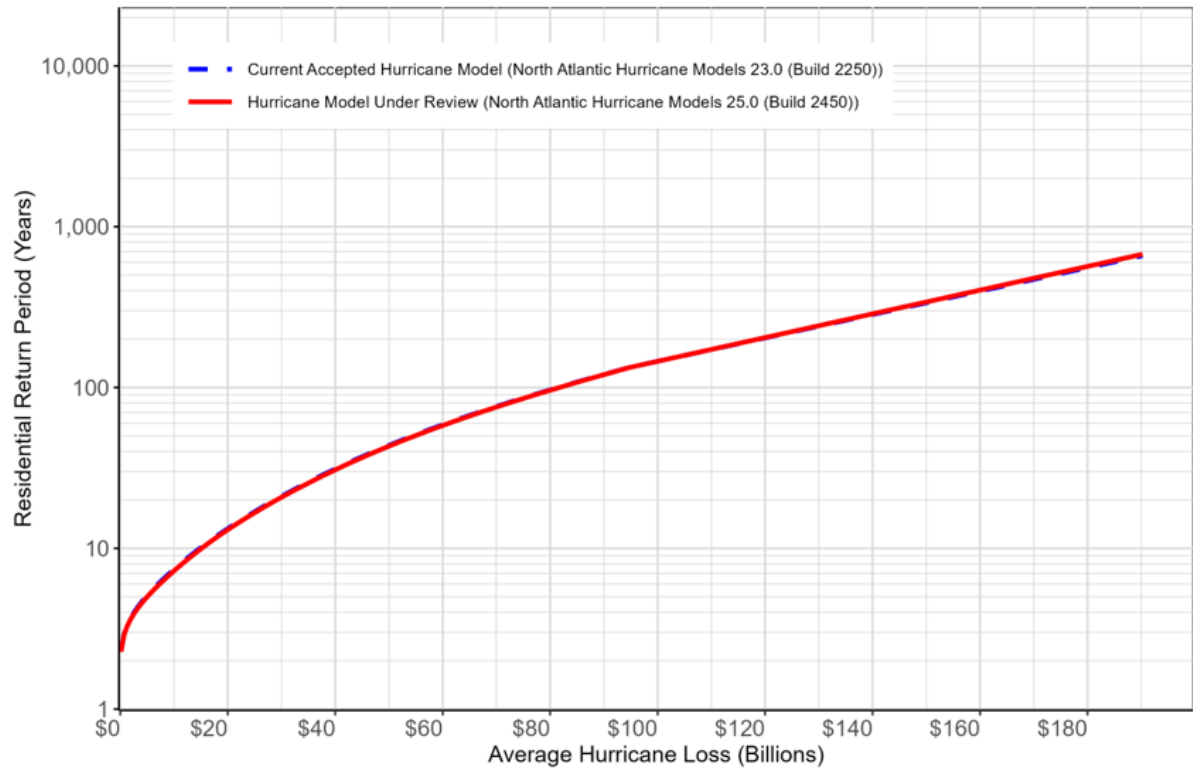
Return Period (Years)	Expected Hurricane Loss Level	10% Loss Level	90% Loss Level
Top Event	1,100,792,289,926	845,446,618,129	1,368,223,190,982
1,000	220,765,959,415	141,151,672,611	309,175,357,890
500	169,447,876,007	123,550,145,866	218,688,750,636
250	127,260,194,244	66,116,404,849	197,545,313,132
100	81,695,504,735	42,743,468,905	126,609,995,171
50	54,787,536,990	32,425,194,711	79,999,633,714
20	29,125,452,254	13,427,854,416	47,586,658,810
10	15,131,425,992	6,137,096,587	25,953,639,430
5	5,019,732,613	1,109,894,512	10,194,605,619

**Part B.3 – Personal and Commercial Residential Hurricane Probable Maximum Loss for Florida
- Annual Occurrence (2023 FHCF Exposure Data)**

Table 53: Estimated loss for each of the return periods given for the 2023 FHCF combined personal and commercial residential occurrence exposure data

Return Period (Years)	Expected Hurricane Loss Level	10% Loss Level	90% Loss Level
Top Event	1,100,792,289,926	845,446,618,129	1,368,223,190,982
1,000	213,468,856,380	139,769,619,229	294,553,774,917
500	162,609,240,913	94,423,937,177	239,648,835,182
250	121,093,135,708	58,123,723,003	195,366,533,644
100	76,463,512,576	38,889,729,144	119,872,650,210
50	50,546,448,589	18,505,563,341	89,733,610,670
20	26,623,241,691	8,526,123,061	49,240,818,361
10	13,872,445,269	4,304,529,721	25,912,982,128
5	4,644,142,634	928,475,172	9,634,069,108

Figure 92: Graphical comparison of the current accepted North Atlantic Hurricane Models 23.0 (Build 2250) with North Atlantic Hurricane Models 25.0 (Build 2450) under review (FHCF 2023)



APPENDIX B – MOODY'S TECHNICAL STAFF

Yasuyuki Akita, PhD, Lead Modeler, Model Development

Since joining Moody's in April 2015, Yasu has been involved in several projects as geospatial modeling specialist. Yasu developed new methodologies to estimate the standard of protection of flood defenses for the U.S. inland flood and North Atlantic hurricane storm surge models. He was also involved in model calibration efforts for the North Atlantic Hurricane Models Version 17.0 release and performed post-event field reconnaissance after Hurricane Matthew (2016) in the Carolinas. Yasuyuki has BS and MS degrees in physics from Sophia University in Japan and PhD degree in environmental science from the University of North Carolina at Chapel Hill (UNC-CH). During this time, he conducted postdoctoral research in air pollution exposure assessment at UNC-CH and Centre for Research in Environmental Epidemiology (CREAL) in Barcelona, Spain.

Hurricane Project Responsibilities: Hurricane claims analysis; testing of the vulnerability component of software

Florian Arfeuille, PhD, Associate Director Manager, Model Development

Florian Arfeuille joined Moody's in March 2018, working on the North Atlantic Hurricane Models. He also did, in 2017, a 4-month internship at Moody's working on the European Windstorm and Pacific Typhoon models. Prior to starting at Moody's, Florian held a postdoctoral position in atmospheric modeling in Zurich and a postdoctoral position in climate modeling at the University of Bern. Florian holds a PhD in atmospheric science from ETH Zurich, and an MSc in climate science from the University of Versailles.

Hurricane Project Responsibilities: Updating the modeled hurricane landfall rates, development of historical reconstructions

Karen Argonza, Senior Science Writer and Editor, Model Content and Data Experience

Karen has been a technical content developer in the software industry for over 30 years, 15 of which she has led the development of methodology and change management documents for catastrophe risk models, and produced crisis communications to clients in response to natural catastrophes. From 2004 to 2009, Karen led the documentation effort for Moody's FCHLPM submissions as a consultant, and rejoined Moody's as a full-time employee in February 2020. She holds a BS in journalism from San Francisco State University. Karen works with regulatory experts at Moody's to develop ownership of U.S. regulatory documentation for North Atlantic Hurricane Models and data, and management of procedures for updating and delivering submissions to U.S. regulators.

Hurricane Project Responsibilities: Coordination of the editorial process and production of Moody's submission to the FCHLPM.

Ed Bannister, PhD, Assistant Director, Model Development

Dr. Bannister joined Moody's in 2022 and has worked on tropical cyclone and winter storm modeling in the U.S. Europe, and Australia. He is responsible for the modelling and development of atmospheric surface-layer processes in all Moody's wind models. Prior to joining Moody's, Dr. Bannister practiced as an intellectual property lawyer, before retraining in meteorology and atmospheric sciences. He holds a PhD in boundary-layer meteorology and an MSc in meteorology and climatology, both from the University of Birmingham, and an BSc in physical chemistry from University College London.

Hurricane Project Responsibilities: Updating the land-cover data and modelling the effects of terrain on large-scale wind fields.

Enrica Bellone, PhD, Senior Director Manager, Model Development

Dr. Bellone is responsible for researching and implementing advanced modeling techniques and leads the development of tropical cyclone models. Prior to joining Moody's, she conducted postdoctoral research in statistics as applied to the atmospheric sciences, first at the National Center for Atmospheric Research in Boulder, Colorado, and then at University College London. Dr. Bellone received a PhD in statistics from the University of Washington.

Hurricane Project Responsibilities: Lead of hazard and frequency updates, development of the stochastic tracks set, review of the model from a statistical point of view, and development lead across all components

Suman Kumar Bhattacharya, Director, Software Development

Suman has a diploma in electrical engineering from RK Mission Shilpamandira, Kolkata, India and has worked for many well-known software technology companies for more than 12 years. For Moody's, Suman works on RiskLink performance, unit tests for improving code quality, TFS administration, and various tools and technology for the application development team. Suman's experience includes user interface, business components, and database programming.

Hurricane Project Responsibilities: RiskLink performance, unit tests for improving code quality, TFS administration, and various tools and technology for the application development team

Masha Bilyak, Software QE Engineer III, Software Development

Masha obtained her bachelor's degrees in economics and management in Ukraine from the Polytechnic University in Lvov. Masha joined Moody's in 2000 in the quality assurance department. Some of her key functions have been working on RiskLink and RiskBrowser®, and testing related projects.

Hurricane Project Responsibilities: Software quality assurance

Auguste Boissonnade, PhD, Senior Director Manager, Model Development

Dr. Boissonnade was the original architect of the Moody's hurricane catastrophe models and has over 32 years of professional experience in structural analysis and design, natural hazard modeling, and risk assessment of natural hazards in the U.S., Europe, Africa, and Asia. His expertise includes developing risk assessment models for natural hazards (earthquakes, extreme winds, floods and other weather phenomena) for applications in risk assessment of critical facilities and insurance exposures. Dr. Boissonnade has a BS degree from Ecole Supérieure des Travaux Publics (France) and a PhD from Stanford University where he has been a consulting professor. While at Stanford, Dr. Boissonnade performed research on damage estimation with application to the insurance industry. Prior to joining Moody's, Auguste was a project leader at Lawrence Livermore National Laboratory with responsibilities for developing probabilistic seismic hazard guidelines for the U.S. Nuclear Regulatory Commission and guidelines on natural phenomena hazards for the Department of Energy. He is a member of several organizations including the American Meteorological Society and the American Society of Civil Engineers and a reviewer for the National Science Foundation. Dr. Boissonnade has authored more than 50 publications, including one book.

Hurricane Project Responsibilities: Loss amplification modeling, and advisor on science and technical issues

Scott Brydon

Scott obtained his bachelor's degree in economics and statistics from California Polytechnic State University, San Luis Obispo. He joined Moody's in 2023 on the Regulatory Analytics team as a Model Success Analyst. Prior to joining Moody's, Scott worked for the Farm Credit Administration as an Associate Examiner Intern, where he researched the potential effects of drought on the portfolios of Farm Credit System institutions.

Hurricane Project Responsibilities: Generating analytical collateral for required regulatory submissions.

Jason Bryngelson, Director, Model Development

Jason has a BS in civil engineering and an MS in structural engineering from San Jose State University. He has worked on many types of risk models including earthquake, hurricane, terrorism, and wildfire, developing hazard and vulnerability functions, site hazard details and designing model implementation methods. Jason joined Moody's in 1995 as a consultant and was hired full time in 1997 and during his tenure has gained significant knowledge of the core Moody's software and data design.

Hurricane Project Responsibilities: Data management, manage model data check-in to TFS/build engineer, debugging, knowledge transfer, advisor on RiskLink data and implementation details, documentation support

Jordan Byk, Senior Director, Model Product Management

Jordan is responsible for the planning, acquisition, documentation, marketing and high-level support for Moody's geocoding software and data. He joined Moody's in 2006 to manage the Moody's weather risk business, taking the role of managing geocoding in 2008. Before joining Moody's, Jordan worked with several large telecom and computer firms and several start-up companies managing infrastructure and leading edge technology product lines. He is a graduate of Carnegie Mellon with a BS in computer science and administrative management science, and of Rutgers University with an MBA in marketing and finance.

Hurricane Project Responsibilities: Functional specification, data acquisition, documentation, and go-to-market responsibilities for geocoding software and data

David Carttar, Senior Director, Software Development

Mr. Carttar has BA degrees in geography and architectural studies from the University of Kansas, and a master's of city planning degree from the University of California at Berkeley. For Moody's, Mr. Carttar coordinates geocoding and mapping applications for the company's core technology. Mr. Carttar's experience revolves around the application of geographic modeling at a variety of technical levels.

Hurricane Project Responsibilities: Updating geocoding capabilities for all hurricane states

Umesh Chander, Manager, Software Development

Umesh has an MS degree in computer science from Northwestern Polytechnic University, Fremont, CA. He has been with Moody's for over 10 years, in the quality assurance department working on EGC, RiskLink, DPM, and RMS(one) testing related projects. Umesh's main responsibilities are functional, performance/stress and automation testing.

Hurricane Project Responsibilities: QA testing of RiskLink/EGC software components

Abhijeet Chhatry, M.Tech, Senior Analyst, Model Development

Abhijeet joined Moody's in 2020 and has worked primarily on the development and quality assurance of land use and land cover for multiple geographies. Before joining Moody's, Abhijeet worked as a junior research fellow at the Remote Sensing Lab at the Indian Institute of Technology Bombay, India. Abhijeet holds an MTech in Remote Sensing and GIS from the National Institute of Technology Surathkal, India.

Hurricane Project Responsibility: Development of land use land cover data

Tommy Chou, Senior Manager, Software Development

Tommy joined Moody's in February of 2007. He received a BA in developmental studies of industrial societies from the University of California at Berkeley.

Hurricane Project Responsibilities: Certify Moody's catastrophe models on EGC/HPC and RDP platform

Peter Datin, PhD, Senior Director, Model Development

Since joining Moody's in June 2011, Peter worked on the vulnerability development for U.S. and Caribbean hurricane and U.S. severe convective storm models. He has been involved on several claims analysis projects for wind-related catastrophes, site specific risk analyses for various structures and field reconnaissance for hurricanes Irene (2011), Sandy (2012), Matthew (2016), Harvey (2017), Irma (2017), Maria (2017), and Michael (2018), as well as the Moore, OK tornado outbreak (2013). He now leads the climate vulnerability group at Moody's. Peter has taught a graduate level course (Fundamentals and Application of Wind Engineering) at Stanford University as a part-time lecturer. Prior to joining Moody's, Peter received his PhD from the University of Florida in Gainesville, where he researched structural load paths in low-rise, wood-framed structures and worked on structural testing of metal roof decking, light-frame residential building components, and water ingress through windows from wind-driven rain as a post-doctoral research assistant.

Hurricane Project Responsibilities: Development lead for the vulnerability component of the North Atlantic Hurricane Models

Sushil Dhyani, Principal Software Development Engineer, Software Development

Sushil joined Moody's in March 2004, he worked on RiskLink and other Moody's projects and developed several utilities for model certification. Currently he is responsible for RiskLink model regression to ensure RiskLink generates the correct results for all models. He is a graduate of (MCA) master of computer application and master of computer science from the University of Rohtak (India).

Hurricane Project Responsibilities: Model regression of RiskLink

Alison Dobbin, PhD, Director Manager, Model Development

Alison joined Moody's in September 2011 and has worked on tropical cyclone, severe convective storm and winter storm modeling in the U.S, Europe, and Asia. She is responsible for surface wind modelling in all Moody's wind models. Prior to joining Moody's, Alison worked as a post doctoral researcher at the National Oceanographic and Atmospheric Administration in Colorado, and at the British Antarctic Survey. Alison holds a PhD in atmospheric physics from University College London, and an MSc in geophysics from the University of Leeds.

Hurricane Project Responsibilities: Updating the land cover data and modelling the terrain effects on large scale model winds.

Michael Drayton, PhD, Consultant, Model Development

Dr. Drayton holds a PhD in applied mathematics from the University of Cambridge and a first class honors degree in civil engineering from New Zealand. Dr. Drayton is primarily involved in the research and development of hazard models. Since joining the Moody's London office in early 1996 he has worked on the Europe Windstorm Models, the North Atlantic Hurricane Models, and the U.K. flood project. He has extensive experience of insurance-related hazard modeling and has also worked as a researcher investigating river flooding and pollution dispersion in the environment. Currently, Dr. Drayton consults to Moody's full-time.

Hurricane Project Responsibilities: Review of the hazard model

Laura Eads, PhD, Lead Modeler, Model Development

Since joining Moody's in October 2013, Laura has worked extensively on hurricane claims data analyses to support the Version 15.0 North Atlantic Hurricane Models update and also leads the structural modeling efforts for the New Zealand Earthquake Model update. Prior to joining Moody's, she was a research and development engineer at OpenSees, Berkeley, where she developed finite element models and nonlinear modeling techniques in structural engineering. Laura has a PhD in civil and environmental engineering from Stanford University, where her research focused on collapse risk assessment of buildings subject to lateral forces.

Hurricane Project Responsibilities: Hurricane claims analysis; testing of the vulnerability component of the software

Greg Fanoë, Actuary, Davies.

Greg Fanoë is an independent actuary from Davies., engaged by Moody's to review the North Atlantic Hurricane Models submission. Mr. Fanoë has been in the actuarial field since 2005. His experience includes preparation of rate filings for a wide variety of personal and commercial lines of insurance, performing competitive and analytic analysis to determine rate structures and develop rate indications, reviews of rate filings for [state insurance departments](#) (including filings proposing or utilizing catastrophe modeling), development of [rate structures, rates, reinsurance requirements, and capital requirements](#) for alternative risk transfer mechanisms, and analysis of catastrophe reinsurance programs. This has included extensive experience utilizing and reviewing predictive models, including catastrophe models.

Mr. Fanoë is a Fellow of the Casualty Actuarial Society and a member of the American Academy of Actuaries and has a BS in mathematics and computer sciences from the University of Richmond.

Hurricane Project Responsibilities: Lead actuary for actuarial review of the North Atlantic Hurricane Models

Philip Feiner, Manager, Regulatory Analytics

Phil holds a MS degree in meteorology from the Pennsylvania State University, where his research involved observing and modeling atmospheric oxidation processes taking place over forests in the southeastern United States. He joined Moody's in June 2015 as a member of the knowledge center, providing frontline support helping clients to understand and derive value from Moody's models. Later, Phil was responsible for the management and execution of technical engagements supporting the Moody's suite of climate peril models both internally for Moody's model development, and externally for Moody's clients. Currently, Phil manages the Regulatory Analytics team, overseeing the process of generating and defending the analytical collateral that complies with required regulatory submissions for Moody's.

Hurricane Project Responsibilities: Historical reconstructions, generation and QA of actuarial, statistical, and vulnerability forms

Paul Ferrara, Actuary, Merlinos and Associates, Inc.

Paul Ferrara, PhD CERA CSPA is an independent actuary from Merlinos and Associates, Inc. assisting with the actuarial review of the North Atlantic Hurricane Models submission. Dr. Ferrara has been in the actuarial field since 1999. His current interests are Enterprise Risk Management (ERM), and the leveraging of data analytics across all lines-of-business, and all business units, for direct insurers, captives, and reinsurers.

Prior to joining Merlinos & Associates Dr. Ferrara was AVP of Research and Business Development for Tokio Marine Technologies (TMTech), where much of his focus was on the development of methodologies to support the implementation of in-house portfolio aggregation, marginal pricing, and capital modeling software (equivalent to MetaRisk). A significant portion of his efforts involved natural CAT exposures, including the development of bespoke parametric Insurance-linked Securities (ILWs) based on the output of multiple CAT vendor models, as well as the analytical and geo-spatial methodologies to facilitate the automatic generation of variable-resolution grids (VRGs) tailored to targeted exposures (and hazards) within the insurer/reinsurer's portfolio, and the subsequent aggregation of the location-level vendor model losses (dis-aggregation of zip-code level losses) relative to the VRG. He also developed methodologies for under-modeled perils such as Pacific-West Typhoon, and European Wind/Hail. Ferrara also has experience developing Cyber Risk models, pricing software for Non-CAT reinsurance treaties, and with Casualty Catastrophe modeling. He also has experience with modeling to support the asset-side of the balance-sheet, including calibration and validation of the Economic Scenario Generators (ESG) and Asset Models of the most widely utilized asset model software vendors within the insurance/reinsurance industry.

Dr. Ferrara is a Fellow of the Society of Actuaries, a Chartered Enterprise Risk Analyst, a Certified Specialist in Predictive Analytics (CSPA). He is also, an Affiliate Member of the Institute & Faculty of Actuaries UK (IFoA), Dr. Ferrara also holds a PhD in Mathematical Statistics from The University of Virginia.

Hurricane Project Responsibilities: Actuarial review of North Atlantic Hurricane Models

David Gatey, PhD, Senior Director Manager, Model Development

Dr. Gatey joined Moody's in 2011 and holds a PhD from the University of Western Ontario, where he researched the standardization and statistical analysis of extreme winds and worked in the commercial wind tunnel carrying out local wind climate studies to assess design criteria for numerous buildings and projects. Since joining the Moody's London office, David has worked on both hazard and vulnerability development and has been involved with the Europe Windstorm Model, Europe Flood Models, and North Atlantic Hurricane Models. Dr. Gatey also holds a BS degree in civil and structural engineering from the University of Western Ontario.

Hurricane Project Responsibilities: Updating the land-use land-cover data and hazard aggregation and validation

Zachary Gellis, Model Analyst, Model Development

Zach Gellis joined Moody's in 2016 after obtaining a BS degree in meteorology with a focus in weather risk management from the Pennsylvania State University. Zach currently works as a model analyst, a part of the model specialist team, where he supports and enables clients to understand and derive value from Moody's models and data products.

Hurricane Project Responsibilities: QA of exposure generation for actuarial forms, flow chart creation

David Glaubman, Senior Director, Software Development

Mr. Glaubman joined Moody's in October 2004 as a lead software developer. His responsibilities have included management of the team responsible for application infrastructure. Prior to joining Moody's, he led development of several financial software products for Barra, Inc. Mr. Glaubman graduated from Northeastern University in Boston with a BS in mathematics. He is a member of IEEE and the Association for Computing Machinery (ACM).

Hurricane Project Responsibilities: Involved in the design and implementation of software libraries and components used by the loss model engine

Olga Goldin, Software QA Engineer III, Software Development

Olga has a diploma in power engineering and in economics from Azerbaijan University of Oil and Chemistry, Baku, Azerbaijan. She has about 15 years of extensive experience in software quality assurance for Windows-based applications. Olga joined Moody's in April 1996 as a contractor and became a full time employee in September 1996. She is responsible for testing different aspects of RiskLink and Risk Browser applications including user interface, business components, functionalities, and databases.

Hurricane Project Responsibilities: Testing of the software related to the hurricane model

Kian Greene, Senior Analyst, Regulatory Analytics

Kian obtained her bachelor's degrees in Environmental Studies and Biological Anthropology from the University of California, Santa Barbara. She joined Moody's in 2019 on the Risk Analytics team as a Senior Analyst where she has completed product acceptance testing on various models and has contributed largely to data engineering and automation advancements. In 2022, Kian joined the Regulatory Analytics team where she continues those pursuits in data engineering for regulatory submissions.

Hurricane Project Responsibilities: Generation, automation, and QA of actuarial, statistical, and vulnerability forms

Nathalie Grima, Senior Principal Software Engineer, Software Development

Ms. Grima joined Moody's in November 2004 as a financial modeler. Her responsibilities include development and quality assurance of new financial model related features. Prior to joining Moody's, she was a mathematics graduate student at San Jose State University. Ms. Grima is a graduate of the University of Paris IX Dauphine with a degree in mathematics.

Hurricane Project Responsibilities: Involved in the design, documentation, and quality assurance of the financial model

Valerie Harper, Actuarial Consultant, Merlinos and Associates, Inc.

Valerie Harper is an independent actuarial consultant from Merlinos and Associates, Inc. assisting with the actuarial review of the North Atlantic Hurricane Models submission. She has an MS in mathematics with a concentration in statistics and decision sciences from Georgia State University. Valerie has been in the actuarial field since 1991 and her experience includes assistance with loss and loss expense reserve analysis for insurance companies and self-insured funds, funding studies for captives and self-insured funds, reviewing various rate filings for state insurance departments, assistance on financial examinations for state insurance departments, and preparation of rate filings for personal and commercial lines of business.

Hurricane Project Responsibilities: Support actuarial review of Hurricane Model

Sarah Hartley, Director, Model Development

Sarah leads the Moody's Event Response team, which is responsible for providing real-time guidance and modeling products across a wide breadth of global natural catastrophes, including supporting Moody's RMS clients in the days prior to and weeks following major storms. Sarah joined the Moody's RMS London model development team in 2013 and prior to Moody's, Sarah worked at URS Corporation Ltd in air quality modeling and consulting. Sarah holds an MSc in applied meteorology from the University of Reading.

Hurricane Project Responsibilities: Updating historical reconstructions

Jara Imbers Quintana, PhD, Associate Director Manager, Model Development

Jara Imbers Quintana joined the Moody's model development team in October of 2012. In her role as a senior catastrophe modeler, Jara has worked on various components of the Moody's North Atlantic and North West Pacific tropical cyclone models, including historical reconstructions. Jara also leads the medium-term rates of the North Atlantic Hurricane Models.

Prior to starting at Moody's, Jara held a postdoctoral research position at the department of applied mathematics in Oxford University, working on the uncertainty analysis of climate change. Jara holds an MPhys in theoretical physics and a PhD in theoretical physics from the University of Nottingham, U.K.

Hurricane Project Responsibilities: Development of historical footprints

Atin Jain, Staff Software Development Engineer, Software Development

Mr. Atin Jain has an MS degree in physics with specialization in electronics from Awadhesh Pratap Singh University Rewa, India and has seven-years industry experience. For Moody's, Mr. Atin Jain works on geocoding and hazard software components of the RiskLink and RiskBrowser products.

Hurricane Project Responsibilities: Development and modification of spatial hazard software component, design and implementation of upgrades to the geocoding software component

Jo Kaczmarzka, PhD, Director, Model Development

Jo joined Moody's in April 2013 after completing a PhD in statistical science from University College London. Prior to her PhD, Jo worked in the life insurance and investment industries, where her recent roles included developing and managing a customer insight team, and providing financial analysis to support product development and strategic initiatives. She is a fellow of the Institute and Faculty of Actuaries. Since joining Moody's, Jo has worked on the Japan Typhoon Model and the North Atlantic Hurricane Models.

Hurricane Project Responsibilities: Historical reconstructions, hazard model validation

Mahmoud Kamalzare, PhD, Modeler, Model Development

Mahmoud joined the Model Certification team at Moody's as a Catastrophe Modeler in June 2018 and was involved in RiskLink analyses and QA of actuarial forms for the FCHLPM project. Mahmoud has three MSc in Structural, Earthquake, and Electrical Engineering and a PhD in civil and environmental engineering from University of Southern California where he developed numerical algorithms for fast computational analysis of nonlinear systems with uncertainties. Mahmoud has published many journal and conference papers in the field of Structural Control and is a licensed Professional Engineer in state of California.

Hurricane Project Responsibilities: QA of actuarial forms

Vidya Karthigeyan, Supervisor Software Development

Mrs. Karthigeyan has a MSc in business administration degree in computer information systems from California State University, East Bay and MS in software systems from Birla Institute of Technology and Science, Pilani, India. In the past she worked for Geometric Software Solutions Co. Ltd. in India for four years. At Moody's, Mrs. Karthigeyan works on software components of RiskLink product.

Hurricane Project Responsibilities: Enhancements to the software components associated with data generation for the hurricane model

Chana Keating, Associate Director Manager, Model Development

Chana joined Moody's in 2015 as part of the acquisition of HWind Scientific, LLC. With Moody's, Chana has remained a part of the HWind group and managed the real-time HWind operations. Chana now assists with historical reconstructions for the North Atlantic Hurricane Models. Chana earned a BS degree in Meteorology from North Carolina State University and an MSc degree in meteorology from Florida State University.

Hurricane Project Responsibilities: Development of historical footprints

Shree Khare, PhD, Senior Director, Modeling

Shree has been working in the London model development group since 2006, and in that time has worked on a variety of projects, including hurricane wind model development, uncertainty quantification, catastrophe response, correlation calibration, and clustering in the North Atlantic Hurricane and Europe Windstorm Models. He also led the development of the Moody's RMS Japan Typhoon HD Model and various other Asia typhoon models. Shree worked at Hiscox for 3 years as the group head of catastrophe research. Shree returned to Moody's in 2020, and now leads the climate change team, looking after climate change conditioned models, global modelling and emissions estimation. Prior to joining Moody's, Shree completed two postdoctoral research fellowships: one at the Statistical and Applied Mathematical Sciences Institute (SAMSI) in Research Triangle Park, NC, and the second at the National Center for Atmospheric Research (NCAR) in Boulder, CO. Shree has a BS in honors physics from the University of British Columbia, and a PhD from the atmospheric sciences program at Princeton University with specialization in ensemble data assimilation. Shree also has a Masters in Mathematical Finance from University of York and completed a dissertation on stochastic volatility in European options pricing. He has numerous peer reviewed journal publications on data assimilation and risk modeling.

Hurricane Project Responsibilities: Wind model development and clustering

Veena Krishnamoorthy, Lead Modeler, Model Development

Veena received her MSc in physics from Madurai Kamaraj University. She has been with Moody's since 2010 in the analytics QA department working on the financial model QA team.

Hurricane Project Responsibilities: Quality assurance for RiskLink

Jenny Lu, Senior Software Development Engineer, Software Development

Ms. Jenny Lu has an MS degree in computer science specialization in software design and development. Jenny joined Moody's in 2013. Prior to Moody's, she has more than 15-years industry experience. For Moody's, Ms. Jenny Lu works on financial model engine software components of the RiskLink and RiskBrowser products and reports.

Hurricane Project Responsibilities: Financial Model implementation; report implementation

Manabu Masuda, P.E., Senior Director, Model Development

Mr. Masuda has a BS and an ME degree in engineering from Kobe University, and an MS in civil engineering from Stanford University. For Moody's, Mr. Masuda has been engaged in multiple risk models including Japan earthquake, Mexico earthquake, and China typhoon. Specifically, for the Version 11.0 U.S. hurricane update, he developed the Industrial Facility Model and the Builders Risk Model. He is also responsible for the maintenance of complex relational databases, client services, and QA of various data layers.

Hurricane Project Responsibilities: Development and QA of the vulnerability module

Nicolas Joss Matthewman, PhD, Senior Director, Product Management

Joss Matthewman rejoined Moody's in 2020 as Senior Director of Climate Change Product Management. Prior to this Joss was Group Head of Catastrophe Exposure Management at Hiscox, responsible for natural catastrophe, war, terror and political violence exposure management and reporting across the group. Before joining Hiscox, Joss spent seven years in model development at Moody's where he worked on the Moody's RMS North Atlantic Hurricane Model and Moody's RMS Asia Typhoon Models, before being appointed Head of Storm Surge Modelling. During this period Joss was a member of the Bank of England's Prudential Regulation Authority working group on climate change in the insurance industry. Prior to entering the insurance industry Joss obtained a PhD in Applied Mathematics from UCL and worked as a postdoctoral researcher in climate science at the University of California, Irvine. His published areas of research include stratospheric sudden warmings, and the impact of sea-ice on global atmospheric teleconnections.

Hurricane Project Responsibilities: Updating the modeled hurricane landfall rates and development of historical footprints and binary files creation

Rohit P. Mehta, Director, Model Development

Mr. Mehta has a BE degree in civil engineering from Delhi College of Engineering, India and an MS in statistics from California State University Hayward. He joined Moody's in 2000 and is primarily responsible for implementation, validations, and data management for various models. Prior to joining Moody's, he gained four-years' experience in the testing, validation, and vulnerability implementation for various models.

Hurricane Project Responsibilities: Implementation, validation, testing, quality assurance, and data management

Akwasi Mensah, PhD, Lead Modeler, Model Development

Akwasi joined Moody's in June 2015 and holds a PhD in civil engineering from Rice University, Houston, where he researched risk assessment of infrastructural systems under hurricane forces. He also earned an MSc from University of Florida, Gainesville, with research focus on wind force interactions with low-rise, wood-framed structures. Since joining Moody's, Akwasi has worked on several claim analysis projects, and has done extensive research on wind vulnerability of residential and commercial buildings. As part of the Moody's field reconnaissance team, he also investigated the impacts of hurricane Matthew (2016) in Florida and Georgia, Harvey (2017) in Houston, and Maria (2017) in Puerto Rico.

Hurricane Project Responsibilities: Research on secondary modifiers and vulnerability development; implementation of secondary modifiers; claim analysis; testing of the vulnerability component of software

Charles Menun, Consultant, Model Development

Dr. Menun joined Moody's as a lead vulnerability engineer in 2005 after spending five years as a faculty member in the Department of Civil and Environmental Engineering at Stanford University, where his

research focused on the development of probabilistic methods for safety and performance assessment in earthquake engineering. Prior to joining Stanford, he worked for six years as a licensed structural engineer in Canada, where he supervised the structural design of residential and commercial high-rise buildings in the Greater Vancouver area. His responsibilities at Moody's include overseeing the development of hurricane and earthquake vulnerability models. Since July 2009, Dr. Menun has provided his services to Moody's as a full-time consultant. Dr. Menun holds bachelor's and master's degrees in civil engineering from the University of British Columbia and earned his doctoral degree in structural engineering from the University of California at Berkeley.

Hurricane Project Responsibilities: Development and calibration of the vulnerability module in RiskLink 11.0

Christos Mitas, PhD, MD Analytics & Modeling, Model Development

Based in London, Christos leads the Moody's climate hazards modeling teams researching and developing modeling frameworks and solutions for the re/insurance industry.

He has worked at Moody's since 2006 developing mathematical models of catastrophic risk from natural and man-made perils, including the Cyber Accumulation Management System (2016, 2017), Cyber Solutions (2018), typhoon models for South Korea and Taiwan (2016), probabilistic flood maps for Taiwan (2015) and South Korea (2014), the Europe Windstorm Models (2011), and the U.S. and Canada Winterstorm Models (2008). He has also researched and developed efficient and scalable computational modeling frameworks.

Before joining Moody's, Christos worked as a post-doctoral associate and an assistant scientist at the University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS) from 2003 to 2006. He holds a PhD in atmospheric sciences from the Dept. of Atmospheric Sciences of the University of Illinois at Urbana-Champaign. He earned a MSc degree from the Dept. of Atmospheric Sciences of the University of Wyoming. Christos' bachelor's degree is in mathematics from the Aristotle University of Thessaloniki, Greece.

Hurricane Project Responsibilities: Review of model components

Rakesh Mohindra, PhD, Director, Model Development

Dr. Rakesh Mohindra received a PhD degree in earth sciences (applied geology) from the Indian Institute of Technology, Roorkee, India in 1989. Before joining industry (Moody's), he carried out quality research work for more than 10 years in the inter-disciplinary fields of paleo-seismology, tectonics and historical geomorphology and published many research papers. Some of his research works in paleo-seismicity and historical geomorphology are well cited. During the last 14 years, working with Moody's/RMSI, Dr. Mohindra played a key role in the development of the Moody's RMS fire following earthquake model for the U.S. and Canada, and the India Earthquake Model. Besides Moody's models, he has also developed country level probabilistic loss models for Romania, Iran, Maldives, Southeast Europe, Yemen and Morocco under World Bank and UNDP consulting projects. The last two years he has been associated with model certification teams, and involved in independent, white box RiskLink model updates testing before the market release.

Hurricane Project Responsibilities: Responsible for model certification and testing

Gilbert Molas, PhD, Vice President, Model Development

Dr. Molas is leading the model certification and model implementation teams within model development at Moody's. His primary technical duties are to develop earthquake and climate stochastic models. He is also actively involved in several technical aspects of Moody's worldwide risk models including calibration, validation, and product implementation. He has been a major contributor to the development of earthquake

and windstorm models for the North America, Central and South America, Japan, Europe, and New Zealand, including securitization projects for these models. Before joining Moody's in 1995, Dr. Molas graduated *Cum Laude* from the University of the Philippines, with a BS in civil engineering. He received his MS and PhD in civil engineering from the University of Tokyo in 1995, where he developed new earthquake ground motion attenuation relations and damage estimation techniques using Neural Networks. He has worked on catastrophe risk model development for more than twenty years.

Hurricane Project Responsibilities: Responsible for model certification and testing

Robert Muir-Wood, PhD, Chief Research Officer, Science and Technology Research

Robert Muir-Wood heads up research and development efforts at Moody's. Robert joined Moody's in 1996 and has developed probabilistic catastrophe models covering earthquake, tropical cyclone, windstorm, and flood for Europe, North America, Australia, and Japan. Author of eight books, many scientific publications, and more than 150 articles, he has been the technical lead on a number of catastrophe risk securitization transactions, and was lead author for the 2007 IPCC Fourth Assessment Report and 2011 IPCC Special Report on Extremes, and is Chair of the OECD panel on the Financial Consequences of Large Scale Catastrophes. He is also Chair of the OECD High Level Advisory Board of the International Network on Financial Management of Large-Scale Catastrophes. He holds a degree in natural sciences and a PhD both from Cambridge University and is a Visiting Professor at the Institute for Risk and Disaster Reduction at University College London.

Hurricane Project Responsibilities: Advisor on science and technical issues

Ian Mutschler, Hurricane Analyst, Model Development

Ian Mutschler joined Moodys in early 2023 as a hurricane analyst. He worked in Hwind's real-time operations, producing snapshots of hurricane wind-fields during the 2023 and 2024 NATL and EPAC hurricane seasons. Ian has developed a new data feed to be used in real-time and historical wind field creations that retrieves and decodes wind data from the Synthetic Aperture Radar (SAR) platform. He has helped develop a tool to search the 30,000+ archived wind-field snapshots based on various user-defined filters. Most recently, he developed historical footprints based on newly released reanalysis data. Ian has earned a BS degree in meteorology from Florida State University and is currently a first year MS student in meteorology at Florida State University.

Hurricane Project Responsibilities: Development of historical footprints

Matthew Nielsen, Senior Vice President, Government and Regulatory Affairs

Mr. Nielsen holds an MS degree in atmospheric science from Colorado State University and a BA degree in physics from Ripon College in Wisconsin. Matthew liaises with U.S. regulators to establish open channels of communication around Moody's models and solutions. He previously supported the product marketing and business development activities for the Moody's U.S. and Canada climate hazard peril models and derivative products and serves as lead contact for Moody's in the submission to the Florida Commission on Hurricane Loss Projection Methodology. He is a member of the American Meteorological Society (A.M.S.) and has authored and presented technical papers at several A.M.S. conferences. He has been with Moody's since September of 2005.

Hurricane Project Responsibilities: Lead contact for Moody's with the Florida Commission on Hurricane Loss Projection Methodologies.

Geoffrey R. Overton, Senior Modeler, Software Development

Geoffrey has a diploma in geography from the University of Nebraska, Omaha. For Moody's, Mr. Overton develops, manages, and tests data for the geocoding module and related components.

Hurricane Project Responsibilities: Geocoding data implementation and management, testing of related software and data issues in support of the hurricane model

Narvdeswar Pandey, Lead Modeler, Model Development

Mr. Pandey joined Moody's in 2004. He has completed an MS in future studies and planning from Devi Ahilya University, Indore, India, and another MS in mathematics from Gorakhpur University, India. He was involved in creating regression dataset for testing in RiskLink, and profile generation and internal tool development for creating regression dataset. He has also performed model QA for India Earthquake Model and currently involved with Europe Earthquake Model QA.

Hurricane Project Responsibilities: Involved in model implementation and QA of geocoding, hazard, and vulnerability files

Ghanshyam Parasram, Senior Director, Software Development

Mr. Parasram has a bachelor's degree in mechanical engineering from Jawahar Lal Nehru Technological University, India. He has over 10 years of experience in design and development of software applications using object oriented technologies. Prior to joining Moody's in 2006, Mr. Parasram worked as software manager for the business services group at Moody's, managing software development for the application logic and workflow layer in RiskLink and Risk Browser products. Between August 1997 and June 2000, Mr. Parasram worked as a development manager at Liquid Software Inc., building enterprise application integration systems that provide integration solutions to PeopleSoft and SAP. Prior to that, he worked at CMC India, developing financial applications for the banking industry. At Moody's, Mr. Parasram's primary role is to manage software and data development for the international geocoding component in RiskLink and RiskBrowser products.

Hurricane Project Responsibilities: Managing software development for the geocoding component in RiskLink and RiskBrowser products

Viraj Patil, Staff Software Development Engineer, Software Development

Viraj has an MS degree in Computer Science from California State University Long Beach. He joined Moody's in 2016. He has a total of 12 years of programming experience. Viraj works on the detailed loss models and infrastructure related development of RiskLink and RiskBrowser.

Hurricane Project Responsibilities: Financial model implementation

Matthew Pinkowski, Assist. Vice President, Government, Public, and Regulatory Affairs

Mr. Pinkowski holds a BA in Political Science from the University of Kentucky. He acts as the lead contact for Moody's RMS in the submission to the Florida Commission on Hurricane Loss Projection Methodology. He also supports Moody's RMS regulatory education outreach. Matt joined Moody's in 2023. Previously he held the position of Global Regulatory Compliance Manager for a large multinational corporation.

Hurricane Project Responsibilities: Lead contact for Moody's with the Florida Commission on Hurricane Loss Projection Methodologies.

Sudha Raghavan, Senior Director, Software Product Management

Sudha is a senior SQL server database administrator and developer who joined Moody's in 2008. She is involved in database data model implementation and database optimization, performance and scalability efforts. Prior to Moody's, Sudha has 11 years of industry experience working on various database technologies.

Hurricane Project Responsibilities: Data model implementation and database optimization, performance and scalability efforts

Mohsen Rahnama, PhD, Chief Risk Modeling Officer and Executive Vice President

Mohsen leads the model development team responsible for the creation of catastrophe models at Moody's. He has participated in and been project lead in the development of many Moody's models. Mohsen was involved with the development of several major models, including RiskLink 11.0 models, Offshore Platform, IFM and Builders Risk models. He oversaw the development of the 2009 earthquake models for North, Central, and South America. Mohsen has over 25 years of experience in the field of earthquake engineering, seismic structural analysis and design, building performance evaluation, catastrophe modeling, and risk assessment. He earned his MS, engineer's degree, and PhD from Stanford University specializing in earthquake and structural engineering.

Hurricane Project Responsibilities: Advisor on development and upgrade of hurricane vulnerability and inventory models

Edida Rajesh, Senior Director, Model Development

Rajesh has a Master of Technology in Geophysics from Andhra University, Visakhapatnam, India and has been working with Moody's since 1996. He leads model development in India and is responsible for geospatial based analysis, developing hazard data products consumed by both natural catastrophe models and underwriting solutions. Rajesh's experience includes analyzing the requirements, project specification, coordination, and providing industry-standard solutions in developing hazard data products.

Hurricane Project Responsibilities: Developing land-use land-cover (LULC) data for study area using satellite images and GIS analysis, site and topo coefficients

Emilie Scherer, PhD, Associate Director, Model Development

Dr. Scherer has been involved in various components of the hazard model including historical reconstructions, landfall rates, update, and model validation. Prior to joining Moody's in 2009, she conducted postdoctoral research in geophysical fluid dynamics applied to the atmospheric and oceanic sciences at the Laboratoire de Meteorologie Dynamique in Paris, France and at the Laboratoire des Ecoulements Geophysiques et Industriels in Grenoble, France. Dr. Scherer received a PhD in meteorology, oceanology, and environment from the University Pierre and Marie Curie in Paris, France. Dr Scherer has been successively an employee and a full-time consultant to Moody's, and she rejoined Moody's in September 2023.

Hurricane Project Responsibilities: Development of historical footprints, hazard model validation, binary hazard files creation, hazard aggregation and update of the modeled hurricane landfall rates

Richa Sharma, Senior Software Development Engineer, Software Development

Richa joined Moody's in September 2010. She has a bachelor's degree in information technology from Uttar Pradesh Technical University, India. Since joining Moody's, she has been actively involved in installation, performance and regression testing of RiskLink and RiskBrowser for every release. She is responsible for

the testing of different aspects of RiskLink and RiskBrowser applications including user interface, business components, functionalities, and databases.

Hurricane Project Responsibilities: Testing installation of RiskLink software

Nilesh Shome, PhD, Vice President, Model Development

Nilesh joined Moody's in 2009 as a director in the model development group. He is involved in developing and reviewing vulnerability functions of residential and commercial structures for U.S. hurricanes as well as vulnerability functions of tall buildings for western U.S. earthquakes. Nilesh has more than 10 years of professional experience in loss estimation of hurricanes, earthquakes, floods, winter storms, and other natural hazards as well as man-made hazards like terrorism. Prior to joining Moody's, he managed a number of projects to develop and update models for earthquakes, hurricanes, and winter storms. He has also worked on several projects for securitization of risks for earthquakes and hurricanes and a number of world-bank projects to evaluate risks of different countries for earthquakes and hurricanes. Nilesh has also worked as a consultant to Federal Emergency Management Agency (FEMA) and Applied Technical Council (ATC). He has authored several publications in international journals and refereed conferences, and is a technical reviewer and editor of a number of papers for several journals. He received the EERI award for the best journal paper in the year 1998. Nilesh earned his PhD in structural engineering from Stanford University.

Hurricane Project Responsibilities: Involved in developing vulnerability functions of residential and commercial structures

Kim Shuss, Principal, Program Management - Technical

Kim joined Moody's in 2013. She is responsible for the coordination and delivery of climate models such as: Europe windstorm, North Atlantic hurricane, and other projects. Prior to joining Moody's, she was a senior supply chain manager at Oracle, and Operational Planning Manager at Sun Microsystems.

Hurricane Project Responsibilities: Project Management for model release

Bronislava Sigal, PhD, Director, Model Development

Ms. Sigal received her BS degree (with honors) in mathematics from Kiev State University in Ukraine and PhD in statistics from Stanford University.

She joined Moody's in March of 2009. After joining Moody's as a part of the model development team Ms. Sigal worked on projects related to terrorism, account fire, and offshore platform Moody's models. Currently Ms. Sigal is a part of the financial modeling group. Prior to joining Moody's, she worked in the field of catastrophe modeling at K2 Technologies and after that at Stanford University as a biostatistician on stochastic modeling in cancer research.

Hurricane Project Responsibilities: Financial modeling

Ankita Singh, PhD, Assistant Director, Model Development

After completing her PhD in Applied Statistics from Utkal University, Ankita became a part of Moody's in July 2018. Her doctoral research, conducted in partnership with IIT Delhi, focused on developing statistical techniques for forecasting rainfall during the Indian summer monsoon. Since joining Moody's, she has worked on the development of models for modeling tropical cyclone rainfall for Vietnam, and further contributing to the North Atlantic Hurricane Models.

Hurricane Project Responsibilities: Hazard model validation

Ajay Singhal, PhD, Senior Vice President, Model Development

Ajay leads the financial modeling group at Moody's and joined Moody's in 2002. He has been involved in the development of hazard, vulnerability, and financial models for these perils. At Moody's, he has been leading teams for the development of the various models such as the terrorism model for estimating losses from various man-made catastrophes, offshore platforms model for hurricane loss analysis to offshore oil and gas platforms, fire risk analysis for estimating losses from accidental and arson fires, and the fire following earthquake model. Ajay holds a BTech degree from the Indian Institute of Technology, Madras (India), an MS in civil engineering from Rice University, Houston, Texas, and a PhD in civil engineering from Stanford University, California specializing in probabilistic loss estimation.

Hurricane Project Responsibilities: Managing financial model development for RiskLink

Puja Sinha, Staff Product Manager, Software Product Management

Ms. Sinha has a bachelor's degree in electrical engineering from Nagpur University, India. Puja joined Moody's in 2007. Prior to joining Moody's, she has 3 years of experience in software development. At Moody's, Ms. Sinha works on RiskLink, RiskBrowser, RiskTools, and RiskOnline. Her responsibilities include software planning, designing, and implementation.

Hurricane Project Responsibilities: Software development

Jayant Srivastava, Vice President, Software Development

Mr. Srivastava has an MS in computer science from the Institute of Management and Technology, India. For Moody's, Jayant is managing the business services development group and develops software enhancements and fixes for various functionalities of core applications.

Hurricane Project Responsibilities: Job distribution framework for RiskLink

Beth Stamann, Senior Documentation Specialist, Model Product Management

Beth joined Moody's in August of 1995. She worked within the client development organization until October 2007 when she moved to the public policy group as senior documentation specialist. Beth is currently part of the model knowledge management group where her responsibilities include production and publishing of peril model documentation.

Hurricane Project Responsibilities: Assists in the production of Moody's submission to the FCHLPM

Carlin Starrs, Senior Analyst – Modeling, Risk Analytics

Carlin received her Master of Forestry degree from the University of California, Berkeley. Her research explored annual wildfire probability in California across ownership, firefighting, and land management strategies. Prior to receiving her masters, Carlin worked for the Society of American Foresters in certification, outreach, and education and at Berkeley Forests as a policy analyst in forest carbon and wildfire. Carlin joined Moody's in 2018 on the risk analytics team, where she primarily works on data engineering and analytics to support model development and customer success.

Hurricane Project Responsibilities: Generation, automation, and documentation of actuarial, statistical, and vulnerability forms

Derek Stedman, Principal Modeler, Model Development

Derek joined Moody's in February 2014. He has since worked on the North Atlantic Hurricane Models and the Moody's Marine Cargo Model. Currently he is responsible for claims analysis used for vulnerability calibration and building code research. Derek has also been involved in field reconnaissance for the Louisiana flooding; (2016) and hurricanes Matthew (2016), Harvey (2017), Irma (2017), Florence (2018) and Michael (2018). Prior to joining Moody's, Derek earned his master's degree in civil and environmental engineering from University of Western Ontario, Canada (UWO), where he focused on the area of wind engineering culminating with two full scale experiments to apply a simulated wind load to a two-story residential building.

Hurricane Project Responsibilities: Building code research; hurricane claims analysis; implementation of the vulnerability functions; testing of the vulnerability component of software

Lindsay Stone, Model Specialist, Regulatory Analytics

Lindsay Stone holds a MS degree in Geography with a specialization in hydrology from Wilfrid Laurier University, where she studied the impact of permafrost degradation on seasonal peatland flooding in the Canadian Northwest Territories. She joined Moody's in 2018 as a model analyst in the knowledge center, where she addressed client inquiries on the Moody's RMS suite of global flood models and the North Atlantic Hurricane model. Lindsay also supported multiple consulting engagements with financial entities on understanding the residential risk to flooding in the United States. Lindsay currently works in the Regulatory Analytics team and is responsible for creating and defending collateral in support of Moody's regulatory submissions.

Hurricane Project Responsibilities: Generation, automation, and QA of actuarial, statistical, and vulnerability forms

Anudeep Sure, PhD, Lead Modeler, Model Development

Anudeep joined Moody's in September 2021 and has been working on land use land cover development using multiple datasets at the country level for multi-peril model development and exposure downscaling. Anudeep is primarily responsible for the development of the product with the highest level of accuracy. Before joining Moody's, Anudeep worked in two organizations, an international research organization, CIMMYT-CGIAR, and a private organization - Skymet Weather Services, where he focused his work on machine learning-based agriculture models for climate-smart agriculture and the insurance-banking sector. Anudeep has done his PhD in remote sensing-based soil moisture assessment from the Indian Institute of Technology Kanpur, India, and an MTech in remote sensing from the Indian Institute of Remote Sensing, ISRO, India.

Hurricane Project Responsibilities: Preparation and quality assessment of land use and land cover data for multiple geographies

Avinash Takale, Manager, Software Development

Mr. Takale has a master's of computer applications from Shivaji University, Maharashtra, India. Prior to Moody's, he has worked for seven years for software companies developing various desktop and enterprise applications. For Moody's, Mr. Takale works mainly in the geospatial area where he is involved in different aspects of hazard data management and retrieval for RiskLink.

Hurricane Project Responsibilities: Implementation of migration of high resolution (spatial) hazard lookup from C++ to C# .NET and migration of hurricane hazard tabular lookup from MS Access to SQL

Joel Taylor, Director, Model Development

Mr. Taylor has a BS degree in mathematics from Bradley University, Peoria, Illinois. He joined Moody's in April 2007. After completing the risk analyst program, he joined the mitigation and regulatory affairs group. Mr. Taylor participated in post-hurricane reconnaissance visits after hurricanes Gustav (2008) and Ike (2008).

Hurricane Project Responsibilities: Generation and QA of actuarial, statistical, and vulnerability forms

Srinivas Thupakula, Lead Modeler, Software Development

Mr. Srinivas has a BS degree in civil engineering from the Indian Institute of Technology Kanpur, India. He joined Moody's in September, 2011. Prior to joining Moody's, Srinivas worked with the National Geophysical Research Institute in India to develop technologies for fault plane mapping and characterizing microseismicity in India and simulating design accelerograms for the Nuclear Power Corporation of India Ltd. At Moody's, Srinivas has worked on exposure modeling for various perils, catastrophe response, and is the build data manager for RiskLink 15.0.

Hurricane Project Responsibilities: Build data manager for RiskLink 15.0

Monika Tomar, Manager, Software Development

Ms. Tomar completed her master's degree in computer applications in 2003 from Bundelkhand University, Jhansi, India. Ms. Tomar has over 11 years of experience in software design and development of software solutions.

Hurricane Project Responsibilities: Previously involved in RiskLink financial model software

Barrett Travis, Senior Analyst, Risk Analytics

Barrett joined Moody's in 2018 after earning his MS in civil and environmental engineering at Stanford University with a focus on environmental fluid mechanics and hydrology. As a senior analyst with the risk analytics team he has contributed to a number of internal model development/validation and client engagement projects involving the Moody's U.S. Flood HD Model and the North Atlantic Hurricane Models.

Hurricane Project Responsibilities: Generation, automation, and documentation of actuarial, statistical, and vulnerability forms

Vahid Valamanesh, Lead Modeler, Model Development

Vahid joined the Americas' climate peril vulnerability group at Moody's as a senior modeler in April 2016 and is the architect of the component-based analytical flood vulnerability module for residential and commercial buildings to be used in the probabilistic U.S. flood and North Atlantic hurricane storm surge models. As part of the Moody's field reconnaissance team, he performed post-event damage assessments after Louisiana floods (2016), and Hurricane Matthew (2016) in the Carolinas. Vahid has a PhD in civil and environmental engineering from Northeastern University, where he developed a probabilistic model for analysis of extreme environmental conditions on offshore wind turbines in the Atlantic.

Hurricane Project Responsibilities: Research on wind, surge, and flood vulnerability

Yogesh Vani, Director, Software Development

Yogesh has an MS in telecommunication systems from California State University, Hayward. For Moody's, he has worked on RiskLink installation and platform testing. In the past, Yogesh has also worked on remote

distributed processing testing. His responsibilities include testing RiskLink installation across multiple OS platforms and SQL server combinations.

Hurricane Project Responsibilities: Testing installation of RiskLink software and DLM data

Rajkiran Vojjala, Vice President, Model Development

Raj leads the engineering and exposure groups worldwide for Moody's property models – hurricane, storm surge, offshore wind and wave, tornado, hail, flood, wildfire, and earthquake risks. Over the last 11 years, Raj has been involved in the design and development of several probabilistic risk models and model components at Moody's. Raj was the architect of the offshore platform model to quantify hurricane risks from wind and waves to oil and gas platforms in the Gulf of Mexico as part of the Version 11.0 North Atlantic Hurricane Models release. More recently, he led the U.S. Severe Convective Storm Model update, focusing on vulnerability and correlation of tornado, hail, and straight-line wind risks. In the last few years, Raj has led the research on wind vulnerability aspects through detailed claims investigation of past storms, field reconnaissance, and damage surveys after hurricanes Irene (2011), Sandy (2012), Matthew (2016), Irma (2017), etc. He holds an MS in civil engineering from Stanford University and is an associate member of the Structural Engineering Association of Northern California and the American Society of Civil Engineers.

Hurricane Project Responsibilities: Development lead for the vulnerability component of North Atlantic Hurricane Models version 17.0; vulnerability signatory (Version 15.0 and Version 17.0)

Jeffrey Waters, Director, Model Product Management

Jeff joined Moody's in 2011 upon completion of an MS degree in meteorology from The Pennsylvania State University, where he studied large-scale diagnostics of tropical cyclogenesis potential in the Atlantic Basin using environmental variability metrics and logistic regression models. As the product manager of the North Atlantic Hurricane Models, he is responsible for ensuring the product's commercial success and technical specifications. Prior to his role as a product manager for the hurricane models, Jeff was product manager of the Moody's RMS U.S. and Canada Severe Convective Storm and Winterstorm models, as well as the HWind suite of real-time tropical cyclone analytics. Jeff is a member of the American Meteorological Society and the U.S. Reinsurance Under 40s Group, Inc.

Hurricane Project Responsibilities: Product management of Moody's North Atlantic Hurricane Models

Hugo Winter, Senior Cyclone Hazard Modeler

Hugo holds a PhD from Lancaster University in Statistics and Operational Research. His PhD focused on developing new statistical methodology for extreme value modelling of heatwaves across Europe and Australia. He joined Moody's as a Cyclone Hazard modeler in July 2020 where his main role has been researching and building statistical models for tropical cyclones in the Model Development team.

Hurricane Project Responsibilities: Assisting with preparation of submission material for statistical forms

Xiaoning Wu, PhD, Assistant Director, Model Development

Dr Wu joined Moody's in 2021 upon completing her PhD studies. Her research expertise includes the statistical and numerical modelling of tropical cyclones, particularly with high-resolution global climate models. For the North Atlantic Hurricane Model, she contributes to developing and implementing the Historical Reconstructions. Dr Wu holds a PhD in marine and atmospheric science from the State University of New York at Stony Brook, US, an MSc in geography specializing in natural hazards from Beijing Normal University, China, and a BSc in atmospheric science from Sun Yat-sen University, China.

Hurricane Project Responsibilities: Development of historical footprints

Michael Young, Vice President, Model Product Management

Mr. Young holds an MSc from the University of Western Ontario in Canada where he studied wind loading on low-rise buildings. He has worked in commercial wind tunnel laboratories doing studies on wind loads for a variety of buildings. Before joining Moody's, he worked as a modeler at Applied Research Associates on hurricane vulnerability risk models. He was involved in the development of the HAZUS-MH software for hurricane risk assessment and studies on mitigation cost-effectiveness for building codes, such as the 2001 Florida Building Code and the North Carolina Building Code. Mr. Young has conducted post-hurricane reconnaissance visits after hurricanes Bonnie (1998), Isabel (2003), Charley (2004), Frances (2004), Ivan (2004), Jeanne (2004), Gustav (2008), and Ike (2008). He is a member of the American Society of Civil Engineers and the American Association of Wind Engineers.

Hurricane Project Responsibilities: Oversees product specifications for Moody's climatic models including the North Atlantic Hurricane Models, oversees regulatory certification process

APPENDIX C – EXTERNAL EXPERT REVIEW OF HAZARD MODULE

28 October 2010

Vincent Daniel

Risk Management Solutions

Peninsular House, 30 Monument Street

London EC3R 8NB, UK

Subject: External Expert Review of Hazard Module of the RiskLink 11.0 North Atlantic Hurricane Model

Mr. Daniel,

The following summary reviews the Hazard Module Component of the RMS RiskLink 11.0 North Atlantic Hurricane Model (NAHU). The analysis is based upon 10 days of direct meetings with the NAHU team, significant inquiry during and following the meetings, and independent research, over a period of 18 months.

a. Overview

The latest version of the RMS NAHU model is sound, incorporates numerous developments in the science since the last version, and based upon statistical analysis of the performance, appears to be a considerable improvement in bias reduction. Key state of the art science additions to the model include:

- i. The incorporation of an improved inland decay model that models much more correctly the rate of decay inland
- ii. The use of the H*Wind dataset archive to more correctly capture the variability in two-dimensional wind structure observed within hurricanes
- iii. The use of the extended best-track dataset to inform the NAHU of the size climatology of hurricanes
- iv. A component upgrade with regard to the handling of extra-tropically transitioning hurricanes, which has shown a marked improvement in historical wind footprint across New England
- v. The incorporation of potential intensity theory to ensure that the stochastic set does not include storms that are physically unjustified given the upstream ocean energy source

- vi. The use of numerical modeling (WRF) to aid in the calibration of inland decay and extratropical transition timing, without relying on WRF modeling in areas where it is not suited

More detailed evaluation of each component of the NAHU model follows next.

b. Track modeling

The track modeling component of the model uses techniques that ensure the stochastic set produces a climatology similar to the best-track, while (necessarily) permitting a distribution of hurricane track more broad than observed. The seasonal and annual variability of the historical record of motion is incorporated into the track modeling. The model for over water intensity is based initially upon central pressure rather than maximum wind speed. This choice is among the most important. Central pressure is arguably more stable over short time periods, more easily observed and verifiable, and doesn't suffer from measurement uncertainty as much as maximum wind speed. RMS has chosen to use the satellite era (1979-) for the intensity training, which has the effect of limiting the training period compared to the longer track period, but also ensures a more confident historical intensity record subset. Further, RMS's approach is to model temporal change in pressure rather than explicit pressure. This has the benefit of being more directly tied to the dynamics of the hurricane, since changes in pressure (rather than pressure per se) are associated with wind field changes. As a consequence of the choice of modeled variable, maximum wind speed must then be determined parametrically based upon central pressure as well as environmental pressure.

The improvement of extratropical transition representation within the track model is a considerable advance forward, in particular for correct modeling of New England landfalls. Consequently, the new model provides a more consistent and more accurate risk estimate across the region. RMS had a challenging decision regarding how to address transition, however. While transition is included within the best-track dataset, it is a binary operator – when in fact science has shown over the past decade that transition is not instantaneous. Further, the transition flag is not well-defined as being at the start of transition or the end. Conversely, it is not feasible (nor desirable) to run WRF model simulations for every member in the stochastic set to attempt to objectively determine transition period (such as might be done using the Hart [2003] framework). RMS wisely chose a compromise of these two approaches. Through a WRF simulation of 39 historical storms over the past two decades, the best-track timing of instantaneous transition was compared to the objective transition period as defined by the cyclone phase space. This intercomparison revealed that the transition flag in the best-track dataset is more consistent with the end of transition than the beginning. Using this benchmark, RMS then modeled the transition period leading up to the end-point, and was able to produce a broad distribution of transition periods that permits the inclusion of very slow transitioning to very fast transitioning storms, as we observe in nature. Finally, potential intensity theory is appropriately relaxed for transitioning storms, to permit New England landfalling hurricanes to have intensities considerably beyond their potential intensity – as a function of their forward movement.

RMS has utilized the extended best-track dataset (DeMuth et al. 2006, 2009) to model the radius of maximum winds. Although the extended best-track has its limitations (such as the fact that size parameters in the absence of recon may often be based on climatology), it is the only extended dataset that provides such size parameters. Future revisions of the NAHU model may wish to limit their use of the extended best track to the subset of storms where recon flights were known to have sampled the storms. Nonetheless, the use of the extended best track brings in a reasonable climatology of storm size. For transitioning storms, WRF simulations (combined with the EBT) were used to more accurately capture the variability in radius of maximum winds – this has the effect of much more accurately capturing the wind swath across New England during transitioning landfalls.

Using research recently published in Monthly Weather Review by NAHU scientists at RMS, RMS simulated thousands of landfalling storms in WRF. The rate of filling after landfall was validated against best-track, and the distribution of stochastic filling rates is a smoothed distribution of the best-track. The consequence of this more appropriate filling is that prior biases on inland damage have been significantly corrected. The ratio of observed inland loss to modeled loss is much closer to unity than in the prior version of this model.

c. Wind field modeling

Two dimensional wind fields from hurricanes are among the most difficult fields to acquire, as the observations leading to them are sparse, from various levels, and instruments. RMS has decided to utilize the H*Wind (Powell) archive of wind fields to produce a parametric model for wind field modeling. While H*Wind is not perfect, it does represent the most complete and reliable database of two dimensional hurricane wind fields. RMS chose to parametrically represent a 629 snapshot (among 46 storm) sample of the H*Wind database using a modified Willoughby (2004, 2006) model, which is a wise choice as it permits more degrees of freedom in storm structure. Further, the Willoughby model captures the strong gradients of wind around the radius of maximum winds more clearly, although it tends to underestimate the far field wind. Given the damaging winds are obviously focused more around radius of maximum winds, the far field biases (compared to H*WIND) are not a major concern. RMS chose to further improve the fit to H*WIND fields by modifying Willoughby to add an additional degree of freedom. It is recommended to RMS that this modification—and its evaluation—be published in peer reviewed literature. Finally, two dimensional detail is then added to the modified Willoughby radial profile by capturing the remaining unexplained variance in the H*WIND archive using principal component analysis (PCA). The resulting wind field has an unexplained cross-validation variance for historical storms that is significantly reduced compared to the other models.

d. Roughness modeling

The new version of NAHU has an improved roughness model that leads to several important improvements in realistic modeling of the details of the wind risk across a surface with varying roughness. These important improvements were the result of incorporating new datasets and science since the prior version of the model. Specifically, the use of ASTER imagery in Florida and all U.S. metropolitan regions has lead to a more realistic and consistent surface roughness database. Secondly,

following the key science results of Powell (2003; Nature), RMS reduced the surface roughness over water to be consistent with that work. Finally, RMS utilized an improved method to aggregate the roughness factors from satellite pixels to the model grid cells. This aggregation method ends up producing a smoother risk map (compared with the current model) that is in better qualitative agreements with patterns derived from location-level claims data. Through the use of observation data more directly, the new model avoids the application of the Cook paradigm to a scale (local) where it is no longer as valid. The results are regional and local estimates of damage that are more consistent with claims data and also have less very small scale inconsistency. While there remains certain aspects of surface roughness that cannot be captured (such as Bernoulli-driven accelerations on the building-scale as well as topographic speed up over complex terrain [Miller and Davenport 1998]), these latter factors are of such a complex and small scale (and depend so heavily on detailed wind direction) that they cannot yet be accounted for in any risk model.

e. Landfall calibration

RMS incorporates the use of the “gate smoothing technique” to the historical record, whereby the track of a given historical storm is permitted to influence gates outside of the original landfall gate. This is one method to get an “optimal landfall rate distribution” from the historical record. This method reduces the undersampling/oversampling issues associated with the limited historical records (109 years). The “optimal distribution” can then be compared to the stochastic landfall rates and the latter can be iteratively adjusted to converge towards the former. The result is a landfall calibration that more appropriately quantifies the broader landfall risk, rather than that limited to the shorter historical record, but is still consistent with the historical record.

f. Event set boiling down

To ensure that RMS has a manageable stochastic set size for their clients, the stochastic set was reduced significantly. This process was done by carefully subsampling the stochastic set without significantly changing the full-set hurricane parameters (including landfall rates). Ideally, all stochastic members should be included such that “boiling down” is not necessary, and RMS should rely upon improved client hardware to ensure this. However, until that time, the boiling down process effectively keeps the stochastic set size manageable without significantly changing the risk implied by that stochastic set.

g. Historical reconstructions

RMS presented historical reconstructions of several hurricanes obviously not included in the training. As part of the reconstruction process, RMS collected all possible sources of information (onshore and offshore) to produce the most complete historical observation archive possible. This task is often daunting, but leads to the necessary synthesis of the historical observational record to derive all the parameters needed by the stochastic model. It is important to note that each historical reconstruction is one realization of the stochastic model, and thus important for the anticipation of other extreme events in the future and the quantification of their risk.

These reconstructions included the 1938 New England Hurricane. The new model produced wind swaths that are considerably more consistent with observations and proxy estimates of wind speed throughout New England. Strong winds are modeled much closer to the track, extends further west overall, and accounts for higher terrain influences across central and northern New England. It is evident that the updated transitioning model within the new RL version improved the wind footprint for the 1938 New England hurricane.

A summary of historical loss predictions for 22 historical storms was presented, on average, the modeled losses were an improvement on the prior RMS model. Several storms had considerable overestimates in predicted loss using the prior RMS model. The new RMS model reduces the bias considerably for that subset. While some reconstructions show modeled losses of the new model becoming slightly worse (compared to PCS losses) than with the old model, that degradation is far smaller in magnitudes than the improvement for the storms where the old model over-forecast the modeled losses.

h. Summary

In summary, the new RMS NAHU model is an improvement over the earlier version of their model. Considerable new research and datasets have been incorporated into the new model, leading to an improvement on the regionalization of the risk. The most significant improvements appear to be in modeling inland wind threat, the threat to New England from both pure hurricanes and transitioning hurricanes, as well as improved representation of surface roughness across over-water and urban areas. RMS has wisely chosen to not rely too heavily on NWP for their training, but at the same time using NWP for limited guidance when appropriate and physically justified. For the historical reconstructions examined, there is an overall improvement in prediction of PCS losses, and while there is a decreased predictive skill for some historical storms, that decrease is overcome by the improvement for a majority of the 22 historical reconstructions presented. The resulting model is currently state of the art for quantifying hurricane damage risk across the US, and while there are deficiencies and biases, these generally cannot be overcome using the resources currently available to the community.



Robert E. Hart, PhD

Associate Professor, Meteorology

Department of Earth, Ocean, and Atmospheric Science

Florida State University

APPENDIX D – EXTERNAL EXPERT REVIEW OF VULNERABILITY MODULE

TLSmith Consulting Inc.

Thomas Lee Smith, AIA, RRC

October 4, 2010

Michael Young, PE
Senior Director of Mitigation and Regulatory Affairs
RMS
7015 Gateway Boulevard
Newark, CA 94560

Subject: External Expert Review of the U.S. Vulnerability Module of the RiskLink 11.0 Atlantic Hurricane Model

Dear Mr. Young:

I was retained by RMS to perform an external expert review of the development of the United States portion of the vulnerability module of the RMS Atlantic Hurricane Model, to be released in RiskLink 11.0. The following report identifies documents that I reviewed, discusses the review process and presents my conclusions and recommendations.

Documents Reviewed

- RMS U.S. Hurricane Model, RiskLink 8.0.1a (dated May 2009) – “Submission to the Florida Commission on Hurricane Loss Projection Methodology.” Note: I was provided the entire document, however I limited my review to sections *G-1 Scope of the Computer Model and its Implementation*, *G-2.3 Independent Peer Review*, *V-1 Derivation of Vulnerability Functions*, *V-2 Mitigation Measures*, *Form V-1: One Hypothetical Event* and *Form V-2: Mitigation Measures – Range of Changes in Damage*.
- RMS Secondary Modifiers for U.S. Hurricane Vulnerability, RiskLink 6.0 (dated October 2009).
- PowerPoint presentation titled *2011 USHU Wind Vulnerability Development Overview*
- PowerPoint presentation titled *Development of Wind-Induced Secondary Modifiers for 2011 Atlantic Basin Hurricane Model*

Review Process

My review included review of the current vulnerability model (RiskLink 8.0.1a) and review of the proposed changes to the model (RiskLink 11.0) as follows: I attended a two day review meeting at the RMS office located in Newark, CA. Prior to the meeting I reviewed the RMS

16681 Boswell Road • Rockton, IL 61072 • Tel: 815-629-2455 • Fax: 815-629-2456 • Email: tlsmith@hughes.net
www.tl-smith.com



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U.S. Hurricane Model, RiskLink 8.0.1a document. The first PowerPoint noted above was reviewed on the first day. I was given an overview of the FCHPLM purpose and process, and an overview of the various components of the model (such as meteorology and economics). However, the majority of this presentation pertained to the vulnerability component. The second PowerPoint noted above was reviewed on the second day.

During the presentations, there was ample time for discussion. I was given sufficient time to provide comments and ask questions. My comments did not pertain to fundamental issues that affect the vulnerability model. Rather, they pertained to the written document (bullet one above), and they were of an editorial or clarification nature. The RMS personnel that I met with answered questions to my satisfaction and they were very receptive of my comments.

Conclusions and Recommendations

My conclusions and recommendations regarding the Hurricane Model are based on my experience with wind performance of buildings, which includes field research in the aftermath of twelve hurricanes. The field research included work on four hurricanes that struck Florida (Hurricane Andrew, Charley, Frances and Ivan). My conclusions regarding the vulnerability section of the hurricane model are as follows:

- Damage functions: The damage functions were developed in a rational, technically based manner (i.e., validated claims data from various hurricanes were analyzed with respect to estimated wind speeds).
- Coastal vulnerability: Wind speeds decay as hurricanes track inland. However, analysis of validated claims data revealed differences between coastal and inland building damage as a function of wind speed. For given wind speeds, the claims data show decreased vulnerability along the coast. Therefore, RiskLink 11.0 proposes a new coastal vulnerability region. Based on my experience and discussion with other design professionals, the inclusion of the new coastal region is appropriate because of the greater attention that is generally given to the design and construction of buildings near the coast.
- Revisions to the secondary modifiers: The changes to the secondary modifiers proposed in RiskLink 11.0 will simplify and clarify the use of the modifiers. During the extensive discussion that we had on the secondary modifier changes, I made recommendations regarding which category certain building elements (such as stucco) would be placed. I also made specific recommendations as listed below. I fully support the changes to the secondary modifiers.
 - Gutters: In RiskLink 8.0.1a, the secondary modifiers for low-slope ("flat") roofs include the type of roof membrane. However, post-storm damage investigations have shown that the presence of a gutter has greater influence on the wind performance of low-slope roofs than does the type of roof membrane. Gutter failure has significant ramifications because subsequent progressive lifting and peeling of the roof membrane often occurs. Therefore, for low-slope roofs, I recommended that in

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RiskLink 11.0, consideration be given to combining the "single-ply membrane " and "built-up roof" options for the "roof covering" secondary modifier and adding an option that identifies the presence of gutters.

- Pool cages (lanais): Changes pertaining to pool cages were made to the Florida Building Code (FBC) around 2004. Cages designed and built in accordance with the new criteria should have improved wind performance. Cages are addressed in the Appurtenant Structures portion of the model (section V-1.5 in the first document bulleted on the previous page). I recommended that RMS consider the changes in the FBC pool cage criteria.
- Soffits: Damage investigations following the 2004 hurricanes revealed soffit performance problems. At the present time, soffit performance is difficult to address in a model. However, in the future as soffit issues are more fully addressed by codes and standards, and as field-evaluation techniques are developed, I recommended that a future revision regarding soffits be made to the model when criteria are available to sufficiently do so.
- Window and door protection: In RiskLink 8.0.1a, window and door protection are considered via two independent modifiers. RiskLink 11.0 addresses windows, doors and garage doors in a single modifier, based on an increasing scale of building envelope protection. The proposed changes simplify use of the model, and recognize the relationship between window and door openings and their key role in wind performance. I concur with the proposed changes.

Respectfully submitted,



Thomas Lee Smith, AIA, RRC

APPENDIX E – USER INTERFACE SCREEN SHOTS

Figure 93: Screen shot of RiskLink model location input form (part 1)

National Accounts Tool

Account Information Locations

Country: United States Modify Country List ...

Schedule of Locations: 1 of 1

	Ear	Wl	Co	Flo	Fir	Ter	Wol	Location Number	Location Name	Primary Bldg	Site Name	Address Type	ESDB Bldg. Name	ESDB Bldg. ID	Street Address	City	State	ZIP Code
▶	☒	☒	☐	☐	☐	☐	☐	00041_OF_0Ded		☒		Unknown					Florida	00041
*	☐	☐	☐	☐	☐	☐	☐			☐								

Label	Value	Limit	Deductible	%	Content Grade	BI Waiting Period (days)	BI Period of Indemn (months)	Limit Extension
▶ WS Coverage A	100,000.00	0.00	0.00	☒	Unknown Damageable	0.0	12.0	0.00
WS Coverage B	10,000.00	0.00	0.00	☒	Unknown Damageable	0.0	12.0	0.00
WS Coverage C	50,000.00	0.00	0.00	☒	Damageable	0.0	12.0	0.00
WS Coverage D	20,000.00	0.00	0.00	☒	Unknown Damageable	0.0	12.0	0.00
*		0.00	0.00	☐		0.0	12.0	0.00

Save as New Account
Save and Exit
Save
Cancel
Help

Figure 94: Screen shot of RiskLink model location input form (part 2)

National Accounts Tool

Account Information Locations

Country: United States Modify Country List ...

Schedule of Locations: 1 of 1

State	ZIP Code	Census Tract	County	High Res CRE	Low Res CRE	Zone	Country Code	Country Scheme	Latitude	Longitude	Data Resolution	MS/B V/s
▶ Florida	00041		BROWARD C				US	ISO2A	26.163213	- 80.616138	ZIP Code	
*									0.000000	0.000000		

Site Limit Amount	Site Deductible Amount	%	WS Cause of Loss	Start Date	Completion Date	Percent Complete	Year Upgrade	BI Zone	Manmade Roughness	Manmade Roug	Natural Roug
▶ 0.00	0.00	☒	Wind only	9/16/2018	9/16/2018	100.00	9999	0	Unknown	None	Unknown

Save as New Account
Save and Exit
Save
Cancel
Help

Figure 95: Screen shot of RiskLink model location input form (part 3)

National Accounts Tool

Account Information

Locations

Country: United States

Modify Country List ...

Schedule of Locations: 1 of 1

MS/B Valuation	User Geo	Construction Class Scheme	Construction Class	ESDB Construction Class	Occupancy Type Scheme	Occupancy Type	ESDB Occupancy Type	Year Built	ESDB Y
0.00		RMS	WOOD	Unknown	ATC	Permanent Dw	Unknown	9999	
0.00		ATC	Unknown	Unknown	ATC	Unknown	Unknown	9999	

III

Natural Roughness	Natural Roughness	Distance To Coast	Distance To Coast Match	HU Flood Zone	Basement Likelihood	Ground Elevation	Ground Elevation Match	Wind Pool	Wind Pool Match
Unknown	None	0.00	None	-99	0.00	- 999.000000	None	0	None

Coverages

Special Conditions

Reinsurance Cessions

BI

WS

Save as New Account

Save and Exit

Save

Cancel

Help

Figure 96: Screen shot of RiskLink model location input form (part 4)

National Accounts Tool

Account Information

Locations

Country: United States

Modify Country List ...

Schedule of Locations: 1 of 1

ESDB Year Built	Floor Area	Est. Flr. Area w/ Conte	Area Unit	ESDB Square Footage	# of Stories	Floors Occupied	%Cnts Below Grade	BI Dependence	ESDB # of Stories	Buildi
9999	0.00	No	sq ft	0	0		0.000000	Building	0	
9999	0.00		sq ft	0	0		0.000000	Building	0	

III

Coastal Segment	First Floor Elevation	NFIP Year	NFIP Year Ma	NFIP Rate	First Floor Height	First Floor Height Match	Foundation Type	Construction Quality	Roof Covering
0	- 999.000000	9999	None	0.000000	- 999.000000	None	Unknown	Unknown	Unknown

Coverages

Special Conditions

Reinsurance Cessions

BI

WS

Save as New Account

Save and Exit

Save

Cancel

Help

Figure 97: Screen shot of RiskLink model location input form (part 5)

National Accounts Tool

Account Information Locations

Country: United States Modify Country List ...

Schedule of Locations: 1 of 1

Building Height	Height Units	ESDB Bldg. Height	User Ground Elevatio	# of Buildings	Content Loss Trig	Inception Date	Expiration Date	User Defined 1	User Defined 2	User Text 1	User
0.00	Feet	0	- 999.00	1	No	9/30/2018	9/30/2018	OF_00ed			
*	0.00	Feet	0	0.00	1	No					

III

Roof Age / Condition	Roof Geometry	Roof Anchor	Roof Equipment Hurricane Brac	Basement	Commercial Appurtenant	Cladding Type	Roof Sheathing Att	Frame-Founda
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

III

Save as New Account Save and Exit Save Cancel Help

Figure 98: Screen shot of RiskLink model location input form (part 6)

National Accounts Tool

Account Information Locations

Country: United States Modify Country List ...

Schedule of Locations: 1 of 1

User Text 2	User Specified Base	Local Flood Wall Heig	Flood Defense Elevation	Flood Defense Elevation Unit	Rental Property Identifier	MFD Subcategory	Currency
-	999.00	- 999.00	- 999.00	- 999.00	Unknown	Unknown	US Dollar
*	0.00	0.00	- 999.00	Feet			US Dollar

III

Frame-Foundation	Residential Appurtenant structure	Ground-Level Equipment	Opening Protection	Flashing and	Floor Type	Flood Missiles	Flood Protection	Vertical Expo	IFM Str
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

III

Save as New Account Save and Exit Save Cancel Help

Figure 99: Screen shot of RiskLink model location input form (part 7)

National Accounts Tool

Country: United States Modify Country List ...

Schedule of Locations: 1 of 1

Flood Defense Elevation Unit	Rental Property Identifier	MFD Subcategory	Currency	Dwell Time (days)	# Shipments	RiskAssessor Curves
* Feet	Unknown	Unknown	US Dollar	0	0	N/A
			US Dollar	0	0	

Opening Protection	Flashing and	Floor Type	Flood Missiles	Flood Protection	Vertical Expo	FM Structure	FM Outdoor	FM Site Haza	Storm-proof H	Marine Storm	Storm Salvag	Specie Stora
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Save as New Account Save and Exit Save Cancel Help

Figure 100: Screen shot of the about RiskLink screen, showing software name and version number

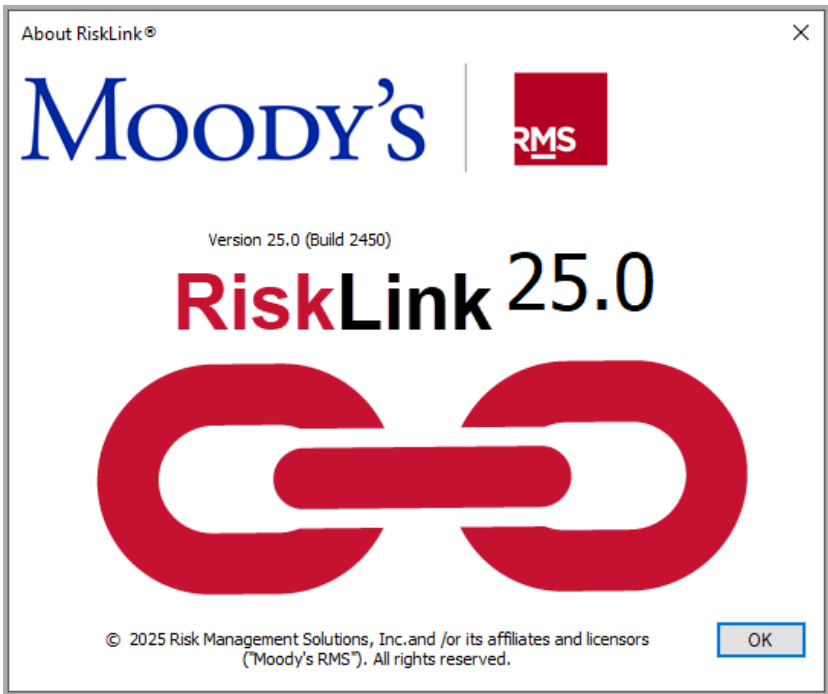


Figure 101: Screen shot of Risk Modeler model location input form (part 1)

Risk Modeler 2.0

Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home New

Search by Name

All Data ?

- Databases
- Results
- Profiles
- Map Layers

Account Number	Account Name	\$ 100.00 K TIV	Employees	Policies	Locations	Reports	Perils	User Defined 1	User Defined 2	User Defined 3	User Defined 4	User Text 1
341			0	0	1	0	--	--	--	--	--	...

Policies 0 Locations 1 Results 0

Search Location Number Filter United States (1)

☐	Location Number	Location Name	Primary Building	Site Name	Address Type	Census Tract	Street Address	City	County	State Code	ZIP Code
☒	1		☒		Unknown				BROWARD COUNTY	FL	00041

Add Row Rows: 1 Selected: 1

Location Details

Coverages Special Conditions Reinsurance Sessions BI Earthquake Windstorm Convective Storm/Winterstorm Flood Fire Terrorism WC

Exposure	Value	Limit	Deductible	Percent Of Loss Deductible (HD ONLY)	Franchise Deductible (HD ONLY)	N
WS Cvg A	100,000.00	0.00	0.00	0.00	No	
WS Cvg B	10,000.00	0.00	0.00	0.00	No	
WS Cvg C	50,000.00	0.00	0.00	0.00	No	

Add Row Rows: 4

Figure 102: Screen shot of Risk Modeler model location input form (part 2)

Risk Modeler

Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home New

Search by Name

All Data Databases Results Profiles Map Layers

Number	Account Name	\$180.00 K TIV	0 Employees	0 Policies	1 Locations	0 Reports	-- Perils	-- User Defined 1	-- User Defined 2	-- User Defined 3	-- User Defined 4	-- User Test 1	
Policies 0	Locations 1	Results 0											
Search Location Number Filter United States (1)													
☐	High Res CRESTA	Low Res CRESTA	Zone	Latitude	Longitude	Data Resolution	Construction Class Scheme	Construction Class	Occupancy Type Scheme	Occupancy			
☒ 1				26.163213	-80.616138	ZIP Code	RMS	1 - WOOD	ATC	1 - Permanent			

+ Add Row Rows: 1 Selected: 1

Location Details

Coverages Special Conditions Reinsurance Sessions BI Earthquake Windstorm Convective Storm/Winterstorm Flood Fire Terrorism WC

Site Limit	Site Deductible	Percent of Loss Site Deductible (HD ONLY)	Franchise Site Deductible (HD ONLY)	Non-Ranking Site Deductible (HD ONLY)	WS Cause Of Loss	Start Date	Completion Date
0.00	0.00	0.00	No		Wind & Surge	Dec-31-9999	Dec-31-9

Rows: 1

Figure 103: Screen shot of Risk Modeler model location input form (part 3)

Risk Modeler 2.0 | Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home | New | Search by Name | All Data | Databases | Results | Profiles | Map Layers

Member | Account Name | \$ 180.00 K TIV | Employees | Policies | Locations | Reports | Perils | User Defined 1 | User Defined 2 | User Defined 3 | User Defined 4 | User Text 1

Policies 0 | Locations 1 | Results 0

Search Location Number | Filter | United States (1) | Map

	Occupancy Type	Inception Date	Expiration Date	User Defined 1	User Defined 2	User Text 1	User Text 2	# Stories	Floors Occupied	% Contents Below Gra
☒	1 - Permanent Dwelling (single fan	Aug-27-2024	Aug-26-2025	Frame				1		0

Add Row | Rows: 1 Selected: 1

Location Details

Coverages | Special Conditions | Reinsurance Cessions | BI | Earthquake | Windstorm | Convective Storm/Winterstorm | Flood | Fire | Terrorism | WC

% Complete	Year Upgrade	BI Zone	Coastal Segment	First Floor Elevation	NFIP Year	NFIP Year Match	NFIP Rate	First Floor Height	First Floor Height Match	Foundation Type
100.00	9999	0		-999.00	1975	ZIP Code	0.60	2.00	Zip Code	Unknown

Rows: 1

Figure 104: Screen shot of Risk Modeler model location input form (part 4)

Risk Modeler 2.0 | Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home | New | Search by Name | All Data | Databases | Results | Profiles | Map Layers

Member | Account Name | \$ 180.00 K TIV | Employees | Policies | Locations | Reports | Perils | User Defined 1 | User Defined 2 | User Defined 3 | User Defined 4 | User Text 1

Policies 0 | Locations 1 | Results 0

Search Location Number | Filter | United States (1) | Map

	% Contents Below Grade	BI Dependency	Building Height	Height Unit	Year Built	Floor Area	Est Floor Area With Contents	Area Units	User Ground Elevation	# Build
☒	0.00		0.00	Feet	1989	0.00	No	sq ft	-999.00	

Add Row | Rows: 1 Selected: 1

Location Details

Coverages | Special Conditions | Reinsurance Cessions | BI | Earthquake | Windstorm | Convective Storm/Winterstorm | Flood | Fire | Terrorism | WC

Construction Quality	Roof Covering	Roof Age / Condition	Roof Geometry	Roof Anchor	Roof Equipment Hurricane Bracing	Basement	Commercial Appurtenant Structures	Cladding Ty
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Rows: 1

Figure 105: Screen shot of Risk Modeler model location input form (part 5)

Risk Modeler 2.0

Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home New

Search by Name

All Data

Databases

Results

Profiles

Map Layers

0 Policies 0 Locations 1 Results 0

Search Location Number Filter United States (1)

	# Buildings	Content Loss Trigger	Currency	User-Specified Base Flood Elev	Local Flood Wall Height	Flood Defense Elevation	Flood Defense Elevation Unit	Rental Property Identifier
☒	1	No	US Dollar	-999.00	-999.00	-999.00	Feet	Unknown

Add Row Rows: 1 Selected: 1

Location Details

Coverages Special Conditions Reinsurance Sessions BI Earthquake Windstorm Convective Storm/Winterstorm Flood Fire Terrorism WC

Roof Sheathing Attachment	Frame-Foundation Connection	Residential Appurtenant Structures	Ground-Level Equipment	Opening Protection	Flashing And Coping Quality	Floor Type	Flood Protection
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Rows: 1

Figure 106: Screen shot of Risk Modeler model location input form (part 6)

Risk Modeler 2.0

Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home New

Search by Name

All Data

Databases

Results

Profiles

Map Layers

0 Policies 0 Locations 1 Results 0

Search Location Number Filter United States (1)

	Defense Elevation	Flood Defense Elevation Unit	Rental Property Identifier	MFD Subcategory	Dwell Time (Days)	# Shipments	RiskAssessor Curves	Modified Date
☒	-999.00	Feet	Unknown	Unknown	0	0		Sep-05-2024, 13:31:59

Add Row Rows: 1 Selected: 1

Location Details

Coverages Special Conditions Reinsurance Sessions BI Earthquake Windstorm Convective Storm/Winterstorm Flood Fire Terrorism WC

Flood Missiles	Flood Protection	Vertical Exposure Distribution	IFM Structure Condition	IFM Outdoor Machinery/Equipment Bracing	IFM Site Hazard	Storm-Proof Packaging	Marine Storm Protection
Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown	Unknown

Rows: 1

Figure 107: Screen shot of Risk Modeler model location input form (part 7)

Risk Modeler 2.0 | Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home | New | Search by Name

All Data | Databases | Results | Profiles | Map Layers

Policies 0 | Locations 1 | Results 0

Search Location Number | Filter | United States (1)

	Defense Elevation	Flood Defense Elevation Unit	Rental Property Identifier	MFD Subcategory	Dwell Time (Days)	# Shipments	RiskAssessor Curves	Modified Date
☒ 1	-999.00	Feet	Unknown	Unknown	0	0		Sep-05-2024, 13:31:59

+ Add Row | Rows: 1 Selected: 1

Location Details

Coverages | Special Conditions | Reinsurance Sessions | BI | Earthquake | **Windstorm** | Convective Storm/Winterstorm | Flood | Fire | Terrorism | WC

Marine Storm Protection	Storm Salvage Potential	Specie Storage - Hurricane	Distance To Coast	Distance To Coast Match	HU Flood Zone	Basement Likelihood	Ground Elevation	Ground
Unknown	Unknown	Unknown	31.92	ZIP Code	0	0.15	9.87	ZIP Code

Rows: 1

Figure 108: Screen shot of Risk Modeler model location input form (part 8)

Risk Modeler 2.0 | Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

Home | New | Search by Name

All Data | Databases | Results | Profiles | Map Layers

Policies 0 | Locations 1 | Results 0

Search Location Number | Filter | United States (1)

	Defense Elevation	Flood Defense Elevation Unit	Rental Property Identifier	MFD Subcategory	Dwell Time (Days)	# Shipments	RiskAssessor Curves	Modified Date
☒ 1	-999.00	Feet	Unknown	Unknown	0	0		Sep-05-2024, 13:31:59

+ Add Row | Rows: 1 Selected: 1

Location Details

Coverages | Special Conditions | Reinsurance Sessions | BI | Earthquake | **Windstorm** | Convective Storm/Winterstorm | Flood | Fire | Terrorism | WC

Ground Elevation Match	Wind Pool	Wind Pool Match	Contamination	Flood Duration	% In Admin1	100 Year RP Risk Score	250 Year RP Risk Score	500 Year RP Risk Score	Overall
ZIP Code	0	None	Unknown	Unknown	0.00	0	0	0	

Rows: 1

Figure 109: Screen shot of Risk Modeler model location input form (part 9)

Risk Modeler™ 2.0

Home

New

Search by Name

All Data

Databases

Results

Profiles

Map Layers

Databases > FormA1_NAHU25Geo_EDM > Portfolios > 00 - All Locations > Frame_00041

041

Account Name

TIV

Employees

0

Policies

0

Locations

1

Reports

0

Perils

0

User Defined 1

0

User Defined 2

0

User Defined 3

0

User Defined 4

0

User Text 1

0

Policies

0

Locations

1

Results

0

Search Location Number

Filter

United States (1)

Map

	Defense Elevation	Flood Defense Elevation Unit	Rental Property Identifier	MFD Subcategory	Dwell Time (Days)	# Shipments	RiskAssessor Curves	Modified Date
☒	1	-999.00	Feet	Unknown	Unknown	0	0	Sep-05-2024, 13:31:59

Add Row

Rows: 1 Selected: 1

Location Details

Coverages

Special Conditions

Reinsurance Cessions

BI

Earthquake

Windstorm

Convective Storm/Winterstorm

Flood

Fire

Terrorism

WC

ch	Contamination	Flood Duration	% In Admin1	100 Year RP Risk Score	250 Year RP Risk Score	500 Year RP Risk Score	Overall Risk Score	Windpool Zone	Distance To Inner Coast
	Unknown	Unknown	0.00	0	0	0	0		0.00

Rows: 1

Moody's RMS North Atlantic Hurricane Models 25.0 (Build 2450)

March 25, 2025

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Figure 110: Screen shot of the Risk Modeler Global Menu, showing platform name and version number

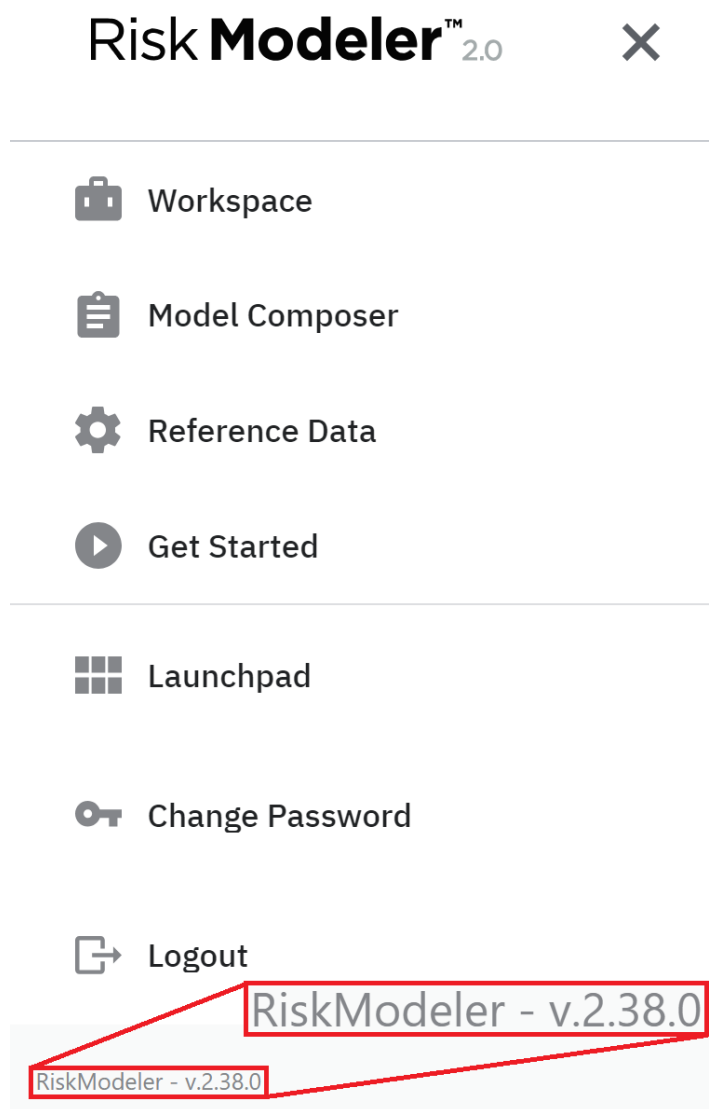


Figure 111: Screen shot of the Moody's Peril Models List for Risk Modeler showing model version and build numberPeril Models List Moody's Peril Models List for Risk Modeler**Table 1: Peril Models Available in Risk Modeler (and selected in DLM or HD model profiles) (continued)**

Peril and Region		Region Peril Abbrev.	Model Versions in Model Profiles	Detailed Version Number	Risk Modeler Effective Date	Last Model Update	Comment
North Atlantic	Canada	NAHU	RL25	25.0 (Build 2450)		2025/V25.0	Submitted to the Florida Commission on Hurricane Loss Projection Methodology (FCHLPM) for certification for use in residential rate filings with the Florida Office of Insurance Regulation under the 2023 Report of Activities.
	Caribbean						
	Central America						
	Mexico						
	Offshore US - Gulf of Mexico						
	United States		RL24	24.0.1 (Build 2350)	Aug-15-24	2023/V23.0	For RL24, detailed version number 24.0.1 replaces version number 24.0.0 (released Apr-3-24) on Aug-15-24 to resolve known issues GS-9361 , GS-9392 , and RM-45336 . When model updates are released as a dot version (e.g., 24.0.1), the major.minor version shown in the model profile and events table (e.g., 24.0.0) <i>implicitly</i> includes the dot release.
			RL23	23.0.3 (Build 2250)	Aug-15-24		For RL23, detailed version number 23.0.3 replaces version number 23.0.2 (released Nov-20-23) on Aug-15-24 to resolve known issues GS-9392 and RM-45336. Detailed version number 23.0.2 replaced version number 23.0.1 (released Aug-16-23) on Nov-20-23 to resolve known issues RLRB-19968 and RLRB-19969. The patch version number shown is updated to maintain consistency with RiskLink versioning; there are no loss changes between version 23.0.1 and 23.0.2. Detailed version number 23.0.1 replaced version number 23.0.0 (released Jun-14-23) on Aug-16-23 to resolve known issue RLRB-19591. Version 23 (Build 2250) was certified by the FCHLPM in June 2023 for use in residential rate filings with the Florida Office of Insurance Regulation under the 2021 Report of Activities.
			RL22	22.0.2 (Build 2150)	Aug-15-24	2021/V21.0	For RL22, detailed version number 22.0.2 replaces version number 22.0.1 (released Aug-16-23) on Aug-15-24 to resolve known issues GS-9392 and RM-45336. Detailed version number 22.0.1 replaced version number 22.0 (released

Appendix E – User Interface Screen Shots

North Atlantic	Canada	RL23	23.0 (Build 2250)		2022/V22.0	Submitted to the Florida Commission on Hurricane Loss Projection Methodology (FCHLPM) for certification for use in residential rate filings with the Florida Office of Insurance Regulation under the 2021 Report of Activities.
	Caribbean					
	Central America	RL22	22.0 (Build 2150)	Jun-28-22	2021/V21.0	The Florida Commission on Hurricane Loss Projection Methodology (FCHLPM) has approved version 21 (Build 2050) in both RiskLink and Risk Modeler, for use in residential rate filings with the Florida Office of Insurance Regulation. Approval was granted in a public meeting held in Tallahassee on June 1st, 2021. Since then, model versions 21.0.1 (Build 2050) and 21.0.2 (Build 2050) and all Risk Modeler updates were released and approved by the FCHLPM as functionally equivalent to model version 21.0 (Build 2050).
	Mexico					
	Offshore US - Gulf of Mexico					
	United States	RL21	21.0.2 (Build 2050)	Dec-15-21		For RL21, detailed version number 21.0.2 replaces version number 21.0.1 (released Nov-9-21) on Dec-15-21. See Version 2.14.0 December 15, 2021 . See Updates to Peril Models and Data Products Version 21
		RL18.1	18.1.1 (Build 1945)	Jul-13-20	2019/V18.1	See Updates to Peril Models and Data Products in RiskLink 18.1
		RL18	18.0 (Build 1930)	Jul-13-20	2018/V18.0	See Updates to Peril Models and Data Products in Version 18.0

APPENDIX F – REPORTS

Figure 112: RiskLink analysis summary report (page 1 of 3)

Analysis Summary Report for FCHLPM		MOODY'S 
		Friday, September 27, 2024 Version 25.0 (Build 2450)
Analysis Settings:		
Analysis Name (ID) : Form A-1 FCHLPM Certified Hurricane Losses(4) RDM Database : RMS_RDM Loss Amplification : Bldg+Cont+BI DLM Profile Name : (Pre-compiled) FCHLPM Certified Hurric PLA Scale Factor : 1.00 Analysis Date : 9/27/2024 1:57:06PM Residual Demand Surge : Excluded Perils : Wind Only Currency : US Dollar Region : North Atlantic (including Hawaii) EDM Database : FormA1_NAHU25Geo_EDM Analysis Mode : Distributed Exposure Type : Portfolio Analysis Type : Exceedance Probability EDM Portfolio : 00 - All Locations Vulnerability Curves : Vulnerability - Default Use RiskAssessorCurves : No Event Rate Set : RMS 2025 Historical Event Rates Storm Surge assumptions : None SFD : 0.00 Low-Rise MFD and COM : 0.00 Other : 0.00 Primary modifiers assumed 'Unknown' : None All secondary modifiers assumed 'Unknown' : No Scale Factors : Building : 1.00 Contents : 1.00 BI Values : 1.00 Non-Modeled Damage Factors : Building : 1.00 Contents : 1.00 BI Values : 1.00 'Unknown' deductibles assumed 2% : Yes Local defenses ignored : No All user entered Base Flood Elevation values reset to RMS Default : No		
Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.		
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Figure 113: RiskLink analysis summary report (page 2 of 3)

Exposure Data Summary Statistics:					
Average Location Value	:	150,000.00			
Average Location Limit	:	0.00			
Average Location Deductible	:	0.00			
Exposure Data Detail Statistics:					
CONSTRUCTION QUALITY	# Locations	% of Locations	BASEMENT	# Locations	% of Locations
0 Unknown	4869	100.00	0 w/ Unknown Flood Protection	4869	100.00
ROOF COVERING	# Locations	% of Locations	ROOF GEOMETRY	# Locations	% of Locations
0 Unknown	4869	100.00	0 Unknown	4869	100.00
ROOF ANCHOR	# Locations	% of Locations	ROOF AGE	# Locations	% of Locations
0 Unknown	4869	100.00	0 Unknown	4869	100.00
ROOF EQUIPMENT HURRICANE BRACING	# Locations	% of Locations	FLASHING AND COPING QUALITY	# Locations	% of Locations
0 Unknown	4,869.00	100.00	0 Unknown	4,869.00	100.00
COMMERCIAL APPURTENANT STRUCTURES	# Locations	% of Locations	CLADDING TYPE	# Locations	% of Locations
0 Unknown	4869	100.00	0 Unknown	4869	100.00
ROOF SHEATHING ATTACHMENT	# Locations	% of Locations	FRAME-FOUNDATION CONNECTION	# Locations	% of Locations
0 Unknown	4869	100.00	0 Unknown	4869	100.00
RESIDENTIAL APPURTENANT STRUCTURES	# Locations	% of Locations	MEC./ ELEC. EQPT - GROUND	# Locations	% of Locations
0 Unknown	4869	100.00	0 Unknown	4869	100.00
Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.					
Risk Management Solutions, Inc. 7575 Gateway Blvd Newark, CA 94560 U.S.A Phone:(510) 505-2500 Fax: (510) 505-2501			Page 2 of 3		

Figure 114: RiskLink analysis summary report (page 3 of 3)

OPENING PROTECTION					
0 Unknown	# Locations	% of Locations			
	4869	100.00			
WS DETAIL					
VALID FLAG	# Locations	% of Locations	ADDRESS MATCH LEVEL	# Locations	% of Locations
1 Valid	4869	100.00	5 Postal Code	4869	100.00
NUMBER OF BUILDINGS			NUMBER OF STORIES	# Locations	% of Locations
1	4869	100.00	1	4869	100.00
YEAR BUILT			LOCATION VALID FLAG	# Locations	% of Locations
1989 1973 - Present	4869	100.00	1 Valid	4869	100.00
COVERAGE			# Locations	% of Locations	
DAMAGEABILITY GRADE			Coverages	Coverages	
0 Unknown			14607	75.00	
3 Damageable			4869	25.00	
CONSTRUCTION CLASS					
Schema Class			# Locations	% of Locations	
RMS Manufactured/Mobile Home with Tie-Downs			1623	33.33	
RMS MASONRY			1623	33.33	
RMS WOOD			1623	33.33	
OCCUPANCY TYPE					
Schema Class			# Locations	% of Locations	
ATC Permanent Dwelling (single family housing)			4869	100.00	
SQUARE FOOT BANDS					
Square Foot Bands			# Locations	% of Locations	
Unknown			4,869	100.00	
< 1507			0	0.00	
BETWEEN 1507 AND 2507			0	0.00	
BETWEEN 2508 AND 5005			0	0.00	
BETWEEN 5006 AND 10010			0	0.00	
>10010			0	0.00	

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

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Figure 115: RiskLink post import summary (page 1 of 4)

Post Import Summary

Friday, September 27, 2024
Version 25.0 (Build 2450)

EDM Database : FormA1_NAHU25Geo_EDM

Portfolio Name : 00 - All Locations

Peril : Wind

Location:

Location Coverage Values and Limits :

Valid	Loc Cov Count	Loc Cov Limits	Loc Cov Values
Yes	19,476	0.00	730,350,000.00
Total	19,476	0.00	730,350,000.00

Valid Location Coverage Values and Limits :

Loss Type	Loc Cov Count	Valid Loc Cov Value	Min Value	Max Value	Average Value
Building	9,738	446,325,000.00	5,000.00	100,000.00	46,833.33
Content	4,869	202,875,000.00	25,000.00	50,000.00	41,666.67
BI/ALE	4,869	81,150,000.00	10,000.00	20,000.00	16,666.67
Total	19476	730,350,000.00			

Loss Type	Loc Cov Count	Valid Loc Cov Limit	Min Limit	Max Limit	Average Limit
Total					

Valid Location Coverage Law and Ordinance Limit Extensions :

Loss Type	Loc Cov Count	Valid Loc Cov Value	Min Value	Max Value	Average Value
Total					

Geocoded Values and Limits :

Geocoded	Loc Count	Loc Cov Values	Loc Cov Limits
Yes	4,869	730,350,000.00	0.00
Total	4,869	730,350,000.00	0.00

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

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Figure 116: RiskLink post import summary (page 2 of 4)

Site:**Site Limits :**

Valid	Loc Count	Site Limits
Yes	4,869	0.00
Total	4,869	0.00

Valid Site Limits:

Min Site Limit	Max Site Limit	Average Site Limit

Account and Policy:**Account :**

Valid	Account Count	Loc Cov Values
Yes	4,869	730,350,000.00
Total	4,869	730,350,000.00

Policy Coverage Limits :

Valid	Pol Cov Count	Pol Cov Limits
Total		

Valid Policy Coverage Limits :

Loss Type	Valid Policy Cov Limit	Min Limit	Max Limit	AverageLimit
Total				

Policy Limits :

Valid	Blanket Limits Count	Blanket Limits
No		
Yes		
Total	0.00	0.00

Valid Policy Limits :

Min Blanket Limit	Max Blanket Limit	Average Blanket Limit
0.00	0.00	0.00

Policy Dates :

Expired Policy Count

Active Policy Count

Line of Business:

Line of Business	Valid Loc Cov Values
Total	

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposures for this report.

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Figure 117: RiskLink post import summary (page 3 of 4)

Construction Class:

Schema	Class	Valid Loc Cov Values
RMS	Manufactured/Mobile Home with Tie-Downs	146,070,000.00
RMS	MASONRY	292,140,000.00
RMS	WOOD	292,140,000.00
Total		730,350,000.00

Occupancy Class:

Schema	Class	Valid Loc Cov Values
ATC	Permanent Dwelling (single family housing)	730,350,000.00
Total		730,350,000.00

Geocoding Resolution:

Resolution	Location Count	Loc Cov Values
Postcode	4,869	730,350,000.00
Total	4,869	730,350,000.00

Area :

Country	State/Cresta	Valid Loc Cov Value
US	FL	730,350,000.00
Total		730,350,000.00

Peril Details (WS) :

Distance to Coast (in miles)	Valid Loc Cov Values
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00 and < 0.00	0.00
>= 0.00	730,350,000.00

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposures for this report.

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Figure 118: RiskLink post import summary (page 4 of 4)

Aggregate US Windstorm Exposures for Coastal Counties by Geocoding Resolution :				
Category	State	Geocoding Resolution	# of Locations	Location Cov Values
Tier 1	FL	Postcode	3,462	519,300,000.00
		Total	3,462	519,300,000.00
All Tier 1 Counties		Postcode	3,462	519,300,000.00
Total for Tier 1 Counties			3462	519,300,000.00
Tier 2	FL	Postcode	1,239	185,850,000.00
		Total	1,239	185,850,000.00
All Tier 2 Counties		Postcode	1,239	185,850,000.00
Total for Tier 2 Counties			1239	185,850,000.00
Total for Tier 1 and Tier 2 counties				705,150,000.00

Aggregate US Windstorm Exposures for Coastal Counties by Unknown Building Characteristics :				
Category	State	Building Characteristics	# of Locations	Location Cov Values
Total for Tier 1 and Tier 2 counties				0.00

Reinsurance :

Facultative :

Location Count	Policy Count
0	0

Surplus Share Treaty :

Location Count	Policy Count
0	0

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposures for this report.

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Figure 119: Risk Modeler analysis summary report (page 1 of 7)



Analysis Summary
FCHLPM Certified Hurricane Losses NAHU 25

Risk Modeler v2.38.0
 Saturday, October 5, 2024

Analysis Settings

Analysis Name	FCHLPM Certified Hurricane Losses NAHU 25
Analysis ID	248088
Analysis Type	Exceedance Probability
Analysis Mode	Distributed
Model Version	25.0
Date	2024-10-05 20:46:30.0
Engine	DLM
Peril	Windstorm
Region	North Atlantic (including Hawaii)
Model Profile	RMS Default FCHLPM Certified Hurricane Losses 25 (Florida Only)
Output Profile	FCHLPM Form A-1 NAHU 25 Outputs
Event Rate Set	RMS 2025 Historical Event Rates

Currency

Currency	USD
Currency Scheme	RMS
Currency Version	RL24

Exposure

Data Source Name	FormA1_NAHU25Geo_EDM
Exposure Type	Portfolio
Exposure Source	1
Portfolio Name	Form A-1
Geocoding Version	25.0
Hazard Version	25.0

Windstorm Settings

Calculate Losses From Sub-Peril(s)	Wind Only
Modifications to Ground Up Storm Surge (Applies to US Only)	None

Loss Amplification

Building and Appurtenant Structures	Yes
Contents	Yes
Business Interruption/Time Element	Yes
PLA Scale Factor	1.00
Vulnerability	Vulnerability - Default
Use RiskAssessor Curves	No

Exposure Modifications

Assume "Unknown" for the following primary characteristics

Construction Class	No
Occupancy Class	No
Year Built	No
Number of Stories	No
Floor Area	No
Floors Occupied	No

Assume "Unknown" for secondary modifiers

Ignore local flood defenses	No
Reset all user entered building elevation values to RMS default	No

Scale Exposure Values

Building and Appurtenant Structures	1.00
Contents	1.00
Business Interruptions/Time Element	1.00
Assume 2% deductible when "Unknown"	Yes

Non Modeled Damage Factors

Building	1.00
Contents	1.00
Business Interruptions	1.00

FCHLPM Certified Hurricane Losses NAHU 25 - Saturday, October 5, 2024

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report. Analysis Metadata that are missing from this analysis are indicated by 'N/A'.

Risk Modeler v2.38.0

1 of 7

Figure 120: Risk Modeler analysis summary report (page 2 of 7)

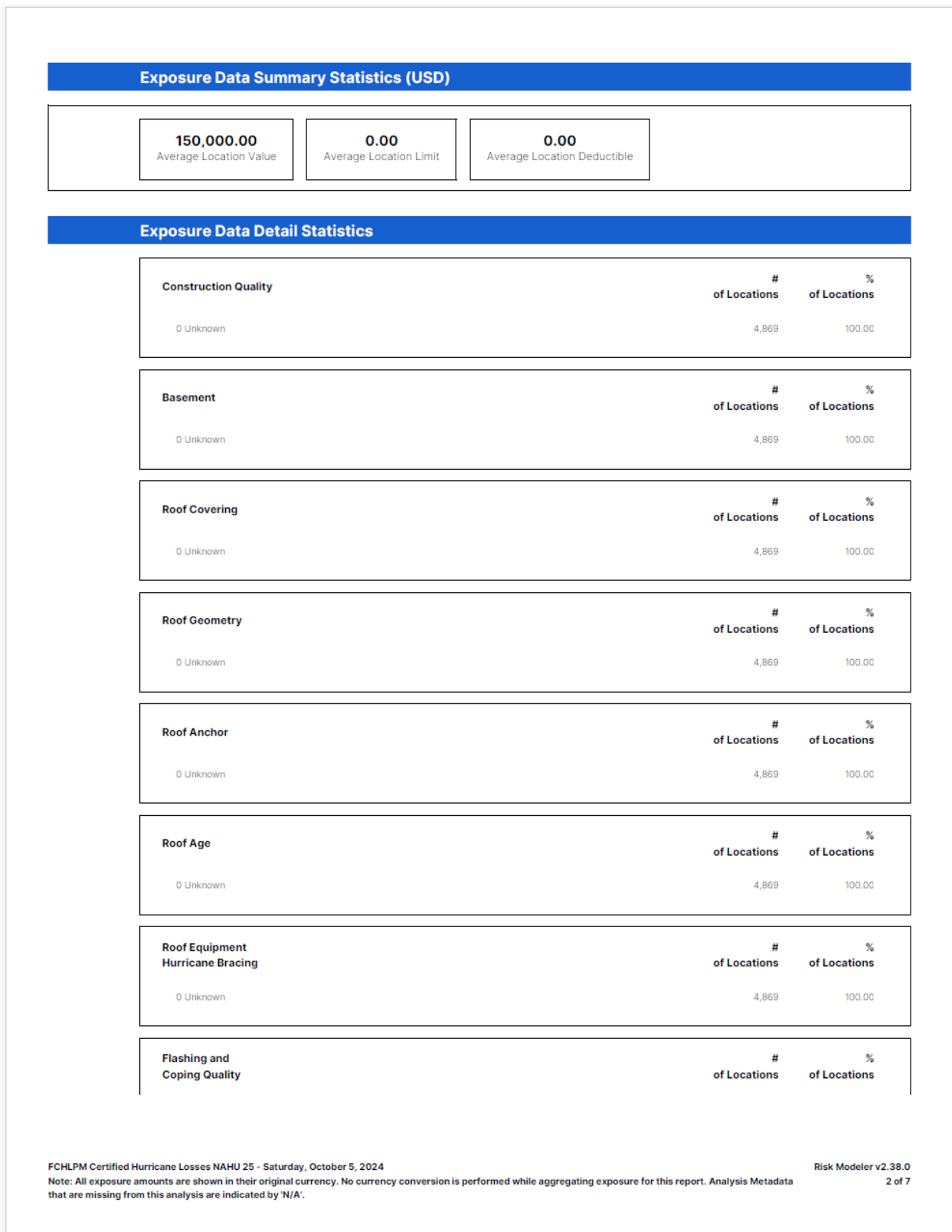


Figure 121: Risk Modeler analysis summary report (page 3 of 7)

0 Unknown	4,869	100.00
Commercial Appurtenant Structures	# of Locations	% of Locations
0 Unknown	4,869	100.00
Cladding Type	# of Locations	% of Locations
0 Unknown	4,869	100.00
Roof Sheathing Attachment	# of Locations	% of Locations
0 Unknown	4,869	100.00
Frame Foundation Connection	# of Locations	% of Locations
0 Unknown	4,869	100.00
Residential Appurtenant Structures	# of Locations	% of Locations
0 Unknown	4,869	100.00
Mec./Elec. Eqpt - Ground	# of Locations	% of Locations
0 Unknown	4,869	100.00

FCHLPM Certified Hurricane Losses NAHU 25 - Saturday, October 5, 2024

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report. Analysis Metadata that are missing from this analysis are indicated by 'N/A'.

Risk Modeler v2.38.0
3 of 7

Figure 122: Risk Modeler analysis summary report (page 4 of 7)

Opening Protection 0 Unknown	# of Locations	% of Locations
	4,869	100.00
WS Detail Valid Flag 1 Valid	# of Locations	% of Locations
	4,869	100.00
Address Match Level 5 Postal Code	# of Locations	% of Locations
	4,869	100.00
Number of Buildings 1	# of Locations	% of Locations
	4,869	100.00
Number of Stories 1	# of Locations	% of Locations
	4,869	100.00
Year Built 1973 - Present	# of Locations	% of Locations
	4,869	100.00
Location Valid Flag 1 Valid	# of Locations	% of Locations
	4,869	100.00
Coverage Damageability Grade 0 Unknown Damageable 3 Damageable	# of Locations	% of Locations
	14,607	75.00
	4,869	25.00

FCHLPM Certified Hurricane Losses NAHU 25 - Saturday, October 5, 2024
Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report. Analysis Metadata that are missing from this analysis are indicated by 'N/A'.

Risk Modeler v2.38.0
4 of 7

Figure 123: Risk Modeler analysis summary report (page 5 of 7)

Construction Class			
Scheme	Class	# of Locations	% of Locations
RMS	MASONRY	1,623	33.33
RMS	Manufactured/Mobile Home with Tie-Downs	1,623	33.33
RMS	WOOD	1,623	33.33

FCHLPM Certified Hurricane Losses NAHU 25 - Saturday, October 5, 2024

Risk Modeler v2.38.0

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report. Analysis Metadata that are missing from this analysis are indicated by 'N/A'.

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Figure 124: Risk Modeler analysis summary report (page 6 of 7)

Occupancy Type			
Scheme	Class	# of Locations	% of Locations
ATC	Permanent Dwelling (single family housing)	4,869	100.00

FCHLPM Certified Hurricane Losses NAHU 25 - Saturday, October 5, 2024

Risk Modeler v2.38.0

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report. Analysis Metadata that are missing from this analysis are indicated by 'N/A'.

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Figure 125: Risk Modeler analysis summary report (page 7 of 7)

Square Foot Bands		
Square Foot Bands	# of Locations	% of Locations
UNKNOWN	4,869	100.00
FCHLPM Certified Hurricane Losses NAHU 25 - Saturday, October 5, 2024		
Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report. Analysis Metadata that are missing from this analysis are indicated by 'N/A'.		
Risk Modeler v2.38.0		7 of 7

Figure 126: Risk Modeler post import summary (page 1 of 8)



Exposure Summary

Risk Modeler v2.38.0

Form A-1

Saturday, October 5, 2024

Windstorm
Peril

730.35 M
TIV

4,869
Accounts

0
Policies

4,869
Locations

Portfolio Number

00 - All Locations

TIV

730,350,000.00

Geocoding Version

25.0

Database Name

FORMA1_NAHU25GEO_-EDM

Hazard Version

25.0

Location

Location Coverage Values and Limits

Valid	Location Coverage Count	Location Coverage Value	Location Coverage Limit
Yes	19,476	730,350,000.00	0.00
Total	19,476	730,350,000.00	0.00

Valid Location Coverage Values

Loss Type	Location Coverage Count	Valid Location Coverage Value	Minimum Value	Maximum Value	Average Value
Building	9,738	446,325,000.00	5,000.00	100,000.00	45,833.33
Contents	4,869	202,875,000.00	25,000.00	50,000.00	41,666.67
BI	4,869	81,150,000.00	10,000.00	20,000.00	16,666.67
Total	19,476	730,350,000.00			

Valid Location Coverage Limits

Loss Type	Location Coverage Count	Valid Location Coverage Limit	Minimum Limit	Maximum Limit	Average Limit
Total	0	0			

Valid Location Coverage Law and Ordinance Limit Extensions

Loss Type	Location Coverage Count	Valid Location Coverage Value	Minimum Value	Maximum Value	Average Value
Total	0	0			

Form A-1 - Saturday, October 5, 2024

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

Risk Modeler v2.38.0
1 of 8

Figure 127: Risk Modeler post import summary (page 2 of 8)

Geocoded Values and Limits			
Geocoded	Location Count	Location Coverage Value	Location Coverage Limit
Yes	4,869	730,350,000.00	0.00
Total	4,869	730,350,000.00	0.00

Site

Site Limits		
Valid	Location Count	Site Limit
Yes	4,869	0.00
Total	4,869	0.00

Valid Site Limits		
Minimum Site Limit	Maximum Site Limit	Average Site Limit
-	-	-

Account and Policy

Account		
Valid	Account Count	Location Coverage Value
Yes	4,869	730,350,000.00
Total	4,869	730,350,000.00

Policy Coverage Limits		
Valid	Policy Coverage Count	Policy Coverage Limits
Total	0	0

Valid Policy Coverage Limits				
Loss Type	Valid Policy Coverage Limit	Minimum Limit	Maximum Limit	Average Limit
Total	0			

Policy Limits		
Valid	Blanket Limits Count	Blanket Limits
Total	0	0

Valid Policy Limits		
Minimum Blanket Limit	Maximum Blanket Limit	Average Blanket Limit
-	-	-

Policy Dates	
0 Expired Policies	0 Active Policies

Form A-1 - Saturday, October 5, 2024

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

Risk Modeler v2.38.0

2 of 8

Figure 128: Risk Modeler post import summary (page 3 of 8)

Line of Business

Policy Limits

Line of Business	Valid Location Coverage Value

Total	0

Form A-1 - Saturday, October 5, 2024

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

Risk Modeler v2.38.0

3 of 8

Figure 129: Risk Modeler post import summary (page 4 of 8)

Construction Class		
Schema	Class	Valid Location Coverage Value
RMS	MASONRY	292,140,000.00
RMS	Manufactured/Mobile Home with Tie-Downs	146,070,000.00
RMS	WOOD	292,140,000.00
Total		730,350,000.00
Occupancy Class		
Schema	Class	Valid Location Coverage Value
ATC	Permanent Dwelling (single family housing)	730,350,000.00
Total		730,350,000.00
Form A-1 - Saturday, October 5, 2024 Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.		
		Risk Modeler v2.38.0 4 of 8

Figure 130: Risk Modeler post import summary (page 5 of 8)

Geocoding Resolution		
Resolution	Location Count	Location Coverage Value
Postal Code	4,869	730,350,000.00
Total	4,869	730,350,000.00

Form A-1 - Saturday, October 5, 2024

Risk Modeler v2.38.0

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

5 of 8

Figure 131: Risk Modeler post import summary (page 6 of 8)

Area		
Country	State	Valid Location Coverage Value
US	FL	730,350,000.00
Total		730,350,000.00
Country	CRESTA	Valid Location Coverage Value
US		730,350,000.00
Total		730,350,000.00
Form A-1 - Saturday, October 5, 2024		
Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.		
Risk Modeler v2.38.0		6 of 8

Figure 132: Risk Modeler post import summary (page 7 of 8)

Peril Details (Windstorm)

DISTCOAST	Valid Location Coverage Value
>= 0.0 and < 0.2	38,700,000.00
>= 0.2 and < 0.5	35,550,000.00
>= 0.5 and < 1.0	46,800,000.00
>= 1.0 and < 2.5	113,400,000.00
>= 2.5 and < 5.0	85,950,000.00
>= 5.0 and < 10.0	88,650,000.00
>= 10.0 and < 25.0	121,950,000.00
>= 25.0 and < 100.0	199,350,000.00
Total	730,350,000.00

Aggregate US Windstorm Exposures for Coastal Counties by Geocoding Resolution

Tier 1	State	Geocoding Resolution	# of Locations	Location Cov Values
	FL	Postal Code	3,462	519,300,000.00
		Total	3,462	519,300,000.00
	All Tier 1 counties	Postal Code	3,462	519,300,000.00
		Total	3,462	519,300,000.00

Tier 2	State	Geocoding Resolution	# of Locations	Location Cov Values
	FL	Postal Code	1,239	185,850,000.00
		Total	1,239	185,850,000.00
	All Tier 2 counties	Postal Code	1,239	185,850,000.00
		Total	1,239	185,850,000.00

Total for Tier 1 and Tier 2 counties705,150,000.00

Aggregate US Windstorm Exposures for Coastal Counties by Unknown Building Characteristics

Total for Tier 1 and Tier 2 counties0

Form A-1 - Saturday, October 5, 2024

Note: All exposure amounts are shown in their original currency. No currency conversion is performed while aggregating exposure for this report.

Risk Modeler v2.38.07 of 8

Figure 133: Risk Modeler post import summary (page 8 of 8)

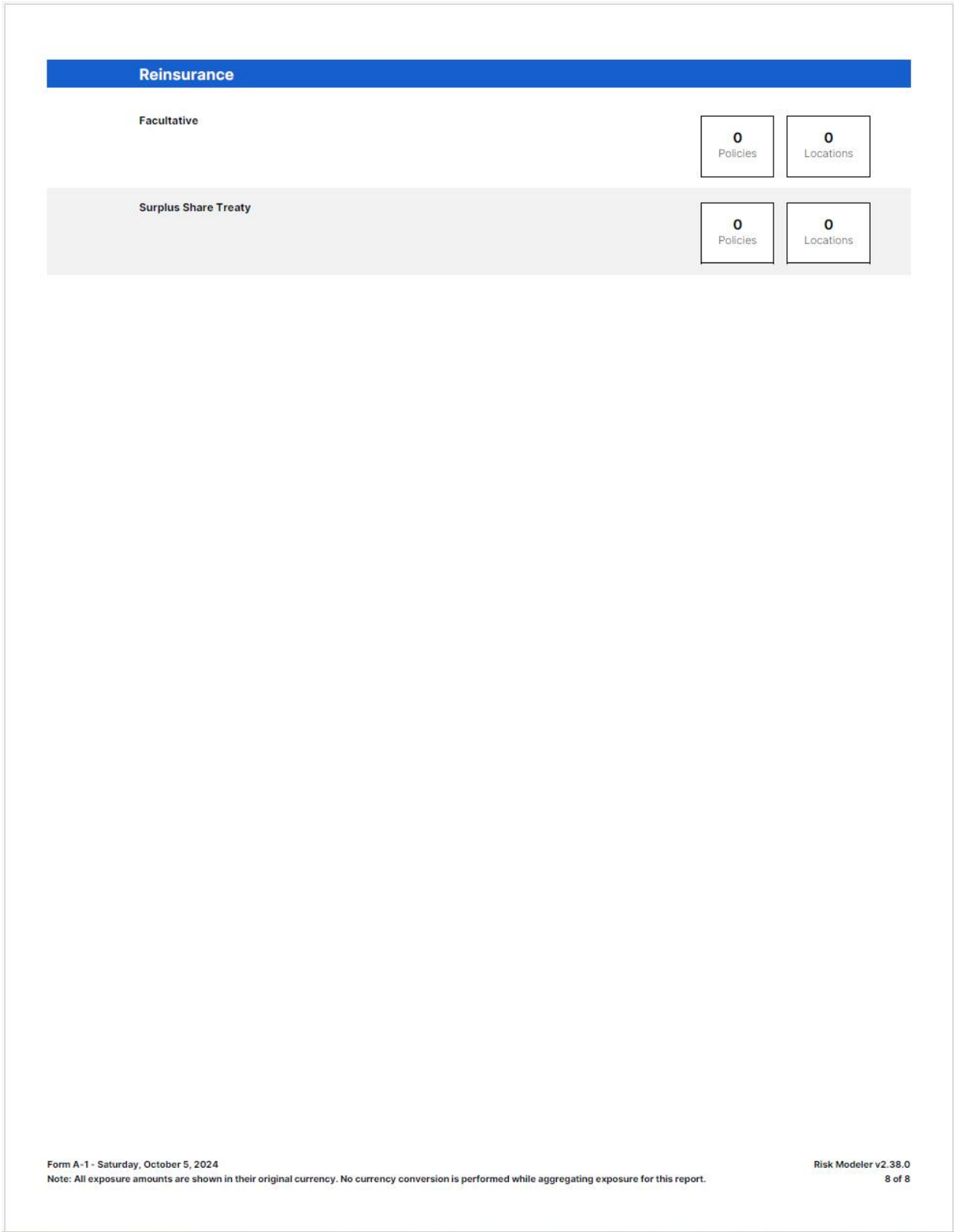


Table 54: Example of client output table showing application of annual deductible factors

North Atlantic Hurricane Models 25.0 (Build 2450)						
						Signature: _____
						Date: _____
Instructions:						
In order to verify that the annual deductible factors have been applied to the model output, clients should report the following results as evidence of appropriate application:						
a.) portfolio level occurrence deductible gross AAL and the annual deductible gross AAL,						
b.) selected return period losses for each of occurrence deductibles and annual deductibles, and						
c.) for three sample locations in the portfolio, location level occurrence deductible gross AAL and the annual deductible gross AAL.						
Client Information:						
		Client Name: _____				
		Model Version: _____				
		Annual Deductible Factors Used (AOP/Non-AOP): _____				
Portfolio Level Model Output:						
AAL	Portfolio Name	Number of Accounts/Locations	Gross Occurrence Deductible AAL	Gross Annual Deductible AAL	Ratio: (Annual AAL) / (Occurrence AAL)	
100 year RPL			100-year RPL with Occurrence Deductible	100-year RPL with Annual Deductible	Ratio: (Annual 100 RPL) / (Occurrence 100 AAL)	
250 year RPL			250-year RPL with Occurrence Deductible	250-year RPL with Annual Deductible	Ratio: (Annual 250 RPL) / (Occurrence 250 AAL)	
Location Level Model Output:						
Location Identifier	Postal Code	LOB-Construction Type	HU Deductible Amount	Gross Occurrence AAL	Gross Annual Deductible AAL	Ratio: Annual / Occurrence

APPENDIX G – ACRONYMS

Table 55: Acronym definitions

Acronym	Definition
AAL	Average annual loss
ACM	Association for Computing Machinery
AEP	Aggregate exceedance probability
AIA	American Institute of Architects
ALE	Additional living expenses
AOP	All other perils
Amax	Angle to maximum winds
ARA	Applied Research Associates,
ASCE	American Society of Civil Engineers
ArcGIS	ArcGIS is a family of client, server and online geographic information system software developed and maintained by ESRI
ASOS	Automated Surface Observing System
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
BA	Bachelor of arts
BE	Bachelor of engineering
BI	Business interruption
BS	Bachelor of science
BSE	Bachelor of science in engineering
BTech	Bachelor of technology
C-MAN	Coastal Marine Automated Network
CDF	Cumulative distribution function
CI	Claims Inflation
CO	Condo owner
CP	Central pressure
CV	coefficient of variation
CVM	Component vulnerability model
DEA	Diploma of profound studies
DLL	Dynamic link libraries
DLM	Detailed Loss Model
DMG	German Meteorological Society
DOI	Department of Insurance
EDS	Economic demand surge
EDT	Effective down time
EGC	Enterprise grid computing
EIFS	Exterior insulation and finish systems
EOF	Empirical orthogonal functions
EP	Exceedance probability
EPRs	Expected percentage reductions
ES	Edge systems
ESRI	Environmental Systems Research Institute
FCAS	Fellow of the Casualty Actuarial Society
FCHLPM	Florida Commission on Hurricane Loss Projection Methodology
FCMP	Florida Coastal Monitoring Program
FEMA	Federal Emergency Management Agency
FFP	Far field pressure
FHCF	Florida Hurricane Catastrophe Fund

Acronym	Definition
ft	Foot/feet
GB	Gigabyte
GIS	Geographic information systems
GPS	Global positioning system
HAZUS	Federal Emergency Management Agency Hazards United States
HCI	Human-Computer Interaction
HOA	Condo association
hPa	Hectopascal – unit of pressure
HPC	High performance computing
HTTPS	Hypertext Transfer Protocol Secure
HUD	U.S. Housing and Urban Development
HURDAT	HURricane DATabase
HWind	Moody's RMS Real-time Hurricane Wind Analysis System
HWS	High wind schedule
IBHS	Insurance Institute for Business and Home Safety
IEDs	Industry exposure databases
IEEE	Institute of Electrical and Electronics Engineers
ILCs	Industry loss curves
ISD	Integrated surface database
JIRA	[brand name of Issue tracking software]
km	Kilometer
LOB	Line of business
LULC	Land use land cover
m	Meter
mb	Millibars
m/s	Meter per second
MAAA	Member American Academy of Actuaries
MBA	Master of business administration
MCA	Master of computer application
MDA	MacDonald, Dettwiler and Associates
MDR	Mean damage ratio
MFD	Multi-family dwelling
MH	Mobile/Manufactured Home
mi	Mile
MIS	Master of international studies
Mph	Mile per hour
MPhys	Masters of physics
MPIUA	Massachusetts Property Insurance Underwriting Association
MS	Master of science
MSc or MSci	Master of science
MSXML	Microsoft XML Core Services
NCARB	National Council of Architectural Registration Boards
NCDC	National Climatic Data Center
NDBC	National Data Buoy Center
NHC	National Hurricane Center
NLCD	National land cover database
NOAA	National Oceanic and Atmospheric Administration
OEP	Occurrence exceedance probability
OIR	Office of Insurance Regulation

Acronym	Definition
OSB	Oriented strand board
PCS	Property Claims Services
pdf	Probability density function
PhD	Doctor of philosophy
PLA	Post-event loss amplification
PLC	Public Limited Company
PV	Photovoltaic
QA	Quality assurance
QGIS	Quantum Geographic Information System
RAM	Random access memory
RES	Residential
RL	RiskLink
RM	Reinforced masonry
Rmax	Radius to maximum winds
RMS	Risk Management Solutions, Inc.
ROA	Report of activities
RPL	Return period loss
SBC	Standard building code
SFBC	Standard Florida building code
SMO	Server management objects
SP	Software patch
sq ft	Square foot
SQL	[brand name of relational database management system]
SWR	Secondary water resistance
TB	Terabyte
TFS	Team foundation server
TIV	Total insured value
TTUHRT	Texas Tech Hurricane Research Team
URM	Unreinforced masonry
USB	Universal serial bus
USPS	U.S. Postal Service
UTC	Coordinated universal time
UX	User experience
Vmax	Maximum wind
VPC	Virtual private cloud
VRG	Variable resolution grid
XML	Extensible markup language