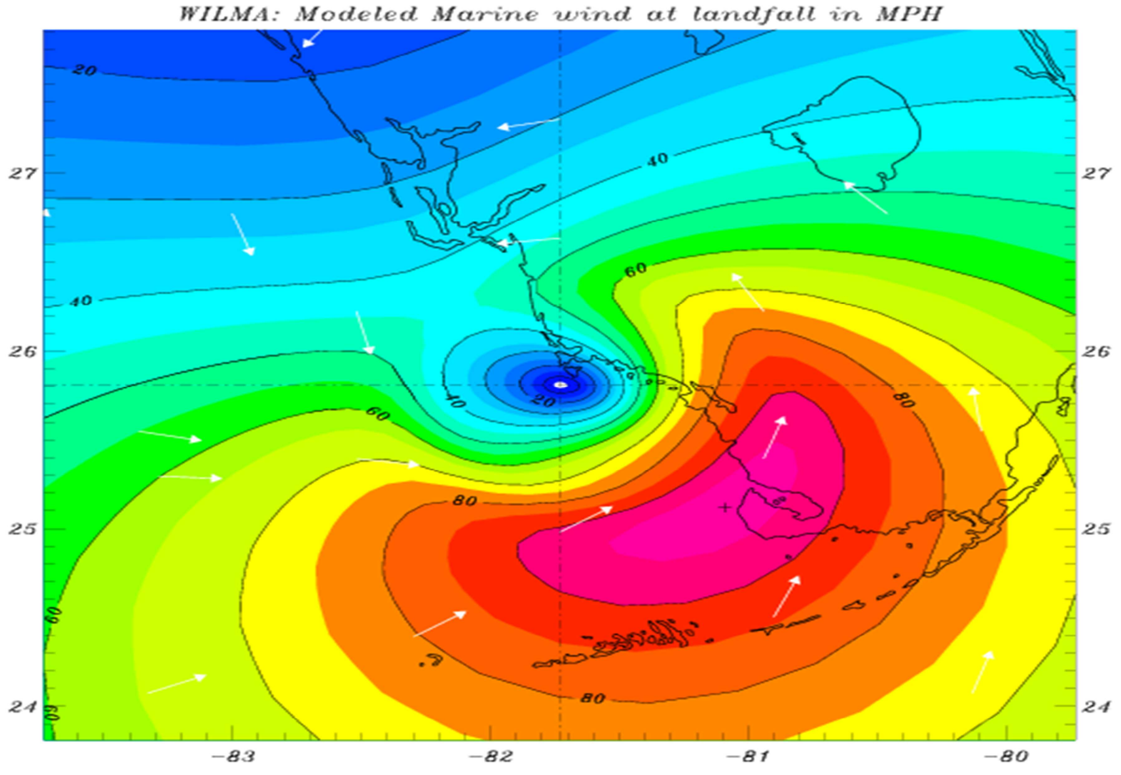
FLORIDA
PUBLIC HURRICANE LOSS MODEL 4.1

Submitted in compliance with the 2009 Standards of the
Florida Commission on Hurricane Loss Projection Methodology
Revision Submitted on July 11, 2011



Model Identification

Name of Model and Version: Florida Public Hurricane Loss Model 4.1

Name of Modeling Organization: Florida International University

Street Address: International Hurricane Research Center, MARC 360

City, State, ZIP Code: Miami, Florida 33199

Mailing Address, if different from above: Same as above

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Date: July 11, 2011

June 8, 2011

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

Dear Commission Chairman:

I am pleased to inform you that the corrected version 4.1 of Florida Public Hurricane Loss Model is ready for review by the Commission. The FPHLM model has been reviewed by professionals having credentials and/or experience in the areas of meteorology, engineering, actuarial science, statistics and computer science; for compliance with the Standards, as documented by the expert certification forms G1-G7.

Enclosed are 20 bound copies of our submission, which includes the summary statement of compliance with the standards, the forms, and the submission checklist. Also enclosed are 21 CDs containing the submission document, output files and forms, including one with no track changes in the submission document.

Please contact me if you have any questions regarding this submission.

Sincerely,

Shahid Hamid, Ph.D, CFA
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Director, Laboratory for Insurance, Economic and Financial Research
International Hurricane Research Center
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Cc: Kevin M. McCarty, Insurance Commissioner

Statement of Compliance and Trade Secret Disclosure Items

The Florida Public Hurricane Loss Model v4.1 is intended to comply with each Standard of the 2009 Report of Activities released by the Florida Commission on Hurricane Loss Projection Methodology. The required disclosures, forms, and analysis are contained herein.

The source code for the loss model will be available for review by the Professional Team.

Model Submission Checklist

1. Please indicate by checking below that the following has been included in your submission to the Florida Commission on Hurricane Loss Projection Methodology.

Yes	No	Item
X		1. Letter to the Commission
X		a. Refers to the Certification Forms and states that professionals having credentials and/or experience in the areas of meteorology, engineering, actuarial science, statistics, and computer science have reviewed the model for compliance with the Standards
X		b. States model is ready to be reviewed by the Professional Team
X		c. Any caveats to the above statements noted with a complete explanation
X		2. Summary statement of compliance with each individual Standard and the data and analyses required in the Disclosures and Forms
X		3. General description of any trade secret information the modeler intends to present to the Professional Team
X		4. Model Identification
X		5. 20 Bound Copies (duplexed)
X		6. 20 CDs containing:
X		a. Submission text in PDF format
X		b. PDF file highlightable and bookmarked by Standard, Form, and section
X		c. Data file names include abbreviated name of modeler, Standards year, and Form name (when applicable)
X		d. Forms A-1 and S-6 in PDF format
X		e. Forms M-1, M-3, V-2, A-1, A-3, A-4, A-5, A-6, A-7, and A-9 in Excel format
X		f. Form S-6 in ASCII format
X		7. Table of Contents
X		8. Materials consecutively numbered from beginning to end starting with the first page (including cover) using a single numbering system
X		9. All tables, graphs, and other non-text items consecutively numbered using whole numbers
X		10. All tables, graphs, and other non-text items specifically listed in Table of Contents
X		11. All tables, graphs, and other non-text items clearly labeled with abbreviations defined
X		12. All column headings shown and repeated at the top of every subsequent page for Forms and tables
X		13. Standards, Disclosures, and Forms in *italics*, modeler responses in non-italics
X		14. Graphs accompanied by legends and labels for all elements
X		15. All units of measurement clearly identified with appropriate units used
X		16. Hard copy of all Forms included in submission document except Forms A-1 and S-6

2. Explanation of "No" responses indicated above. (Attach additional pages if needed.)

Florida Public Hurricane Loss Model 4.1 | S. Hamid | July 11, 2011

Model Name | Modeler Signature | Date

Table of Contents

List of Figures

List of Tables

GENERAL STANDARDS

G-1 Scope of the Computer Model and Its Implementation

The computer model shall project loss costs and probable maximum loss levels for residential property insured damage from hurricane events.

The Florida Public Hurricane Loss Model estimates loss costs and probable maximum loss levels from hurricane events for personal lines and commercial lines of residential property. The losses are estimated for building, appurtenant structure, contents, and additional living expense (ALE).

Disclosures

1. ***Specify the model and program version number.***

The model name is Florida Public Hurricane Loss Model (FPHLM). The current version is 4.1.

2. ***Provide a comprehensive summary of the model. This summary shall include a technical description of the model including each major component of the model used to produce residential loss costs and probable maximum loss levels in the State of Florida. Describe the theoretical basis of the model and include a description of the methodology, particularly the wind components, the damage components, and the insured loss components used in the model. The description shall be complete and not reference unpublished work.***

The model is a very complex set of computer programs. The programs simulate probable future hurricane activity, including where and when hurricanes form; their tracks and intensities; their wind fields and sizes; how they decay and how they are affected by the terrain along the tracks after landfall; how the winds interact with different types of residential structures; how much they can damage roofs, windows, doors, interior, and contents, etc.; how much it will cost to rebuild the damaged parts; and how much of the loss will be paid by insurers. The model consists of three major components: wind hazard (meteorology), vulnerability (engineering), and insured loss cost (actuarial). It has over a dozen subcomponents. The major components are developed independently before being integrated. The computer platform is designed to accommodate future subcomponents or enhancements. Following is the description of each of the major components and the computer platform.

METEOROLOGY COMPONENT

Hurricane Track and Intensity

The storm track model generates storm tracks and intensities on the basis of historical storm conditions and motions. The initial seeds for the storms are derived from the HURDAT database. For historical landfalling storms in Florida and neighboring states, the initial positions, intensities, and motions are taken from the track fix 36 hours prior to first landfall. For historical storms that do not make landfall but come within 62 sm (100 km) of the coast, the initial conditions are taken from the track fix 36 hours prior to the point at which the storm first comes within 62 sm of the coast (threat zone) and has a central pressure below 1005 mb. Small, uniform random error terms are added to the initial position, the storm motion change, and the storm intensity change. The initial conditions derived from HURDAT are recycled as necessary to generate thousands of years of stochastic tracks. After the storm is initiated, the subsequent motion and intensity changes are sampled from empirically derived probability distribution functions over the model domain (Figure 1).

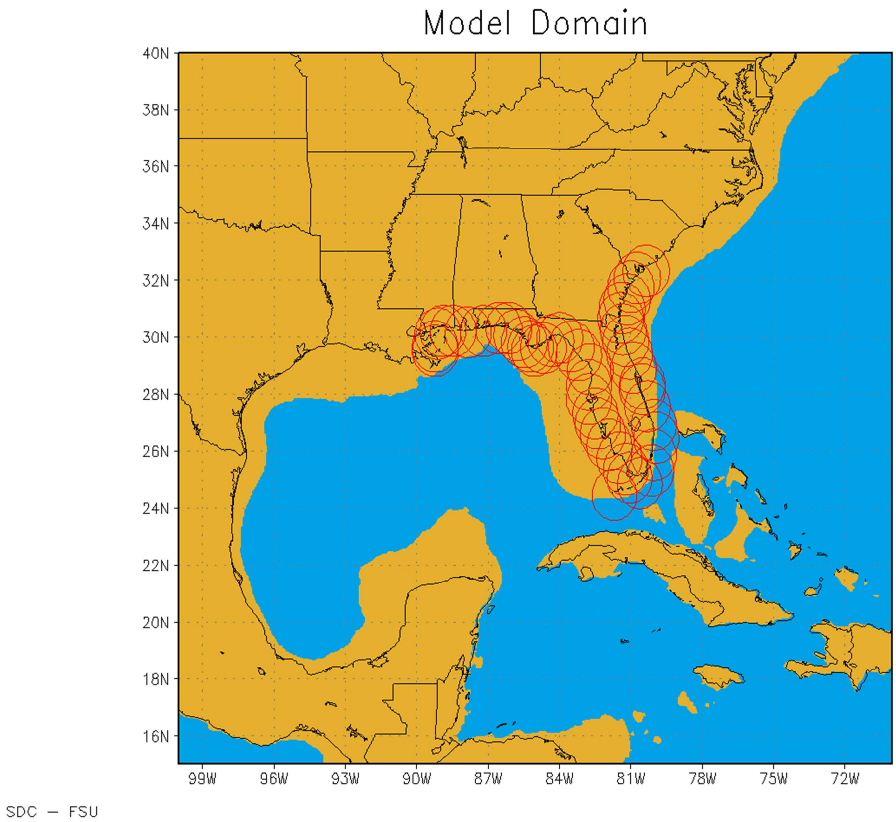

Figure 1. Florida Public Hurricane Loss Model domain. Circles represent the threat zone. Blue color indicates water depth exceeding 656 ft (200 m).

The time evolution of the stochastic storm tracks and intensity are governed by the following equations

$$\Delta x = c\cos(\theta)\Delta t / \cos(y)$$
$$\Delta y = c\sin(\theta)\Delta t$$
$$\Delta p = w\Delta t$$

where *(x,y)* are the longitude and latitude of the storm, (c,θ) are the storm speed and heading (in conventional mathematical sense), *p* is central pressure, *w* is the rate of change in *p*, and Δt is the time step. The time step of the model is currently one hour. The storm speed and direction changes $(\delta\theta,\delta c)$ are sampled at every 24-hour interval from a probability distribution function (PDF). The intensity change after the initial 24 hours of track evolution is sampled every six hours to capture the more detailed evolution over the continental shelf (shallow water). From the 24-hour change in speed and heading angle, we determine the speed and heading angle at each one-hour time step by assuming the storm undergoes a constant acceleration that gives the 24-hour sampled change in velocity. For changes in pressure, we first sample from a PDF of relative intensity changes, δr, for the six-hour period and then determine the corresponding rate of pressure change, *w*. The relative intensity is a function of the climatological sea surface temperatures and the upper tropospheric 100 mb temperatures. The PDFs of the changes $(\delta c, \delta\theta, \delta r)$ depend on spatial location, as well as the current storm motion and intensity. These PDFs are of the form

$$PDF(\delta a) = A(\delta a, a, x, y)$$

where *a* is either *c*, *θ*, or *r* and are implemented as discrete bins that are represented by multi-dimensional matrices (arrays), *A(l,m,i,j)*. The indices (*i,j*) are the storm location bins. The model domain (100W to 70W, 15N to 40N) is divided into 0.5-degree boxes. The index *m* represents the bin interval that *a* falls into. That is, the range of all possible values of *a* are divided into discrete bins, the number of which depends on the variable, and the index *m* represents the particular bin *a* is in at the current time step. As with *a,* the range of all possible values of the change in *a* are also discretely binned. Given a set of indices (*m,i,j),* which represent the current storm location and state, the quantity *A(l,m,i,j)* represents the probability that the change in *a*, δa, will fall into the *l'*th bin. When *A* is randomly sampled, one of the bins represented by the *l* index, e.g. *l'*, is chosen. The change of *a* is then assigned the midpoint value of the bin associated with *l'*. A uniform random error term equal to the width of bin *l'* is added to δa, so that δa may assume any value within the bin *l'*.

The PDFs described above were generated by parsing the HURDAT database and computing for each track the storm motion and relative intensity changes at every 24- and 6-hour interval, respectively, and then binning them. Once the counts are tallied, they are then normalized to obtain the distribution function. For intensity reports for which pressure is not available, a wind pressure relation developed by Landsea et al. (2004) is used. In cases where there is no pressure report for a track fix in the historical data but there are two pressure reports within a 24-hour period that includes the track fix, the pressures are derived by linear interpolation. Otherwise the pressure is derived by using the wind-pressure relation. Extra-tropical systems, lows, waves, and depressions are excluded. Intensity changes over land are also excluded from the PDFs. To ensure a sufficient density of counts to represent the PDFs for each grid box, counts from nearest neighbor boxes, ranging up to 2 to 5 grid units away (both north-south and east-west direction), are aggregated. Thus, the effective size of the boxes may range from 1.5 to 5.5 degrees but are generally a fixed size for a particular variable. The sizes of the bins were determined by finding a compromise between large bin sizes, which ensure a robust number of counts in each bin to define the PDF, and small bin sizes, which can better represent the detail of the distribution of storm motion characteristics. Detailed examinations of the distributions, as well as sensitivity tests, were done. Bin sizes need not be of equal width, and a nonlinear mapping function is used to provide unequal-sized bins. For example, most storm motion tends to be persistent, with small changes in direction and speed. Thus, to capture this detail, the bins are more fine-grained at lower speed and direction changes.

For intensity change PDFs, boxes which are centered over shallow water (defined to be less than 656 ft deep, see Figure 1) are not aggregated with boxes over deeper waters. Deeper waters may have significantly higher ocean heat content, which can lead to more rapid intensification [see, for example, Shay et al. (2000); DeMaria et al. (2005); Wada and Usui (2007)]. The depth that defines deep and shallow waters is not too critical, as the continental shelf drops rather sharply. The 200 m (656 ft) bathymetric contour line appears to distinguish well estimates of regions with high and low tropical cyclone heat potential (see http://www.aoml.noaa.gov/phod/cyclone/data/). When gridded long-term analyses of tropical cyclone heat potential, or similar characterization of oceanic heat content, become available, we intend to use that data in lieu of bathymetry.

In Figure 2 we show a sample of tracks generated by the stochastic track and intensity model.

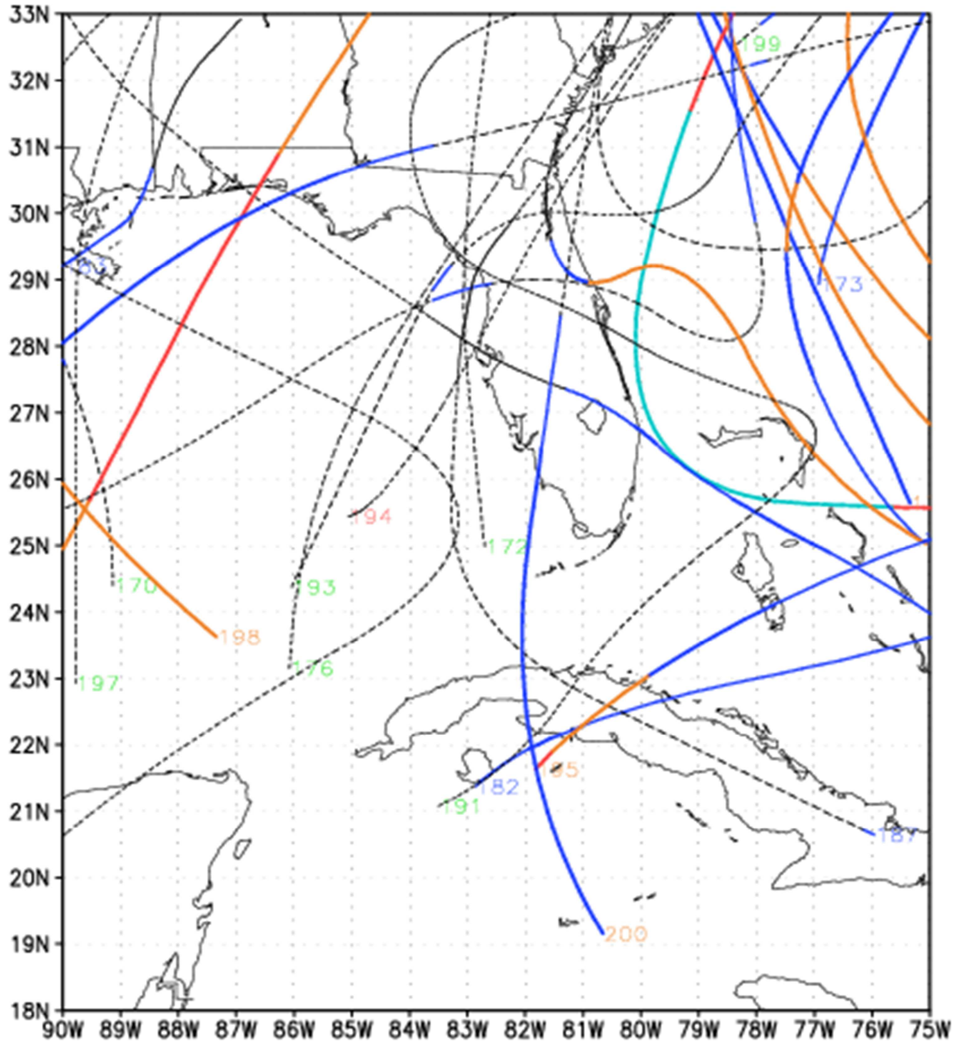

Figure 2. Examples of simulated hurricane tracks. Numbers refer to the stochastic track number, and colors represent storm intensity based on central pressure. Dashed lines represent tropical storm strength winds, and Cat 1–5 winds are represented by black, blue, orange, red, and turquoise, respectively.

When a storm is started, the parameters for radius of maximum winds and *Holland B* are computed and appropriate error terms are added as described below. The *Holland B* term is modeled as follows:

$$B = 1.74425 - 0.007915 Lat + 0.0000084 DelP^2 - 0.005024 Rmax$$

where *Lat* is the current latitude (degrees) of the storm center, *DelP* is the central pressure difference (mb), and *Rmax* is the radius of maximum winds (km). The random error term for the *Holland B* is modeled using a Gaussian distribution with a standard deviation of 0.286. Figure 3 shows a comparison between the Willoughby and Rahn (2004) *B* dataset (see Standard M-2.1) and the modeled results (scaled to equal the 116 measured occurrences in the observed dataset). The modeled results with the error term have a mean of about 1.38 and are consistent with the observed results. The figure indicates excellent agreement between model and observations.

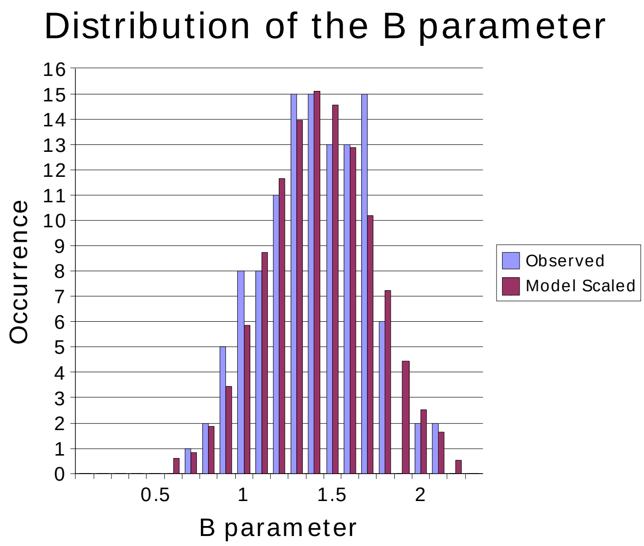

Figure 3. Comparison between the modeled and observed Willoughby and Rahn (2004) *B* dataset.

We developed an *Rmax* model using a landfall *Rmax* database, which includes 108 measurements for storms up to 2005. We have opted to model the *Rmax* at landfall rather than the entire basin for a variety of reasons. One is that the distribution of landfall *Rmax* may be different than that over open water. An analysis of the landfall *Rmax* database and the 1988–2007 DeMaria extended best track data shows that there appears to be a difference in the dependence of *Rmax* on central pressure (*Pmin*) between the two datasets (Demuth et al., 2006). The landfall dataset provides a larger set of independent measurements, more than 100 storms compared to about 31 storms affecting the Florida threat area region in the best track data. Since landfall *Rmax* is most relevant for loss cost estimation and has a larger independent sample size, we have chosen to model the landfall dataset. Future studies will examine how the extended best track data can be used to supplement the landfall dataset.

We modeled the distribution of *Rmax* using a gamma distribution. Using the maximum likelihood estimation method, we found the estimated parameters for the gamma distribution, $\hat{k} = 5.53547$ and $\hat{\theta} = 4.67749$. With these estimated values, we show a plot of the observed and expected distribution in Figure 4. The *Rmax* values are binned in 5 sm intervals, with the *x*-axis showing the end value of the interval.

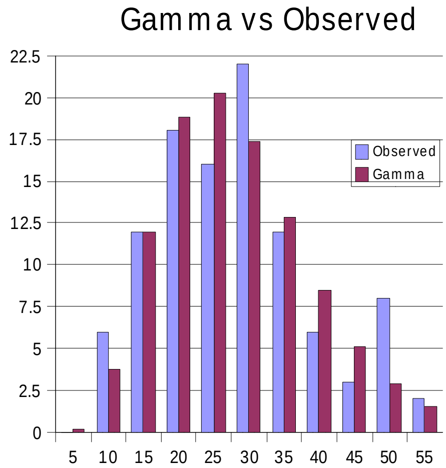

Figure 4. Observed and expected distribution for *Rmax*. The x-axis is the radius in statute miles, and the y-axis is the frequency of occurrence.

An examination of the *Rmax* database shows that intense storms, essentially Category 5 storms, have rather small radii. Thermodynamic considerations (Willoughby, 1998) also suggest that smaller radii are more likely for these storms. Thus, we model Category 5 (*DelP*>90 mb, where *DelP*=1013-*Pmin* and *Pmin* is the central pressure of the storm) storms using a gamma distribution, but with a smaller value of the θ parameter, which yields a smaller mean *Rmax* as well as smaller variance. We have found that for Category 1–4 (*DelP*<80) storms there is essentially no discernable dependence of *Rmax* on central pressure. This is further verified by looking at the mean and variance of *Rmax* in each 10 mb interval. Thus, we model Category 1–4 storms with a single set of parameters. For a gamma distribution, the mean is given by $k\theta$, and variance is $k\theta^2$. For Category 5 storms, we adjust θ such that the mean is equal to the mean of the three Category 5 storms in the database: 1935 No Name, 1969 Camille, and 1992 Andrew. An intermediate zone between *DelP*=80 mb and *DelP*=90 mb is established where the mean of the distribution is linearly interpolated between the Category 1–4 value and the Category 5 value. As the θ value is reduced, the variance is likewise reduced. Since there are insufficient observations to determine what the variance should be for Category 5 storms, we rely on the assumption that variance is appropriately described by the rescaled θ, via $k\theta^2$.

A simple method is used to generate the gamma-distributed values. A uniformly distributed variable, a product of the random number generator that is intrinsic to the FORTRAN compiler, is mapped onto the range of *Rmax* values via the inverse cumulative gamma distribution function. For computational efficiency, a lookup table is used for the inverse cumulative gamma distribution function, with interpolation between table values. Figure 5 shows a test using 100,000 samples of *Rmax* for Category 1–4 storms, binned in 1 sm intervals and compared with the expected values.

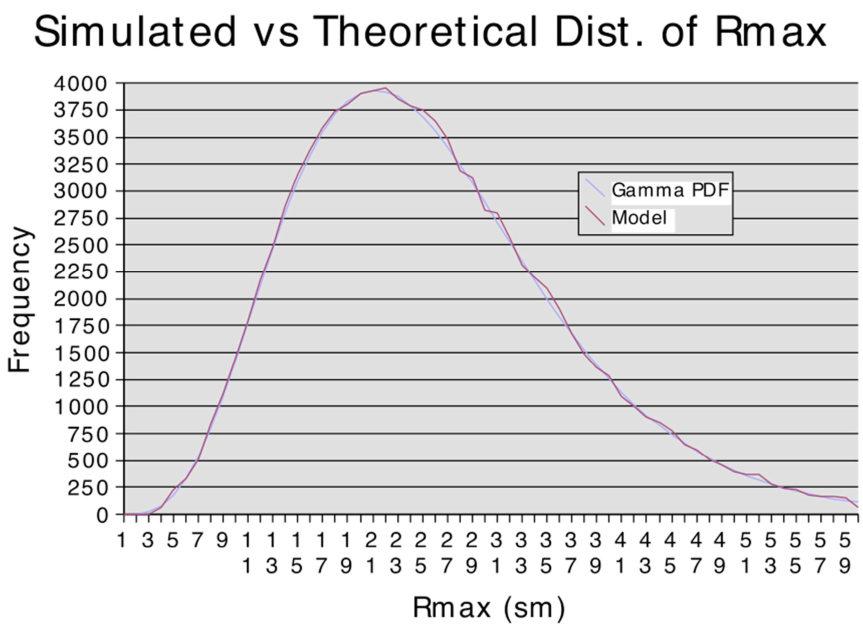

Figure 5. Comparison of 100,000 *Rmax* values sampled from the gamma distribution for Category 1–4 storms to the expected values.

For Category 5 and intermediate Category 4–5 storms, we use the property that the gamma cumulative distribution function is a function of (k,x/θ). Thus, by rescaling θ, we can use the same function (lookup table), but just rescale x (*Rmax*). The rescaled *Rmax* will still have a gamma distribution but with different mean and variance.

The storms in the stochastic model will undergo central pressure changes during the storm life cycle. When a storm is generated, an appropriate *Rmax* is sampled for the storm. To ensure the appropriate mean values of *Rmax* as pressure changes, the *Rmax* is rescaled every time step as necessary. As long as the storm has *DelP* < 80 mb, there is in effect no rescaling. In the stochastic storm generator, we limit the range of *Rmax* from 4 sm to 60 sm.

Storm landfall and decay over land are determined by comparing the storm location *(x,y)* with a 0.6 sm resolution land-sea mask. This land mask is obtained from the U.S. Geological Survey (USGS) land use cover data, and inland bodies of water have been reclassified as land to avoid spurious landfalls. Landfall occurs every time the storm moves from an ocean point to a land point as determined by this land mask. During landfall, the central pressure is modeled by a filling model described in Vickery (2005) and is no longer sampled from the intensity change PDFs. The Vickery (2005) model basically uses an exponentially decaying, in time, function of the central pressure difference with the decay coefficients varying by region on the basis of historical data. The pressure filling model also takes into account the speed and size of the storm. When the storm exits to sea, the land-filling model is turned off and sampling of the intensity change PDFs begins again. A storm is dissipated when its central pressure exceeds 1011 mb.

Wind Field Model

Once a simulated hurricane moves to within a threshold distance of a Florida ZIP Code, the wind field model is turned on. The model is based on the slab boundary layer concept originally conceived by

Ooyama (1969) and implemented by Shapiro (1983). Similar models based on this concept have been developed by Thompson and Cardone (1996), Vickery et al. (1995), and Vickery et al. (2000a). The model is initialized by a boundary layer vortex in gradient balance. Gradient balance represents a circular flow caused by balance of forces on the flow whereby the inward directed pressure gradient force is balanced by outward directed Coriolis and centripetal accelerations. The coordinate system translates with the hurricane vortex moving at velocity *c*. The vortex translation is assumed to equal the geostrophic flow associated with the large-scale pressure gradient. In cylindrical coordinates that translate with the moving vortex, equations for a slab hurricane boundary layer under a prescribed pressure gradient are

$$u\frac{\partial u}{\partial r}-\frac{v^2}{r}-fv+\frac{v}{r}\frac{\partial u}{\partial \phi}+\frac{\partial p}{\partial r}-K\left(\nabla^2 u-\frac{u}{r^2}-\frac{2}{r^2}\frac{\partial u}{\partial \phi}\right)+F(c,u)=0=\frac{\partial u}{\partial t}$$

$$u\left(\frac{\partial v}{\partial r}+\frac{v}{r}\right)+fu+\frac{v}{r}\frac{\partial v}{\partial \phi}-K\left(\nabla^2 v-\frac{v}{r^2}+\frac{2}{r^2}\frac{\partial u}{\partial \phi}\right)+F(c,v)=0=\frac{\partial v}{\partial t}$$

where *u* and *v* are the respective radial and tangential wind components relative to the moving storm; *p* is the sea level pressure, which varies with radius (*r*); *f* is the Coriolis parameter, which varies with latitude; ϕ is the azimuthal coordinate; *K* is the eddy diffusion coefficient; and *F*(*c*,*u*), *F*(*c*,*v*) are frictional drag terms. All terms are assumed to be representative of means through the boundary layer. The motion of the vortex is determined by the modeled storm track. The symmetric pressure field *p*(*r*) is specified by the Holland (1980) pressure profile with the central pressure specified according to the intensity modeling in concert with the storm track. The model for the *Holland B* pressure profile and the radius of maximum wind are described above. The wind field is solved on a polar grid with a 0.1 *R*/*Rmax* resolution. The input *Rmax* is adjusted to remove a bias caused by a tendency of the wind field solution to place *Rmax* one grid point radially outward from the input value.

The marine surface winds from the slab model are adjusted to land surface winds using a new surface friction model. The FPHLM now includes the ability to model losses at the "street level." To incorporate this feature, the treatment of land surface friction in the model has been enhanced to provide surface winds at high resolution and to take advantage of recent developments in hurricane boundary layer theory. The 10-minute winds from the slab model are interpolated to a 1 km (0.62 mi) fixed grid covering the entire state of Florida at every time step to obtain a wind swath for each storm. Surface friction is modeled using an effective roughness model (Axe, 2004) based on the Source Area Model of Schmidt and Oke (1990) that takes into account upstream surface roughness elements. The surface roughness elements are derived from the Multi-Resolution Land Characteristics Consortium (MRLC) National Land Classification Database (NLCD) 2001 land cover/land use dataset (Homer et al., 2004) and the Statewide 2004 Florida Water Management District land use classification data (available from the Florida Department of Environmental Protection). The effective roughness elements are computed for eight incoming wind directions on a grid of approximately 90 m (295 ft) resolution covering the entire state of Florida.

For modeling losses at the ZIP Code level, the effective roughness elements are aggregated over the ZIP Code by a weighted summation of the roughness elements according to population density determined from census block data.

The methodology for converting marine winds to actual terrain winds is based on Powell et al. (2003) and Vickery et al. (2009). This method assumes that wind at the top of the marine boundary layer is similar to the wind at the top of the boundary layer over land, and a modified log-wind profile is then used to determine the wind near the land surface. The winds are computed at various height levels that are needed for the vulnerability functions for residential and commercial residential structures.

The effect of the sea-land transition of hurricane winds coming onshore is modeled by modifying the terrain conversion methodology of Vickery et al. (2009). This modification is based on the concept of an internal boundary layer (IBL) (Arya, 1988) that develops as wind transitions from smooth to rough surface conditions. Winds above the IBL are assumed to be in equilibrium with marine roughness. In the equilibrium layer (EL), defined to be one-tenth of the IBL, the winds are assumed to be in equilibrium with the local effective roughness. Between the EL and IBL the winds are assumed to be in equilibrium with vertically varying step-wise changes in roughness associated with upstream surface conditions. This concept of multiple equilibrium layers is similar in philosophy to the method prescribed by the Engineering Sciences Data Unit (ESDU). The coastal transition function produces wind transitions that are very close to the ESDU and modified ESDU values reported in Vickery et al. (2009).

THE VULNERABILITY COMPONENT: PERSONAL RESIDENTIAL MODEL

The engineering component performs several tasks: (1) it estimates the physical damage to exterior components of typical buildings, including roof cover, roof decking, walls, and openings; (2) it assesses the interior and utilities damage and contents damage due to water penetration through exterior damage and defects to interior walls, ceiling, doors, etc.; (3) it combines the exterior and interior damage to estimate the building and content vulnerabilities; (4) it estimates additional living expenses; and (5) it estimates the appurtenant structure vulnerability (Pinelli et al., 2003a, 2003b, 2004a, 2004b, 2005a, 2005b, 2006, 2007a, 2007b, 2008a, 2008b, 2009a, 2010a, 2011; Cope, 2004; Cope et al., 2003a, 2003b, 2004b, 2005; Gurley et al., 2003).

Exposure Study

Personal residential single-family home buildings (PRB), either site built (Figure 6) or manufactured (Figure 7), are categorized into typical generic groups with similar structural characteristics, layout, and materials within each group. These buildings can suffer substantial external structural damage (in addition to envelope and interior damage), including collapse under hurricane winds. The approach to assessing damage for each of these building types is to model the building as a whole so that interactions among components can be accounted for. The models are intended to represent the majority of the PRB's in Florida.

An extensive survey of the Florida building stock was carried out to develop a manageable number of building models that represent the majority of the Florida residential building stock. The modelers analyzed several sources of data for building stock information. One source was the Florida Hurricane Catastrophe Fund (FHCF) exposure database. Another source was the Florida counties' property tax appraisers' databases. Although the database contents and format vary county to county, many of these databases contain the structural information needed to define common structural types. The 52 most populous counties were contacted to acquire their tax appraiser database, producing information from 33 counties. These 33 counties account for more than 90% of Florida's population. The residential buildings in each county database were divided into single-family residential buildings and mobile homes.

County property tax appraiser (CPTA) databases contain large quantities of building information, and it was necessary to extract those characteristics related to the vulnerability of buildings to wind. The available building characteristics vary from county to county and include some combination of the following: exterior wall material, interior wall material, roof shape, roof cover, floor covering, foundation, opening protection, year built, number of stories, area per floor, area per unit, and geometry of the building. The parameters important for modeling are roof cover, roof shape, exterior wall material, number of stories, year built, and building area. For each of these categories, the authors extracted statistical information. The dependency between critical building characteristics was also investigated. For example, it was found that roof shape and area of the building are strongly dependent on the year built. The survey statistics were calculated for different eras to account for the correlation between various factors and year built.

Figure 6. Typical single-family homes (Google Earth)

Figure 7. Manufactured homes (Google Earth)

The modelers divided Florida into four regions: North, Central, South, and the Keys. Geography and the statistics from the Florida Hurricane Catastrophe Fund (FHCF) provided guidance for defining regions that would have a similar building mix. For example, North Florida has primarily wood frame houses while South Florida primarily has masonry houses. Figure 8 shows the regions. Each county for which data were available is marked with a star and shaded.

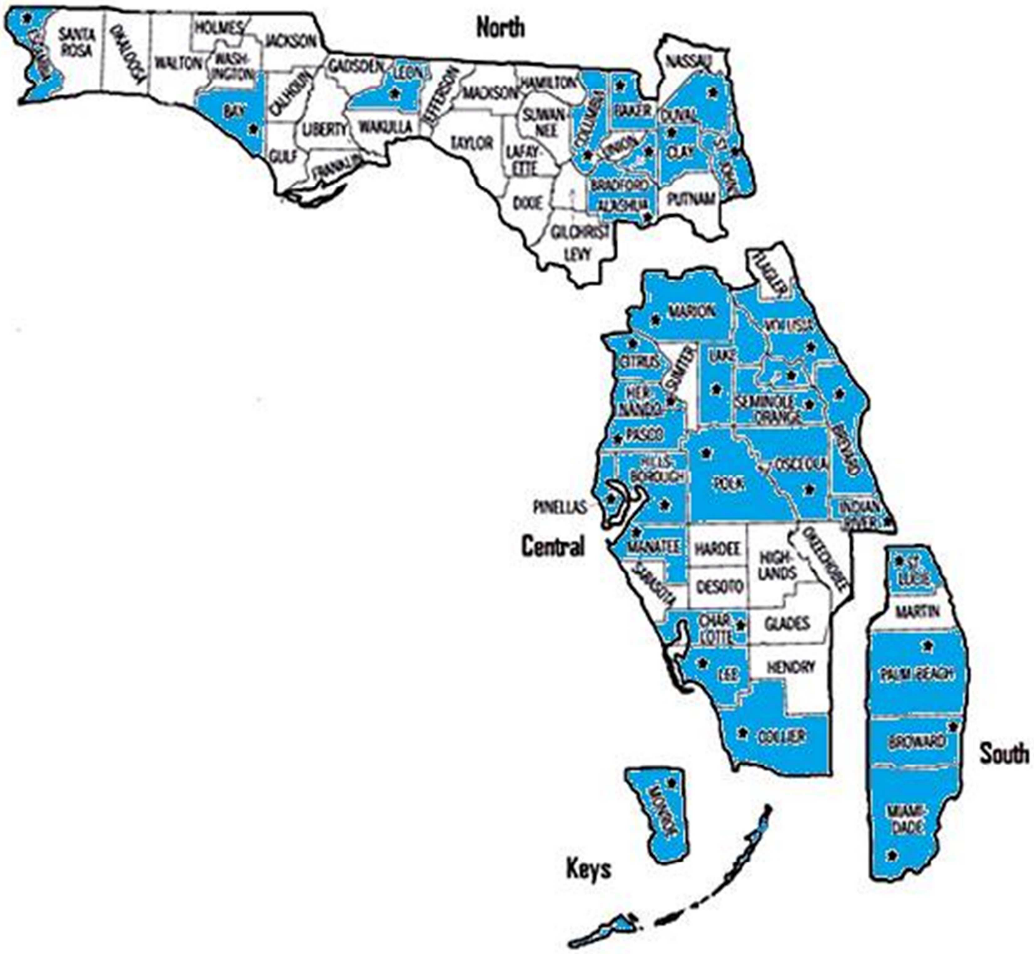

Figure 8. Regional Classification of Florida with the Corresponding Sample Counties (Blue and star)

Structural types are delineated by a combination of four characteristics: number of stories (either one or two), roof cover (either shingle or tile), roof shape (either gable or hip), and exterior wall material (either concrete blocks or timber). Statistics were computed for each structural type in every sampled county. Weighted average techniques were used to extrapolate the results to the remaining counties in each region.

Building Models

Site-Built Home Models

In addition to a classification of building by structural types (wood or masonry walls, hip or gable roof), it was also necessary to classify the buildings by relative strength to reflect changes in construction practice over many years. The vulnerability team has developed strong, medium, and weak strength models for each site-built structural type to represent relative quality of original construction as well as post-construction mitigation. The weak and medium models have additional variants that reflect both historical building practices, roof retrofits, and reroofing of existing structures as mandated by the newer building standards.

The three strength categories are based on the same model framework, in which strength is represented by the capacities assigned to the modeled building components. For example, the strong model differs from the weak model by stronger assigned capacities for roof-to-wall (r2w) and stud to sill connections, garage pressure capacity, cracking capacity of masonry walls, gable end walls, and decking and shingle capacities. The medium models differ from the weak models by improving the strength of the roof-to-wall connections, roof decking capacity, and masonry wall strength.

Any given strong, medium, or weak model may be altered by additional mitigation or retrofit measures individually or in combination. For example, from the base weak model, additional models were derived to represent historical building practices and mitigation techniques. The modified weak W10 model accounts for the use of tongue-and-groove plank decking in pre-1960s buildings. These buildings tend to exhibit higher deck strength capacities than the buildings with the plywood decking implemented in the base weak model, referred to as W00 (Shanmugam et al., 2009).

A modified medium model M10 was adopted that reflects the use of oriented strand board (OSB) decking with staples in the 1980s and pre-Andrew 1990s. This was considered an adequate alternative to nailed plywood at the time. It was, however, weaker in terms of wind resistance and was assigned a weaker deck attachment capacity than the standard medium model.

Finally, retrofitted weak W01 and medium M01 models were derived from the base weak and medium models. They represent the case in which a structure has been reroofed and the decking re-nailed according to current code requirements. On the basis of the average lifespan of a roof, reroofing would be required periodically throughout the structure’s lifetime and would result in an increase in the deck attachment capacity and shingle ratings to meet current building code requirements. The deck attachment capacities of these models were therefore upgraded to produce the retrofitted weak W01 and medium M01 cases. The roof cover was also upgraded to rated shingles.

The retrofitted and modified versions of the weak and medium models were developed for this submission in order to provide a finer model resolution of quality of construction for homes constructed prior to 1994 and a portion of the homes prior to 2002. These increase the number of models available to resolve building quality for approximately 80% of the existing single-family residential inventory in Florida. Currently, two applications of the strong model are utilized to represent construction quality for the remaining 20% of the single-family residential inventory (post-2001 construction). The strong model as presented in Table 1 is applied with opening protection to represent modern construction in the high velocity hurricane zone (HVHZ) and wind-borne debris region (WBDR), as per Florida Building Code (FBC) requirement. It is applied without opening protection for modern construction outside of HVHZ and WBDR. The distribution of the three weak models, three medium models and two strong models with respect to year built will be presented later in Table 6 and in the discussion of the models’ distribution in time.

Table 1 illustrates the basic models and their variations implemented in the FPHLM vulnerability library.

Table 1. Basic models – Weak, Medium, and Strong.

	Weak			Medium			Strong
	W00 (base)	W01 (retrofitted*)	W10 (modified**)	M00 (base)	M01 (retrofitted*)	M10 (modified***)	Strong (base)
Roof to wall	Weak	Weak	Weak	Medium	Medium	Medium	Strong
Stud to sill	Weak	Weak	Weak	Medium	Medium	Medium	Strong
Roof cover	Weak	Strong	Weak	Weak	Strong	Weak	Strong
Roof deck	Weak	Strong	Strong	Medium	Strong	Weak	Strong
Wall	Weak	Weak	Weak	Medium	Medium	Medium	Strong
Gable end	Weak	Weak	Weak	Weak	Weak	Weak	Strong
Garage	Weak	Weak	Weak	Weak	Weak	Weak	Strong
*retrofitted refers to re-roof and re-nailed decking, occurring post-1993 for HVHZ and Monroe, and post-2001 for everywhere else. No other retrofits are included. **modified weak refers to the base weak model with stronger decking to reflect the use of plank decking ***modified medium refers to the base medium model with weak decking to reflect the use of staples and/or OSB							

Manufactured Homes Model

On the basis of the exposure study, it was decided to model four manufactured home (MH) types: (1) pre-1994—fully tied down, (2) pre-1994—not tied down, (3) post-1994—Housing and Urban Development (HUD) Zone II, and (4) post-1994—HUD Zone III. The partially tied-down homes are assumed to have a vulnerability that is an average of the vulnerabilities of fully tied-down and not tied-down homes. Because little information is available regarding the distribution of manufactured home types by size or geometry, it is assumed that all model types are single-wide manufactured homes. The modeled single-wide manufactured homes are 56 ft x 13 ft, have gable roofs, eight windows, a front entrance door, and a sliding-glass back door.

Damage Matrices

Exterior Damage

The model accounts for a number of construction factors that influence the vulnerability of single-family dwellings, including classification (site-built or manufactured home), size, roof shape, location, age, and a variety of construction details and mitigation measures. The effects of mitigation measures such as code revisions and post-construction upgrades to the wind resistance of homes (e.g., new roof cover on an older home, shutter protection against debris impact, braced garage door, re-nailed roof decking, etc.) are accounted for both individually and in combination by modifying the statistical descriptors of the capacities of the various components. Thus the comparative vulnerability of older homes as built, older homes with combinations of mitigation measures, and homes constructed to the new code requirements can be estimated.

The vulnerability model uses a component-based Monte Carlo simulation to determine the external vulnerability at various wind speeds for the different building models. The approach accounts for the resistance capacity of the various building components, the wind-load effects from different directions, and associated uncertainties of capacity and loads to predict exterior damage at various wind speeds. The simulation relates probabilistic strength capacities of building components to a series of three-second peak gust wind speeds through a detailed wind and structural engineering analysis that includes effects of wind-borne debris. Damage to the structure occurs when the loads from wind or flying debris are greater than the components' capacity to resist them. The vulnerability of a structure at various wind speeds is estimated by quantifying the amount of damage to the modeled components. Damage to a given component may influence the loads on other components, e.g., a change in roof loading from internal pressurization due to a damaged opening. These influences are accounted for through an iterative process of loading, damage assessment, load redistribution, and reloading until convergence is reached. The flow chart in Figure 9 summarizes the Monte Carlo procedure used to predict the external damage. The random variables include wind speed, pressure coefficients, debris impact, and the resistances of the building components (roof cover, roof sheathing, openings, walls, connections).

The damage estimations are affected by uncertainties regarding the behavior and strength of the various components and the load effects produced by hurricane winds. Field and laboratory data that better define these uncertain behaviors can thus be directly included in the model by refining the statistical descriptors of the capacities, load paths, and applied wind loads.

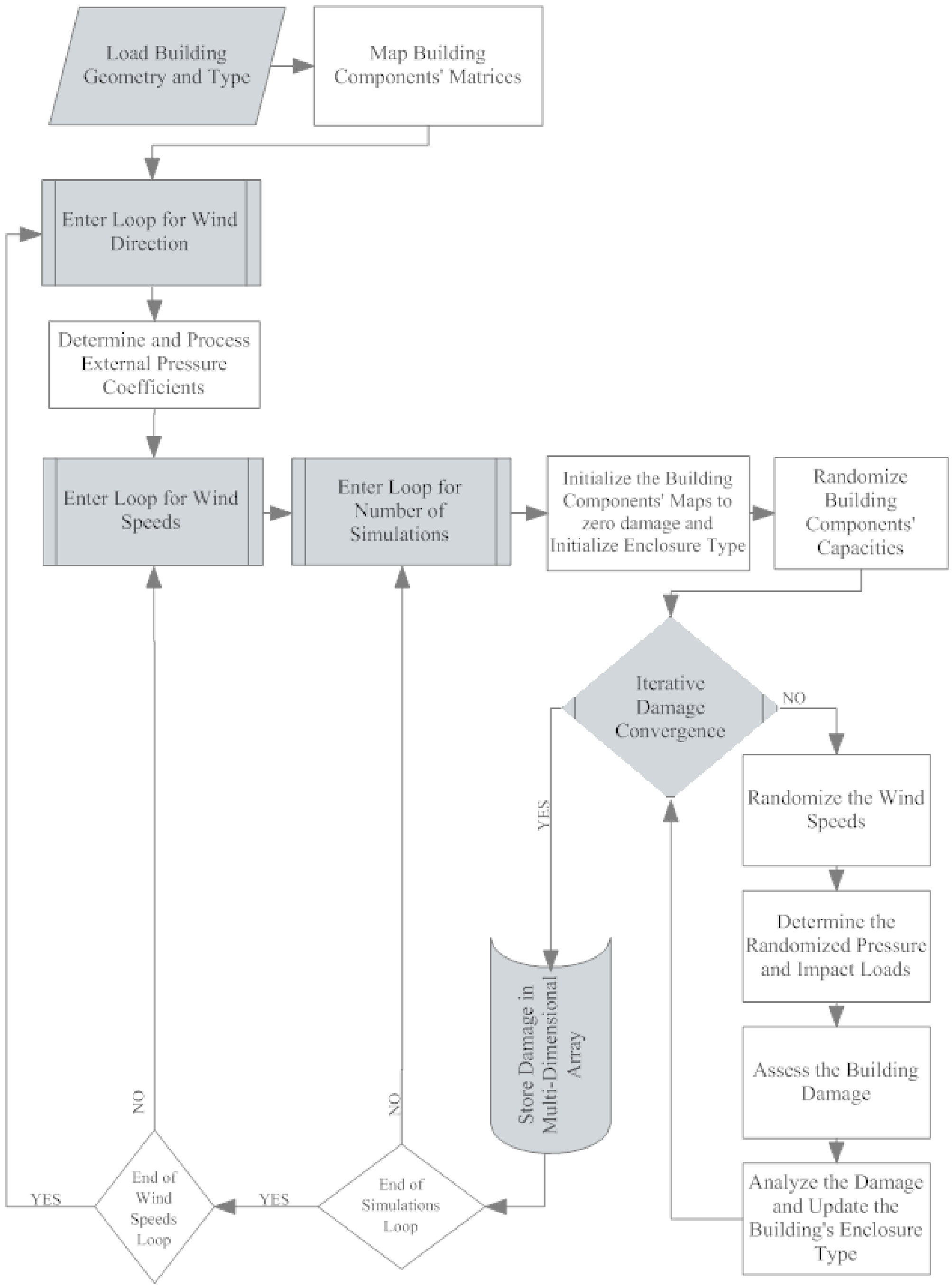

Figure 9. Monte Carlo simulation procedure to predict external damage.

The output of the Monte Carlo simulation model is an estimate of physical damage to structural and exterior components of the modeled home. The results are presented in the form of a damage matrix, where each row presents the output of an individual simulation. The 15 rows of this matrix (Table 2) correspond to damage to 14 components, and the internal pressure of the building upon completion of that simulation (column 11). A separate matrix is created for each peak three-second gust wind speed between 50 and 250 mph in 5 mph increments (50, 55, …, 250 mph) and for each wind angle between 0 and 315 degrees in 45-degree increments. A description of the values in each of the nine columns of the manufactured home damage matrix is given in Table 3. Note that internal pressure is not included as an output from the manufactured home model (Table 3). Changes in internal pressure due to breach are accounted for and utilized to quantify damage, but the final internal pressure value is not needed as an output.

Table 2. Description of values given in the damage matrices for site-built homes.

Col. #	Description of Value	Min Value	Max Value
1	% failed roof sheathing	0	100
2	% failed roof cover	0	100
3	% failed roof to wall connections	0	100
4	# of failed walls	0	4
5	# of failed windows	0	15
6	# of failed doors	0	2
7	y or n failed garage	0 = no	1 = yes
8	y or n envelope breached	0 = no	1 = yes
9	# of windows broken by debris impact	0	15
10	% of gable end panels broken	0	100
11	internal pressure	0	Not defined
12	% failed wall panels – front	0	100
13	% failed wall panels – back	0	100
14	% failed wall panels – side	0	100
15	% failed wall panels – side	0	100

Table 3. Description of values given in the damage matrices for manufactured homes.

Col #	Description of Value	Min Value	Max Value
1	# of failed windows (out of 8 for single wide)	0	8
2	# of broken windows that were broken by impact load case	0	8
3	# of failed doors (front and back = 2 total)	0	2
4	% of roof sheathing failed	0	100
5	% of roof cover failed	0	100
6	% of wall sheathing failed	0	100
7	# of failed roof to wall connections (out of 58)	0	58
8	sliding (0 = no sliding, 1 = minor sliding, 2 = major sliding)	0	2
9	overturning (0 = not overturned, 1 = overturned)	0	1

Interior and Utilities Damage

Once the external damage has been calculated for a given Monte Carlo simulation, the internal, utilities, and contents damages to the building are then extrapolated from the external damage. For the interior and utilities of a home, there is no explicit means by which to compute damage. Damage to the interior and utilities occurs when the building envelope is breached, allowing wind and rain to enter. Damage to roof sheathing, roof cover, walls, windows, doors, and gable ends present the greatest opportunities for interior damage. For manufactured homes, sliding and overturning are additional factors.

Interior damage equations were derived as functions of each of the external components. These equations are developed primarily on the basis of experience and engineering judgment. Observations of homes damaged during the 2004 hurricane season helped to validate these predictions. The interior equations are derived by estimating typical percentages of damage to each interior component, given a percentage of damage to an external component. The interior damage as a function of each modeled component is the same for both site-built and manufactured homes.

To model the uncertainties inherent in the determination of interior damage, the output of the equations is multiplied by a random factor with mean unity. The factor is assumed to have a Weibull distribution with tail length parameter 2. For the factor to have mean unity, the scale parameter must be 0.7854, resulting in a variance of 0.2732. This choice of Weibull parameters is assumed to be reasonable, and a sensitivity study was done to confirm that assumption and to show that it has no effect on the mean vulnerability, as expected.

To compute the total interior damage for each model simulation, all values in the damage matrices are converted to percentages of component damage. The interior equations are applied to each component, one at a time. The total interior damage for each simulation is the maximum interior damage value produced by these equations. The maximum value is used instead of a summation to avoid the possibility of counting the same interior damage more than once. That is, once water intrusion from one breach of the envelope has thoroughly damaged any part of the interior, further water intrusion from other sources will not increase the cost of the damage of that part.

Utilities damage is estimated on the basis of interior damage. A coefficient is defined for each utility (electrical, plumbing, and mechanical), which multiplies the interior equations defined for each component. As in the case of interior damage, the maximum value is retained as the total damage. The utilities coefficients are based on engineering judgment. In both site-built and manufactured homes, it is assumed that electrical damage occurs at half the rate of interior damage (0.5). Plumbing damage is set to 0.35 of interior damage for site-built homes and for manufactured homes. Mechanical damage is set to 0.4 of interior damage for site-built homes and for manufactured homes.

Contents Damage

As with the interior and utilities, the contents of the home are not modeled by Monte Carlo simulations. Contents damage is assumed to be a function of the interior damage caused by each failed component that causes a breach of the building envelope. The functions are based on engineering judgment and are validated using actual claims data.

Additional Living Expenses

Additional Living Expense (ALE) coverage covers only expenses actually paid by the insured. This coverage pays only the increase in living expenses that results directly from the covered damage and having to live away from the insured location. The value of an ALE claim is dependent on the time required to repair a damaged home and the surrounding utilities and infrastructure.

The equations and methods used for manufactured and residential homes are identical. However, it seems logical to reduce the manufactured home ALE predictions because typically a faster repair or replacement time may be expected for these home types. Therefore, an ALE multiplier factor of 0.75 was introduced into the manufactured home model.

Vulnerability Matrices

The estimates of total building damage result in the formulation of vulnerability matrices for each modeled building type. The flowchart in Figure 10 summarizes the procedure used to convert the Monte Carlo simulations of physical external damage into a vulnerability matrix.

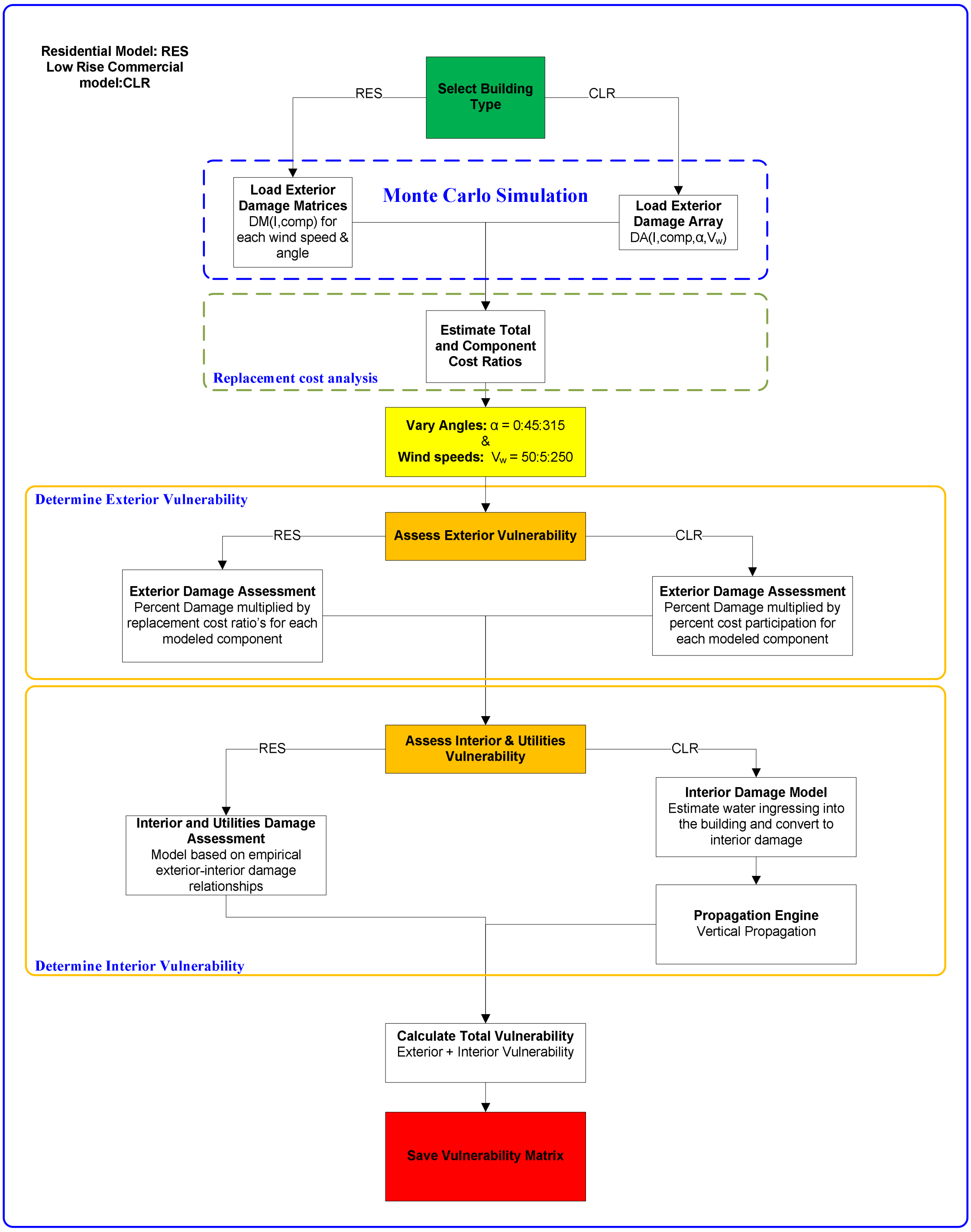

Figure 10. Procedure to create vulnerability matrix.

For each Monte Carlo model, 5000 simulations are performed for each of 8 different wind angles and 41 different wind speeds. This is 5000 x 8 x 41 = 1,640,000 simulations of external damage per model, which are then expanded to cover interior, utilities, and contents damage, plus ALE, as explained above.

Knowing the components of a home and the typical square footage, the cost of repairing all damaged components is estimated using cost estimation resources [e.g., RSMeans Residential Cost Data and

Construction Estimating Institute (Langedyk & Ticola, 2002)] and expert advice. These resources provide cost data from actual jobs based on estimates and represent typical conditions. Unmodeled nonstructural interior, plumbing, mechanical, and electrical utilities make up a significant portion of repair costs for a home.

Replacement cost ratios provide a link between modeled physical damage and the corresponding monetary losses. They can be defined as the cost of replacing a damaged component or assembly of a home divided by the cost of constructing a completely new home of the same type. The sum of the replacement cost ratios for all the components of a home is greater than 100% because the replacement costs include the additional costs of removal, repair, and remodeling.

An explicit procedure is used to convert physical damage of the modeled components to monetary damage. Since the replacement ratio of each modeled component is known, the monetary damage resulting from damage to a component expressed as a percentage of the home's value can be obtained by multiplying the damaged percentage of the component by the component's replacement ratio. For example, if 30% of the roof cover is damaged, and for this particular home type the replacement ratio of roof cover is 14%, the value of the home lost as a result of the damaged roof cover would be 0.30 x 0.14 = 4.2%. If the value of this home were $150,000, the cost to replace 30% of the roof would be $150,000 x 0.042 = $6,300. In addition, the costs will be adjusted as necessary because of certain requirements of the Florida building code that might result in an increase of the repair costs (for example, the code might require replacement of the entire roof if 30% or more is damaged).

After the simulation results have been translated into damage ratios, they are then transformed into vulnerability matrices. A total of 1032 matrices for site-built homes is created for different combinations of wall type (frame or masonry), region (North, Central, or South), subregion (high wind velocity zone, wind-borne debris region, or other), roof shape (gable or hip), roof cover (tile or shingle), window protection (shuttered or not shuttered), number of stories (one or two), and strength (base weak W00, modified weak W10, retrofitted weak W01, base medium M00, modified medium M10, retrofitted medium M01, or strong S).

The cells of a vulnerability matrix for a particular structural type represent the probability of a given damage ratio occurring at a given wind speed. The columns of the matrix represent three-second gust wind speeds at 10 m, from 50 mph to 250 mph in 5 mph bands. The rows of the matrix correspond to damage ratios (DR) in 2% increments up to 20%, and then in 4% increments up to 100%. If a damage ratio is DR= 15.3%, it is assigned to the interval 14%<DR<16% with a midpoint DR=15%. After all the simulations have been counted, the total number of instances in each damage interval is divided by the total number of simulations per wind speed to determine the percentage of simulations at any damage state occurring at each speed. These percentages are the conditional probabilities of occurrence of a level of damage, given a certain wind speed. A partial example of a vulnerability matrix is shown in Table 4.

Table 4. Partial example of vulnerability matrix.

Damage\Wind Speed (mph)	47.5 to 52.5	52.5 to 57.5	57.5 to 62.5	62.5 to 67.5	67.5 to 72.5
0% to 2%	1	0.99238	0.91788	0.77312	0.61025
2% to 4%	0	0.00725	0.0806	0.21937	0.36138
4% to 6%	0	0.00037	0.001395	0.007135	0.0235
6% to 8%	0	0	0.000125	0.000375	0.0025
8% to 10%	0	0	0	0	0.000375
10% to 12%	0	0	0	0	0.000375
12% to 14%	0	0	0	0	0.000625
14% to 16%	0	0	0	0	0.0005
16% to 18%	0	0	0	0	0.000125
18% to 20%	0	0	0	0	0.00012
20% to 24%	0	0	0	0	0.00025
24% to 28%	0	0	0	0	0

One important plot derived from the vulnerability matrix is the vulnerability curve. The vulnerability curve for any structural type is the plot of the mean damage ratio vs. wind speed. The model can also generate fragility curves (the probability of exceedance of any given damage level as a function of the wind speed) for each vulnerability matrix, although these curves are not used in the model.

Similar vulnerability matrices and vulnerability curves are developed for contents and ALE, one for each structural type. The whole process is also applied to manufactured homes.

Weighted Vulnerability Matrices

Building vulnerability matrices were created for every combination of region (Keys, South, Central, and North), construction type (masonry, wood, or other), roof shape (gable or hip), roof cover (tile or shingle), number of stories (one or two), shutters (with or without), and subregion (inland, wind-borne debris region, or high velocity hurricane zone). However, in general, there is little information available in an insurance portfolio file regarding the structural characteristics and the wind resistance of the insured property. Instead, insurance companies rely on the Insurance Services Office's (ISO) fire resistance classification. Portfolio files have information on ZIP Code and year built. The ISO classification is used to determine if the home is constructed of masonry, timber, or other. The ZIP Code is used to define the region and subregion. The year the home was built is used to assist in defining the strength to be assigned to the home.

Region, subregion, construction type, and year built are determined from the insurance files. This leaves the roof shape, roof cover, and shutter options undefined. From the exposure study of 33 Florida counties, the distribution of number of stories, roof shapes, and roof cover by age per region can be extrapolated. For each age group, we define a weighted matrix for each construction type in each region and subregion. The weighted matrices are the sum of the corresponding vulnerability model matrices weighted on the basis of their statistical distribution. For example, consider a masonry home built in the wind-borne debris region of central Florida in 1990. The exposure study indicates that 66% of such homes have gable roofs, 85% have shingle roof cover, and 20% have window shutters. Weight factors can be computed for each model matrix based on these statistics. For example, the Central Florida, gable, tile, no shutters, masonry matrix would have a weight factor of 66% (masonry percent gable) x 15% (percent tile) x 80% (percent without shutters) = 7.9%; this is the percentage of that home type that would be expected in this region, for that year built. Each model matrix is multiplied by its weight factor, and the results are summed. The final result is a weighted matrix that is a combination of all the model matrices and can be applied to an insurance policy if only the ZIP Code, year built, and ISO classification are known. As a result, for each subregion (inland, wind-borne debris region, and high velocity hurricane zone) of each region (Keys, South, Central, and North), there will be sets of weighted matrices (masonry, wood, and others) for weak, medium, and strong structures.

Age-Weighted Matrices

The year built or year of last upgrade of a structure in a portfolio might not be available when performing a portfolio analysis to estimate hurricane losses in a certain region. In that case, it becomes necessary to assume a certain distribution of ages in the region to develop an average vulnerability by combining weak, medium, and strong.

The tax appraisers' databases include effective year of construction and thus provide guidance as to how to weigh the combined weak, medium, and strong model results when year built information is not available in other portfolio files. In each region, the data were analyzed to provide the age statistics. These statistics were used to weigh the average of weak, medium, and strong vulnerabilities in each region. The results are shown in Figure 11 for the wind-borne debris zone in the Central region. The different weighted vulnerability curves are shown for the weak, medium, and strong models, superimposed with the age-weighted vulnerability curve.

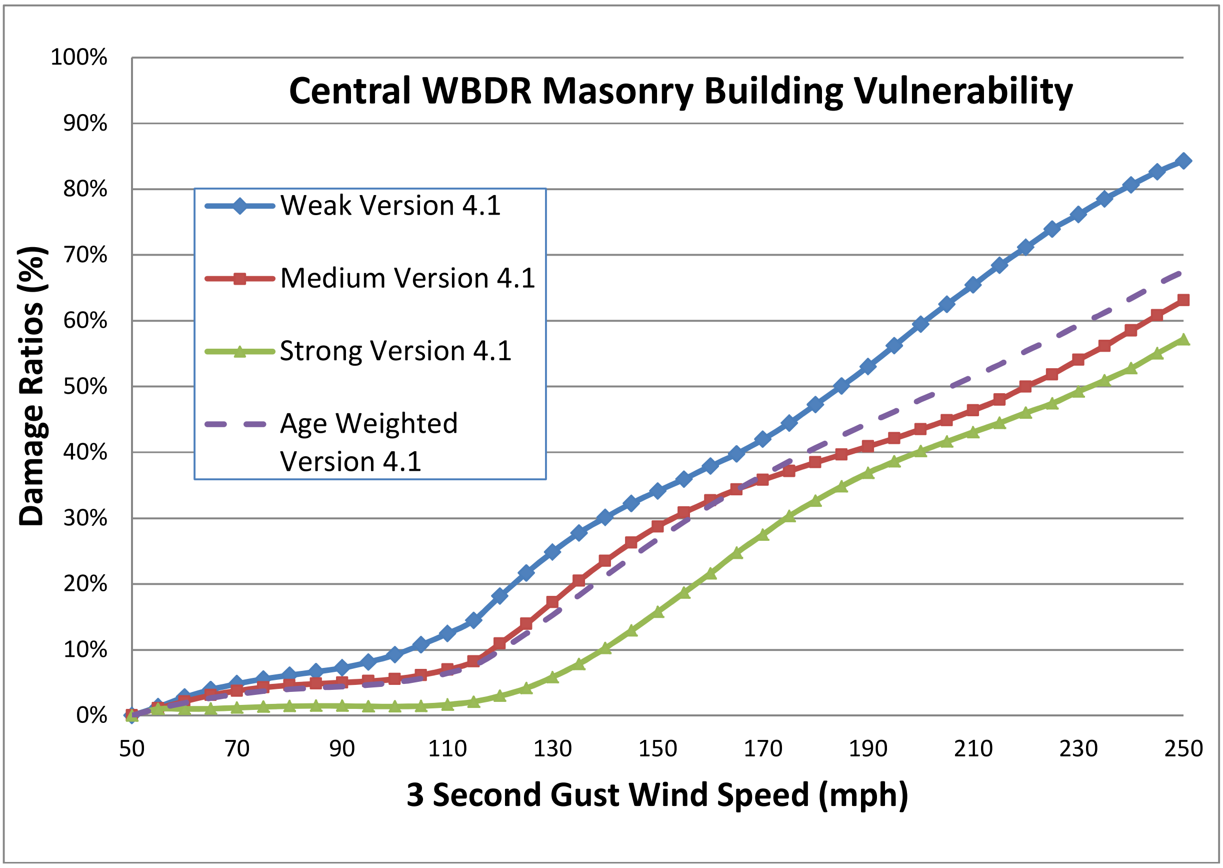

Figure 11. Weighted masonry structure vulnerabilities in the Central wind-borne debris region.

Mapping of Insurance Policies to Vulnerability Matrices

The FPHLM processes insurance portfolios from many different insurance companies. Since there is no universal way to classify building characteristics, each company assigns different names or classifications to the building variables. In many cases most of the building structural information in a portfolio is unknown since, in general, detailed records of building characteristics are missing. In a minority of cases, parameters are known, but they do not match any value in the library of the FPHLM. In this case these parameters are classified as "other." For example, the FPHLM models only timber or masonry residential single-family homes. A steel structure would be classified as other.

This makes the mapping of existing portfolio policies to available vulnerability matrices challenging. The engineering team designed a mapping tool that can be used to read a policy and assign building characteristics, if unknown or other, on the basis of building population statistics and year built, where the year built serves as a proxy for the strength of the building. The process is summarized in Table 5. Once all the unknown parameters in the policy have been defined, an unweighted vulnerability matrix based on the corresponding combination of parameters can then be assigned. If the number of unknown parameters exceeds a certain threshold defined by the user of the program, he or she always has the choice of using a weighted matrix or age-weighted matrix instead.

In the few cases in which a policy in a portfolio has a combination of parameters that would result in a vulnerability matrix different than any of the existing matrices in the library of the FPHLM, the program assigns to the policy a so-called "other" weighted matrix (see Table 5 below). The "other" matrices are an average of timber and masonry matrices.

Table 5. Assignment of vulnerability matrix depending on data availability in insurance portfolios.

Data in Insurance Portfolio	Year Built	Exterior Wall	No. of Story	Roof Shape	Roof Cover	Opening Protection	Vulnerability Matrix
Case 1	known	known	known	known	known	known	Use unweighted vulnerability matrix
Case 2	known	known or unknown	Any combination of the four parameters is either unknown or other				use weighted matrix or replace all unknown and others randomly based on stats and use unweighted vulnerability matrix
Case 3	known	other	Any combination of the four parameters is either unknown or other				use the "other" weighted matrix
Case 4	unknown	known	Any combination of the four parameters is either unknown or other				use age weighted matrix or replace all unknown and others randomly based on stats and use unweighted vulnerability matrix

Data in Insurance Portfolio	Year Built	Exterior Wall	No. of Story	Roof Shape	Roof Cover	Opening Protecti on	Vulnerability Matrix
Case 5	unknown	other	Any combination of the four parameters is either unknown or other				Use age weighted matrices for "other"

Models' Distribution in Time

Over time the codes used for construction in Florida have evolved to reduce wind damage vulnerability. The weak W00, modified weak W10, retrofitted weak W01, medium M00, modified medium M10, retrofitted medium M01, and strong models represent this evolution in time of relative quality of construction in Florida. Each model is representative of the prevalent building type for a certain historical period. However, the assignment of a building strength (its relative vulnerability to wind damage) based on its year of construction is not a straightforward task. The appropriate relationship between age and strength is a function of location within Florida, code in place in that location, and code enforcement policy (also regional). It is therefore important to define the cut-off date between the different periods since the overall aggregate losses in any region are determined as a mixture of homes of various strengths (ages). The cut-off dates are based on both the evolution of the building code and the prevailing local builder/community code enforcement standards in each era.

Given the importance of these issues in the estimation of wind damage vulnerability, a brief history of codes and enforcement is presented next.

Construction practice in South Florida recognized the importance of truss-to-wall connection as early as the 1950s, when it became common to use clips rather than toe nails. The clips were not as strong as modern straps, but they were an improvement over nails. North Florida has fewer historical occurrences of severe hurricane impact, resulting in weaker construction in general than in the south within the same given era. The use of clips became relatively standard statewide by the mid 1980s. The use of improved shingle products and resistant garage doors became more common after Hurricane Andrew.

The issue of code enforcement has also evolved over time. The State of Florida took an active role in uniform enforcement only recently. Prior to Hurricane Andrew, a given county may have built to standards that were worse than or exceeded the code in place at the time. Following consultation with building code development experts, which included the director of the Miami-Dade building department, the president of an engineering consulting firm and consultant to the South Florida Building Code, the consensus was that the issue was not only the contents of the code, but also enforcement of the code.

In an attempt to standardize construction, some cities and counties in Florida adopted building codes, some of the earliest being Clearwater, which adopted a draft of the Standard Building Code (SBC) in 1945 (Cox, 1962); Daytona Beach in 1946 (The Morning Journal, 1946); Bradenton and Manatee counties by 1950; Sarasota County in 1956 (Sarasota Journal, 1956), and Riviera Beach in Palm Beach County in 1957 (The Palm Beach Post, 1957). Miami-Dade and Broward counties adopted the South Florida Building Code (SFBC) in 1957 and 1961, respectively. The SFBC, one of the most stringent codes in the United States, had some wind provisions since its inception. SBC made wind-load provisions mandatory in 1986. Modern wind design started in 1972 and improved considerably for low-rise construction in 1982 (Mehta, 2010). In addition, Florida's construction boom of the 1970s led the state authorities to promote a statewide uniformity of building standards. The first attempt was Chapter

553, "Building Construction Standards," of the Florida Statutes (F.S.), which was enacted in 1974 and required all counties to adopt a code by January 1st, 1975. The statute selected four allowable minimum codes as the pool from which jurisdictions needed to adopt their official building codes, namely: (1) SBC (Southern Building Code Congress International, 1975), (2) the SFBC (South Florida Building Code, 1957), (3) the One and Two Family Dwelling Code, (CABO) (ICC, 1992) and (4) the EPCOT code (enforced in Walt Disney World and based on the SBC, SFBC, and Uniform Building Code) (Reedy Creek Improvement District, 2002). However, the responsibility for the administration and enforcement was left to the discretion of 400 local jurisdictions as diverse as local governments, local school boards, and state agencies (Governor's Report, 1996). The State allowed the jurisdictions to choose any code from the four allowed codes and granted them the authority to amend the code according to their needs, as long as the amendments resulted in more stringent requirements and the power to enforce it.

Problems in the Building Code System

After 1975, there were two main codes in use in Florida before the 1990s: the SFBC in Miami-Dade and Broward counties and the SBC in most of the rest of the state. Although the SFBC was the most stringent code in Florida, this was uncorrelated with compliance and enforcement from many builders, design professionals, and inspectors. To a lesser extent, some of the code stringency was eroded for almost three decades (Getter, 1992; Fronstin & Holtmann, 1994). Some measures that watered down the code included the allowance of power-driven staples instead of nails for roof decking, thinner roofing-felt, 63 mph resisting shingles, and waferboards (pressed wood) as a replacement for plywood for roof decking. A study by Florida A&M University published in 1987 also highlighted deficiencies in code compliance and enforcement in the rest of Florida. Furthermore, the local amendments created a state of confusion, making it difficult for engineers, architects, and contractors to identify the locally administered codes and their jurisdictions (Shingle, 2007; Barnes et al., 1991).

The aftermath of Hurricane Andrew confirmed the concerns reported above. Post-storm damage surveys revealed innumerable violations to the SFBC (the absence of corner columns, vertical reinforcement, and gypsum board used as wall sheathing to name a few) that produced catastrophic failures of buildings (Khan & Suaris, 1993; Siddiq Khan & Associates, 1993). Clearly there were serious shortcomings in the compliance and enforcement process.

For later hurricanes like Opal and Erin in 1995, the rebuild process was also delayed because of the intricacies of the jurisdictional, enforcement, and compliance issues of the codes, exacerbating losses. An expeditious and unambiguous system would have eased proper compliance and enforcement and therefore would have drastically reduced losses (Governor's Report, 1996).

Post-Andrew Building Code Development Enforcement

<u>The South Florida Building Code</u>

Three to four months after Hurricane Andrew, South Florida began to reform the code and the code enforcement system. Engineers became directly involved in the design of residential structures. OSB decking and staples were banned. Wind-rated shingles were required. In 1994 the whole SFBC was reformed and adopted the ASCE 7 wind provisions.

The Florida Building Code

After Hurricane Andrew, local and state agencies were unsure about how to guarantee building safety. Concerns arose that a diminution of insurance availability would occur, which threatened the continuity of economic growth. In response, Governor Lawton Chiles established a Building Codes Study Commission in 1996 to review the current system of codes. The Governor's Commission found that the existing system had led to a "patchwork of technical and administrative processes." Its recommendations led to the formation of the Florida Building Commission in 1998, which was responsible for creating a unified Florida Building Code (Governor's Report, 1996).

For the new unified Florida Building Code (FBC), the Commission selected the SBC, developed in Alabama from 1940 to 1945 (Ratay, 2009), as the base code because 64 out of 67 counties were already using the 1973 and the 1997 versions of the code with amendments (Shingle, 2007). The SFBC was later included as an additional base code in 1999 to meet South Florida's special requirements. The Building Commission worked to reach a consensus among all stakeholders, and the first version of a unified FBC was made effective on March 1, 2002 (Blair, 2009). Studies indicate that the losses due to hurricanes have decreased since the enactment of the FBC (Gurley et al., 2006).

Application of the Building Code History

The history above clearly indicates that a completely accurate accounting of all building practices in every region of Florida going back many decades is not possible, given the limited policy information of age and location. To accommodate the history of residential building construction practice in Florida, buildings were classified into different eras. The classifications shown in Table 6 were adopted for characterizing the regions by age and model. The descriptions of weak, modified weak, medium, modified medium, and strong can be found in Table 1. In Table 6, Strong_OP refers to the strong model with opening protection. The use of opening protection is required by current code in the regions in which Strong_OP is assigned, and not required elsewhere. Thus the application of the strong model is regionally dependent. The specific building eras and classifications per region are based on the evolution of the building codes in Florida and the opinions of the experts consulted.

Table 6. Age classification of the models per region.

	Pre-1960	1960-1970	1971-1980	1981-1993	1994-2001	2002-pres.
HVHZ	⅔ modified Weak, ⅓ Medium	⅔ Weak, ⅓ Medium	½ Weak, ½ modified Medium	⅔ Weak, ⅓ modified Medium	Strong_OP	Strong_OP
Keys	½ modified Weak, ½ Medium	Medium	Medium	Medium	⅓ Medium ⅔ Strong_OP	Strong_OP
WBDR	modified Weak	⅔ Weak, ⅓ Medium	⅓ Weak, ⅔ Medium	⅓ Weak, ⅔ Medium	½ Medium, ½ Strong_OP	Strong_OP
Inland	modified Weak	⅔ Weak, ⅓ Medium	½ Weak, ½ Medium	½ Weak, ½ Medium	½ Medium, ½ Strong	Strong

Strong_OP: Strong model run with opening protection, as per FBC requirement in these regions

Note: HVHZ means high velocity hurricane zone; WBDR means wind borne debris region.

Table 6 can be modified to include the retrofitted weak W01 and medium M01 matrices, if the average life span of a shingle roof is assumed to be 20 years, on the basis of input from roof professionals.

In the case of a real past scenario analysis, for the purpose of model validation, the weak and medium matrices must be replaced by their retrofitted version (W01 or M01) if

- hurricane year of occurrence, YH, is such that YH >1993, and year built (YB) plus any multiple of 20 is such that, 1993<YB + 20m <YH. in HVHZ and Keys;

- hurricane year of occurrence, YH >2001, and 2001<YB + 20m <YH, in rest of the state.

In the case of stochastic analysis, or for the purpose of "what if" hypothetical future scenarios, the weak and medium must be replaced by their retrofitted version (W01 or M01) if

- year built (YB) plus any multiple of 20 is such that, 1993<YB + 20m <TD (today's date) in HVHZ and Keys;

- year built (YB) plus any multiple of 20 is such that, 2001<YB + 20m <TD (today's date) in rest of the state.

Appurtenant Structures

Appurtenant structures are not attached to the dwelling or main residence of the home but are located on the insured property. These types of structures could include detached garages, guesthouses, pool houses, sheds, gazebos, patio covers, patio decks, swimming pools, spas, etc. Insurance claims data reveal no obvious relationship between building damage and appurtenant structure claims. The variability of the structures covered by an appurtenant structure policy may be responsible for this result.

Since the appurtenant structures damage is not derived from the building damage, only one vulnerability matrix is developed for appurtenant structures. To model appurtenant structure damage, three equations were developed. Each determines the appurtenant structure insured damage ratio as a function of wind speed. One equation predicts damage for structures highly susceptible to wind damage, the second predicts damage for structures moderately susceptible to wind damage, and the third predicts damage for structures that are affected only slightly by wind. Because a typical insurance portfolio file gives no indication of the type of appurtenant structure covered under a particular policy, a distribution of the three types (slightly vulnerable, moderately vulnerable, and highly vulnerable) must be assumed and is validated against the claim data.

THE VULNERABILITY COMPONENT: COMMERCIAL RESIDENTIAL MODEL

Given the hurricane hazard defined by the atmospheric component, the engineering component performs several tasks: (1) it estimates the physical damage to exterior components of typical buildings or apartment units; (2) it assesses the interior and utilities damage and contents damage due to water penetration through exterior damage and defects to interior walls, ceiling, doors, etc.; (3) it combines the exterior and interior damage to estimate the building and content vulnerabilities; (4) it estimates the time related expenses; and (5) it estimates appurtenant structure vulnerability (Pita et al., 2008, 2009a, 2009b, 2009c, 2010; Pinelli et al., 2009b, 2010b ; Weekes et al., 2009).

Exposure Study

Most low-rise commercial residential buildings (LB) (Figure 12) can be categorized into a few generic groups having similar structural characteristics, layout, and materials, although they may differ somewhat in dimensions. These buildings can suffer substantial external structural damage, in addition to envelope and interior damage, from hurricane winds. The modeling approach to assessing damage for these building types is the same as that for assessing damage for single-family homes, modeling the building as a whole.

However, commercial residential mid- and high-rise buildings (MHB) (Figure 13) are very different from low-rise buildings and single-family homes. The mid-/high-rise buildings are engineered structures, which suffer few structural failures during a windstorm are subject to water ingress from cladding and opening failures. These buildings, which come in many different types, shapes, height, and geometries, consist of steel, reinforced concrete, timber, masonry, or a combination of different structural materials.

It is not realistic to perform damage simulations on a reduced collection of ‘base’ buildings, as is done for single-family residential and low-rise commercial residential buildings, because that will necessarily leave out a majority of existing mid- and high-rise typologies. For instance, for steel frame structures alone there are a wide variety of possible building shapes and configurations. These different shapes lead to very different wind-loading scenarios and therefore different vulnerabilities. Equally important, the number of MHB is at least an order of magnitude smaller than the number of PRB or LB. It is therefore not feasible to average the losses over a very large number of buildings and compensate small differences between buildings, as in the case of PRB. On the contrary, the analyst is faced with a relatively small number of buildings, each of which is different from the other.

As a result, the FPHLM has adopted a modular approach to model mid- and high-rise buildings. Rather than considering a structure as a whole, the model treats the building as a collection of apartment units. The base modules are typical apartment units, divided as corner and middle units. Thus, buildings with any number of stories and any number of units per floor can be modeled by aggregating the corresponding apartment units’ vulnerabilities and accounting for correlation of damage among units (e.g., water ingress through an envelope breach in a fifth-floor unit creates problems for lower units with no failures).

To summarize, in the case of LB, typical models of the whole structure that are representative of the vast majority of this building population in Florida must be defined. In the case of MHB, typical models of individual units that are representative of the vast majority of units in Florida must be defined.

An extensive survey of the commercial residential Florida building stock was carried out to generate a manageable number of these building and apartment models to represent the majority of the Florida residential building stock. The modelers analyzed Florida counties’ property tax appraisers’ (CPTA) databases for building stock information. Although the database contents and format vary from county to county, many of the databases contain the structural information needed to define the most common structural types. Information from 21 counties was collected for commercial residential buildings. The modelers extracted information on several building characteristics for classification, including roof cover, roof shape, exterior wall material, number of stories, year built, building area, foundation type, floor plan, shape, and opening protection.

Figure 12. Typical low-rise buildings.

Figure 13. Examples of mid- and high-rise buildings.

Commercial Residential Building Survey

In the case of the commercial residential buildings, the CPTAs classify the buildings either as condominiums or as multifamily residential (MFR) based only on the type of ownership. Condo buildings are such that each unit or apartment has a different owner. The condo unit can then be occupied by the owner or by a renter. The CPTAs do not record if the condo unit is rented or owned. Condo owners' expenses include the maintenance and use of the common areas and common facilities because the condo owner actually owns a percentage of the entire facility. The condo buildings relevant to this survey are all classified by the CPTAs as residential. Commercial office condo buildings are out of the scope of the survey.

A MFR building has a single owner who rents the units to tenants. The CPTAs classify MFR buildings with fewer than 10 units (duplex, triplex, and quadruplex) as residential buildings; MFR buildings with 10 units or more are classified as commercial buildings. Both residential and commercial MFR buildings were considered in this survey. MFR buildings are interchangeably referred to as apartment buildings by CPTAs. Residential MFR buildings (fewer than 10 units) account for approximately 70% of the MFR building stock, and the remaining 30% are commercial MFR buildings (10 units or more).

The commercial-residential buildings, regardless of whether they are condos or MFR buildings, were divided in two categories: low-rise (one–three stories) and mid-high rise (four stories and more). Low-rise buildings have three stories or fewer. The survey shows these buildings, which represent the majority of the building stock, have different characteristics than taller buildings. Unanwa (1997) uses a similar definition in his study. The mid- and high-rise buildings tend to be more heterogeneous and necessitate a different treatment in the vulnerability model. Owned as well as rented apartment units are included in this survey; the CPTAs do not distinguish between the two.

Appraisers have confirmed that MFR buildings tend to have fewer stories than condo buildings and the majority of MFR buildings are duplexes, triplexes, and quadruplexes. Also, the proportion of MFR buildings that can be classified as mid-/high-rise is negligible according to available information and consultation with CPTAs.

Building Models

Distinctly different construction characteristics and modes of damage in high winds led to the development of separate models for low-rise commercial residential construction (LB) and mid-/high-rise commercial residential construction (MHR).

Low-Rise Commercial Residential Models

The LB model was developed to represent typical apartment and town-house style structures of three stories or fewer (Figure 12). The model framework is based on the single-family, site-built residential model, which uses a probabilistic description of wind loads and exterior and structural component capacities to project physical damage as a function of wind speed. The components in the LB damage model include roof cover, roof sheathing, roof-to-wall connections, wall type, wall sheathing, windows, entry doors, sliding-glass doors, and gable end truss integrity.

Given the large array of sizes and geometries for low-rise commercial residential structures, the program is developed to provide flexibility in choosing a building layout and dimensioning details (footprint, overhang length, roof slope, roof shape, etc.). The changes in construction practice over decades in Florida also necessitate flexibility when choosing construction quality with regard to hurricane wind resistance. The model allows the selection of building components with a variety of strength options to represent a range from low to high wind resistance (braced or unbraced gable ends, old or new roof cover, sheathing nailing schedules, etc.).

A standard (default) model was developed based on the building exposure study that quantified average square footage per story, units per story, and other descriptors. Default settings were also developed to represent weak, medium, and strong construction practice. Any given strong, medium, or weak model may be altered by additional mitigation or retrofit measures individually or in combination. For example, reroofing an older apartment can be represented by increasing the probabilistic descriptor of capacity for the roof cover.

Outputs (damage matrices) have been produced for each combination of the following: building height (one, two, or three stories), wall type (timber or masonry), roof shape (hip or gable), strength (weak, medium, or strong), and window protection (no protection or with shutters).

Mid-/High-Rise Commercial Residential Models

The mid-/high-rise model uses the Monte Carlo simulation concept, but it differs from the low-rise model in significant ways. There is a high level of variability among mid-/high-rise buildings because of the combination of the number of stories, the number of units per floor, intentionally unique geometries, and the materials used for the exterior. This makes the application of a “standard” or default model unfeasible. Because of the construction methods and materials used in these structures, damage to the superstructure and exterior surfaces of the buildings tends to be relatively minor. The majority of damage accumulation in mid-/high-rise structures is due to water penetration and failure of openings. The model reflects this by focusing on the failure of windows and doors, the ingress of rain water, and the proliferation of water from the source of the ingress to adjacent living units. The structure in whole is not modeled. Rather, individual units are modeled in isolation. That is, the vulnerability of a single unit is explicitly modeled, and damage is assessed to openings as a function of wind speed.

Two different mid-/high-rise classifications are modeled for this study: “closed building” and “open building.” Closed buildings are characterized by the location of the unit entry doors at the interior of the building. The sliding-glass doors and windows are all facing the exterior of the building. For the open building model there is exterior corridor access to each unit entry door on one side of the building, and the patio areas are situated on the opposite side of the building (Figure 14). The type of building chosen can increase or decrease the vulnerability of a selected unit because of the exposure of the exterior openings. Middle units in a closed or open building have one or two exterior walls, respectively.

There are three main differences between the low-rise and mid-/high-rise models: (1) the use of a modular (i.e., per unit rather than per building) approach, (2) the exterior components being analyzed for failure, and (3) the use of two basic floor plans. Location of unit within the plan view of the building, unit square footage, and number of available openings are some of the important factors that separate one unit from another.

Corner units are subjected to higher wind pressures that are present along the edges of the building, compared to the middle units, which are located within lower pressure zones at the center of the wall area (Figure 14). Increased square footage typically results in an increase in exterior wall frontage and the number of openings vulnerable to damage.

The MHB model uses the same analysis and output technique as the LB model. The difference is the number of failure types. The MHB model analyzes only the damage to the openings, which include the windows, sliding doors, and entry doors. Each of the components can fail due to pressure or debris impact.

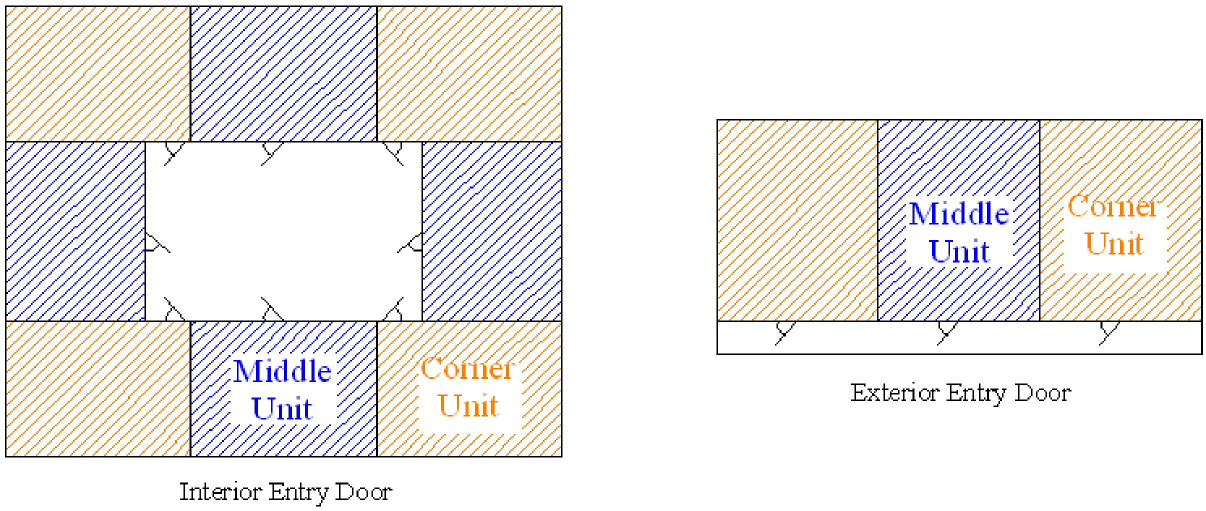

Figure 14. Apartment types according to layout (left: closed building with interior entry door; right: open building with exterior entry door).

Damage Matrices

Exterior Damage

The vulnerability model uses a Monte Carlo simulation based on a component approach to determine the external vulnerability (as shown in Figure 9) at various wind speeds of buildings in the case of LB, or apartment units in the case of MHB. For the case of LB, the procedure is identical to the one described for single-family residential (PRB). In the case of MHB, the simulations address only wind pressure and debris impact on the openings.

The damage assessment is conducted over a range of wind speeds and wind directions, and results are stored in a damage matrix. Probabilistic damage assessment is conducted by first creating an individual building realization by mapping each component according to typical construction practice. Random capacity values are assigned to the various components on the basis of a probability distribution for each component type. This realization is subjected to a peak three-second gust wind speed from a particular direction. Directional loads are calculated using randomized pressure coefficients based on directional modifications to ASCE 7 as well as wind tunnel data (NIST Aerodynamic Database - http://fris2.nist.gov/winddata), and a comparison of resulting surface and internal loads to component capacities is conducted. Damage occurs when the assigned capacity of a component is exceeded by its loading. Once the openings have been checked for failure due to pressure, the damage due to the impact of windborne debris is also evaluated. Damaged components are removed, and a series of checks are performed to determine if lost components will redistribute loading to adjacent components or change the overall loading. For example, loss of a roof-to-wall connection places additional load on adjacent connections, whereas an envelope breach will potentially alter internal loading—changing the overall loading on most components. Iterative convergence is used to produce the final damage state for that building realization. The results of this single simulation are documented on the basis of the final iteration, another realization of that building is constructed by assigning new random capacities to each component, and the process repeats for the same three-second gust, same wind direction, and newly randomized pressure coefficients based on the number of desired simulations the user would like to run. The process is repeated for eight wind directions and a series of three-second wind speeds between 50 and 250 mph in 5 mph increments.

The output of the Monte Carlo simulation model is an estimate of physical damage to structural and exterior components. The results are in the form of a four-dimensional damage matrix. Each row of the matrix lists the results of one simulation. The amount of damage to each of the modeled components for a simulation is listed in 32 columns. The third dimension represents the peak three-second gust wind speed between 50 and 250 mph in 5 mph increments, and the fourth dimension represents the eight angles between 0 and 315 degrees in 45-degree increments. Table 7 delineates the damage matrix contents for the case of the LB. A description of the values in each of the six columns of the MHB damage matrix is given in Table 8.

Table 7. Description of values given in the damage matrices for LB.

Col.#	Description of Value	Min Value	Max Value
1	Percent roof cover (shingles or tiles) failed	**0**	**100**
2	Percent field roof sheathing lost (field roof sheathing is all but overhang)	**0**	**100**
3	Percent edge (overhang) roof sheathing failed	**0**	**100**
4	Percent roof-to-wall connections failed	**0**	**100**
5	Collapse of gable end trusses side 1 - Assuming 38 trusses	**0**	**19**
6	Collapse of gable end trusses side 2 - Assuming 38 trusses	**0**	**19**
7	Percent gable end wall covering failed	**0**	**100**
8	Percent gable end sheathing failed	**0**	**100**
9	Percent wall covering failed – 1st floor	**0**	**100**
10	Percent wall sheathing failed – 1st floor	**0**	**100**
11	Number of windows failed from wind pressure – 1st floor (assuming 15 windows per floor)	**0**	**15**
12	Number of windows failed from debris impact – 1st floor (assuming 15 windows per floor)	**0**	**15**
13	Number of sliding glass doors failed from wind pressure – 1st floor (assuming 3 units per floor)	**0**	**3**
14	Number of sliding glass doors failed from debris impact – 1st floor (assuming 3 units per floor)	**0**	**3**
15	Number of entry doors failed from wind pressure – 1st floor (assuming 3 units per floor)	**0**	**3**
16	Number of entry doors failed from debris impact – 1st floor (assuming 3 units per floor)	**0**	**3**
17-24	Repeat columns 9-16 respectively for 2nd floor	-	-
25-32	Repeat columns 9-16 respectively for 3rd floor	-	-

Table 8. Description of values given in the damage matrices for MHB apartments.

Col #	Description of Value	Min Value	Max Value
1	# of windows failed due to pressurization (out of a possible 5 windows)	0	5
2	Entry door failure due to pressurization	0	1
3	Sliding door failure due to pressurization	0	1
4	# of windows failed due to debris impact (out of a possible 5 windows)	0	5
5	Entry door failure due to debris impact	0	1
6	Sliding door failure due to debris impact	0	1

Interior and Utilities Damage

The FPHLM introduces a novel approach to assessing the interior damage by considering the physics of the problem. The approach starts from the damage to the building envelope (Weekes et al., 2009), described in the previous section. The model then estimates the amount of wind-driven rain that enters through the breaches and defects in the building envelope and converts it to interior damage. The approach is described below.

Description of the Model

The method described hereafter (Figure 15) combines existing building defects and estimated building envelope damage with the impinging rain to predict the amount of water that will enter a building. This physically based approach models the main contributor to interior damage, addresses the uncertainty in the interior damage source, and documents the individual water ingress contribution of each component to the total water intrusion.

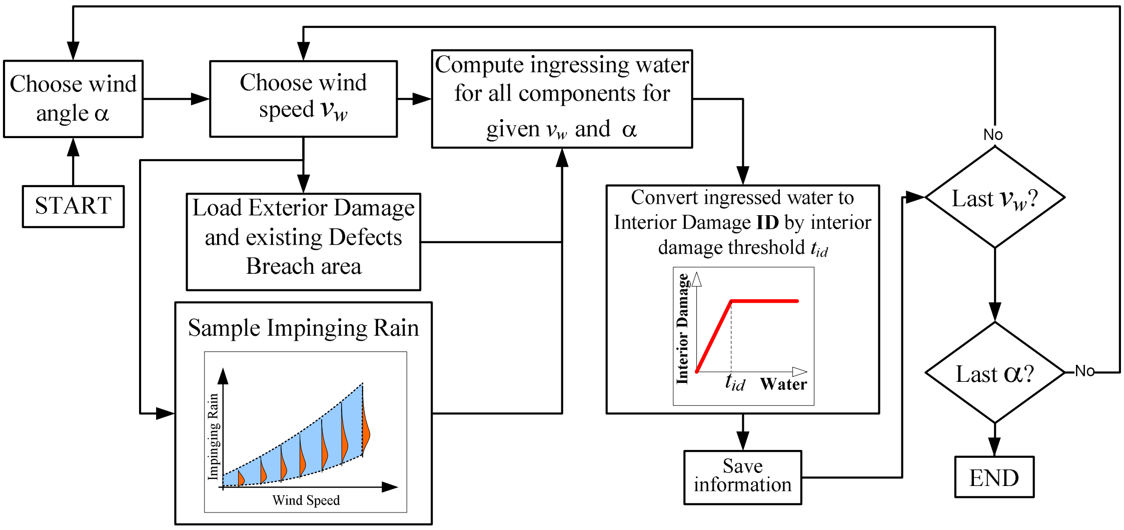

Figure 15. Flowchart of the interior damage model.

The exterior building components that the model considers include roof cover, roof sheathing, wall cover, wall sheathing, gable cover, gable sheathing, windows, doors, and sliding doors. In the case of MHB units, only windows, doors, and sliding doors are considered. For a given wind speed, the model first estimates breach areas of each component from the exterior damage array. The area of existing defects in envelope components is estimated based on surveys (Mullens et al., 2006) and engineering experience.

In order to estimate water intrusion into the buildings, a study was performed to estimate the likely accumulated horizontally impinging rain on a structure during a hurricane event. This study used a simulation model that is composed of a simplified wind model and the R-CLIPER rain rate model developed at NOAA HRD (Lonfat et al., 2007) and is used operationally at NHC. The simplified wind model is based on the Holland (1980) radial profile and includes parameters for the pressure profile ("B"), radius of maximum winds, translation speed and central pressure. Additionally, the Vickery (2005) pressure filling model was used to decay the storms. Storm parameters are sampled from distributions relevant to Florida. The R-CLIPER model determines the vertically free-falling rain rates at each time step of the simulation. The R-CLIPER rain rate is essentially an azimuthally averaged rain rate that varies as a function of radius and maximum intensity of the storm.

The total potential impinging rain rate is calculated as a function of the vertical rain rate (*rr*), the horizontal mean wind speed (V_h) and the terminal velocity of the rain drops (V_t). We may write this as

$$\dot{IR} = rr \cdot V_h / V_t$$

The actual impinging rain rate entering a building is assumed to be a fraction of the total potential impinging rain rate by the use of a rain admittance factor (*RAF)* that is described in Disclosure 4 in the Vulnerability Standard. The vertical rain rate is determined from the R-CLIPER model. The terminal velocity depends on the rain drop size (*D*), which in turn has a distribution based on rain rate. We use a rain drop distribution based on Willis and Tattelman (1989):

$$N_D = N_G D^{\alpha} e^{-\gamma D}$$

where

$$\gamma = 5.5880 / D_0$$
$$\alpha = 2.160$$
$$D_0 = 0.1571 M^{0.1681}$$
$$M = 0.062 rr^{0.913}$$
$$N_G = \frac{512.85 M 10^{-6}}{D_0^4} \left(\frac{1}{D_0} \right)^{\alpha}$$

The term N_G is the concentration parameter, γ is the slope parameter, α is the curvature parameter, M is the water content, and D_0 is the median volume diameter.

The terminal velocity is based on Dingle and Lee (1972):

$$V_t(D) = -.166033 + 4.91844 \cdot D - .888016 \cdot D^2 + 0.54888 \cdot D^3$$

We compute an average V_t based on the mass flux contribution of each drop size to the rain rate

$$\overline{V_t} = \frac{\int V_t N_D \left(D^3 V_t \right) dD}{\int N_D \left(D^3 V_t \right) dD}$$

We define the Driving Rain Factor (*DRF*) as

$$DRF(rr) = \frac{1}{\overline{V_t}}$$

The *DRF* is a function of the rain rate. The R-CLIPER model, as mentioned above, produces a rain rate that is based on the azimuthal average of rain rate as a function of radius to center of the storm. Thus the averaged rain rate includes locations where there is very little or no rain. So the *DRF* could have a high bias if based solely on an average rain rate, since the terminal velocity increases with drop size, which in turn increases with rain rate. We seek to compute an effective *DRF* that is an average of the *DRF* weighted by the distribution of rain rates that contribute to the average rain rate estimated by R-CLIPER, as follows

$$\overline{DRF}\left(\overline{rr}\right)=\int DRF\left(rr\right)g\left(\overline{rr},rr\right)drr$$

where *g* is the rain rate distribution from TRMM observations that yield a given mean rain rate, $\overline{rr}$. Rain rate distributions generally follow a log normal distribution (e.g., Marks et al., 1993). A study by Lonfat et al. (2004) using TRMM data shows figures that suggest rain rates have a log normal distribution. Hence we may provisionally assume that *g* has a log normal distribution. We can estimate the range of the mode and frequency of the mode using probability distribution functions shown in figures from Lonfat et al. (2004) for the entire range of possible radii and storm intensity. These two parameters uniquely determine the distribution. We find that using a range of values for these two parameters, the mode ranging from 1 to 10 mm/hr and frequency of the mode ranging from 7% to 11%, the effective *DRF* is approximately 0.18 and does not vary by more than a few percent of this value. Given that the *DRF* is insensitive to relatively large changes in these parameters, it is unlikely that the *DRF* would be sensitive to a choice of reasonable alternative distributions (such as a gamma), and also not likely to be sensitive to parameter estimation due to maximum likelihood approximations, for example.

We use a simple wind model to provide a time series of the peak three-second gust wind for a given station location. The wind model is a simple *Holland B*-type model that incorporates a term for the translation speed. The wind speed, assumed to be valid at gradient wind height (taken to be 700 mb), is given by

$$W = W_0 + \sqrt{W_0^2 + \left(Bdp/\rho\right)\left(R_m/r\right)^B e^{-\left(R_m/r\right)^B}}$$

where

$$W_0 = 0.5\left(c\sin\left(\theta\right) - fr\right)$$

and *B* is the *Holland B* shape profile, *dp* is the central pressure deficit, ρ is the air density, R_m is the radius of maximum winds, *r* is the radius to center of the storm, *c* is the translation speed, *f* is the Coriolis parameter and θ is the angle between the vector for the storm motion and the vector pointing to the station location with reference to the center of the storm.

The gradient winds are reduced to winds at 300 m using a radially dependent gradient conversion factor based on dropsonde data from Franklin et al. (2003). Further details can be found in Axe (2004). Finally, winds are reduced to surface using a log wind profile. The surface roughness length was assumed to be 0.45 m, though tests were done using 0.30 m without significant difference in the final results. A gust factor was used to obtain the peak three-second gust based on ESDU methodology (Vickery & Skerlj, 2005).

The effects of storm decay at landfall are modeled using a pressure filling model (Vickery, 2005). This is the same pressure filling model used in the FPHLM. The distance of simulated stations to the shore line are modeled using a uniform distribution ranging from 0-100 km. This distance effectively determines the time before the storm begins to decay.

The parameters used to specify the storm characteristics are based on statistical distributions relevant to Florida. For each storm simulation, a set of parameters were sampled from their respective distributions. Table 9 provides a list of parameters and their associated distributions used in the model, as well as the reference. Please refer to the references provided in the table for details on the distributions.

Table 9. Parameter Distributions used in the Wind Model.

Parameter	Description	Distribution	Reference
B	Pressure shape profile	Gaussian	FPHLM
dp	central pressure deficit	Weibull	Huang et al. (2001)
c	translation speed	Log Normal	Huang et al. (2001)
Rm	radius maximum winds	Gamma	FPHLM
e_decay	pressure filling error term	Gaussian	Vickery (2005)/FPHLM
Dshore	distance to shore	Uniform	Present Study

The model simulates the duration of the event from the time a location enters the storm affected area (defined as being within 450 km of the storm center) until exit. The number of storm simulations was 100,000 and for each simulation, 91 locations were selected to record the accumulated impinging rain ("*IR*") and maximum three-second wind gust at 10 m. Each location was specified to be a multiple of 10 km away from the storm closest approach to center (from 450 km to the left of the storm to 450 km to the right of the storm, in steps of 10 km. A direct hit is at 0 km). The time step of the model was 0.1 hr. In addition to the total impinging rain during the event, separate accumulations were recorded starting at the time that a location experiences the peak wind of the storm event ("IR_2"). The impinging rain accumulated prior to the maximum peak gust ("IR_1") is computed as the difference: $IR_1=IR-IR_2$. The resulting accumulations are then distributions of impinging rain as a function of the peak three-second wind gust for 10 meter height.

The product of the areas of the breaches and defects by the impinging rain conveys the amount of water that enters the building. The water penetration is computed as follows.

Water penetration through defects:

$$h_{def_i} = k \cdot RAF\left[IR_1 \underbrace{\left(d_{def} A_{comp}\right)}_{\text{Total Defects Area}} + IR_2 \underbrace{\left(d_{def} A_{comp} S\right)}_{\text{Post-breach Defects Area}} \right] A_b^{-1}$$

Water penetration through breaches:

$$h_{B_i} = k \cdot RAF\left[IR_2 \cdot A_B\right] A_b^{-1}$$

Where:

h_{def}: height of water that accumulates due to defects, in inches
h_B: height of water that accumulates due to envelope breaches, in inches
k: adjustment factor
RAF: rain admittance factor
d_{def}: defects percentage
A_{comp}: area of component
A_B: breach area
A_b: living area
IR_1 : accumulated impinging rain prior to maximum wind
IR_2 : accumulated impinging rain after the occurrence of maximum wind
S : survival factor = $1 - A_B / A_{comp}$

These terms are discussed in more detail in the Vulnerability Standard.

The full distribution of impinging rain from the simulation is used in the development of the vulnerability matrices for low-rise structures. For mid-/high-rise structures, the mean value of the distribution of the impinging rain as a function of wind speed is used in the calculation of water intrusion, and hence damage, in the Loss Module. Figure 16 shows the mean IR_1 and IR_2 as a function of peak three-second gusts at 10 m. As shown in the figure, simple regressions were performed to facilitate calculations in the Loss Module. Note that for very high wind speeds there is large sampling error, as these are rare events, and thus the relation between mean rain and wind speed is less reliable.

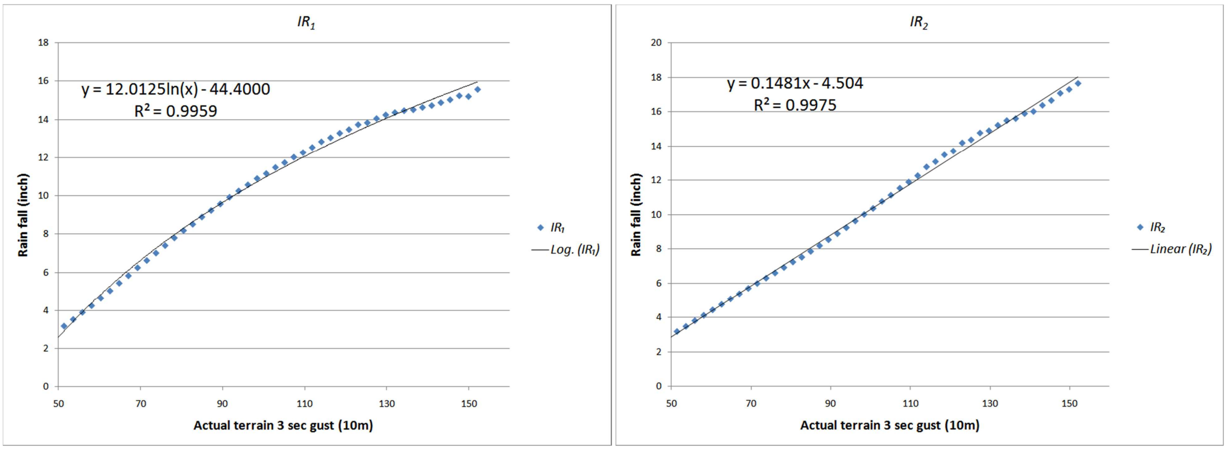

Figure 16. Mean accumulated impinging rain as a function of peak 3-second wind gust.

This approach estimates the amount of water that enters through each component of the envelope. The total amount of water is calculated by adding the contribution of all components for a given wind speed, and by estimating the water which percolates from story to story. The final step maps water inside the building to interior damage with a bilinear relationship, where total interior damage is achieved for a certain threshold of height of accumulated water (currently set at 1 inch).

Contents Damage

Contents include anything in the building that is not attached to the structure itself. As in the case of interior and utilities damage, the contents damage is assumed to be a function of the amount of water that penetrates the building, and it is therefore proportional to interior damage. The function is based on engineering judgment and is validated using claims data. In the case of a condo building, only the contents of the common areas are covered by the policy. In the case of an apartment building, the personal contents of the renters are not covered by the building policy.

Time Related Expenses

Time Related Expenses refer to loss of rent for owners of apartment buildings, which are mainly low-rise commercial residential buildings. As in the case of interior and utilities damage, the Time Related Expenses are assumed to be a function of the amount of water that penetrates into the building, and they are therefore proportional to interior damage. The function is based on engineering judgment and should be validated using claims data, which is almost non-existent.

Vulnerability Matrices for Low-Rise Buildings

Unweighted Vulnerability Matrices of LB

A description of the process to estimate the total vulnerability of low-rise buildings is displayed in Figure 10. Given a particular building type, the Monte Carlo simulation-generated damage array that expresses the exterior damage in the envelope is loaded. For a particular wind speed and wind direction, each component's physical damage is normalized to a percentage value. For instance, the number of damaged doors, windows, and sliding doors is divided by the total number of the corresponding openings; collapsed trusses are divided over the total number of trusses, etc. The cost of the damage is then assessed.

Interior damage is estimated by (1) simulating the amount of wind-driven rain that enters through the breaches and defects in the building envelope, (2) propagating water from floor to floor, and (3) converting to damage to interior and utilities.

Replacement cost ratios provide the link between modeled physical damage and the corresponding monetary losses. They can be defined as the cost of replacing a damaged component or assembly of a building divided by the cost of constructing a completely new building of the same type. An explicit procedure is used to convert physical damage of the modeled components to monetary damage. The procedure is almost identical to the one already described for single-family residential buildings. The damage ratio (DR) as a function of wind speed for the exterior, interior, and utilities is calculated by adding the corresponding costs of damaged exterior plus damaged interior plus damaged utilities divided over the overall building cost that is contingent upon the type and size of the building.

Derivation of the probability distribution functions of damage at each wind speed interval is the final step of the process. For each wind speed interval, the probability of damage given that wind speed interval (i.e., the cells of the vulnerability matrices) is computed as the summation of specific damage ratios for all wind directions divided by the total number of simulations at that particular wind speed interval.

Weighted Vulnerability Matrices of LB

In the case of LB, vulnerability matrices were created for every combination of construction type (masonry, timber, or other), roof shape (gable or hip), roof cover (tile or shingle), shutters (with or without), number of stories (one, two, or three), and subregion (inland, wind-borne debris region, and high velocity zone). However, in general, there is little information available in an insurance portfolio file regarding the structural characteristics and the wind resistance of the insured property. Instead, insurance companies rely on the ISO fire resistance classification. Portfolio files have information on ZIP Code and year built. The ISO classification is used to determine if the home is constructed of masonry, timber, or other. The ZIP Code is used to define the subregion. The year built is used to assist in defining whether a building should be considered weak, medium, or strong.

From the insurance files, sub-region, construction type, and year built are determined. This leaves the roof shape, roof cover, number of stories, and shutter options undefined. From the exposure study of 21 Florida counties, the distribution of these parameters can be extrapolated. For each age group, we define a weighted matrix for each construction type in each sub-region. The procedure is identical to the one already described for single-family buildings.

Age-Weighted Matrices of LB

The year built or year of last upgrade of a structure in a portfolio may not be available when performing a portfolio analysis to estimate hurricane losses in a certain region. In that case, it becomes necessary to assume a certain distribution of ages in the region to develop an average vulnerability by combining weak, medium, and strong. Here again, the procedure is identical to the one described for single-family residential buildings.

Mapping of Insurance Policies to Vulnerability Matrices for LB

The mapping of the low-rise vulnerability matrices to the insurance policies in any given portfolio is also very similar to the process already reported for single-family buildings.

LB Models' Distribution in Time

The low-rise building models' distribution in time is similar to that of the single-family buildings.

Vulnerability of Mid-/High-Rise Buildings

MHB apartment vulnerability

In the case of MHB, a process similar to the one described above is followed to derive exterior vulnerability matrices and curves for different typical apartment units, instead of buildings. These curves are derived for the cases of open and closed buildings, for corner and middle units, with different opening protections (with or without impact-resistant glass).

MHB building vulnerability

Unlike the single-family home loss model in which interior and exterior damage was aggregated inside the vulnerability module, the aggregation for mid-/high-rise buildings is performed outside that module because of the interior damage propagation. The modular approach produces independent assessments of exterior damage for each unit while also considering the interior water damage that can spread from unit to unit and trigger damage far from its source. Therefore, interior damage is treated in two stages: the first stage occurs as a direct result of the exterior damage, and the second occurs as a consequence of propagation between units. The separate modeling of exterior and interior damage is also well suited to dealing with the insurance issue of different insurance coverage for apartment and condo buildings.

The process for damage estimation for MHB is presented in Figure 17. For each policy in the portfolio, the program reads the information on the building (location and number of stories and units) and assigns a wind speed profile based on its location (i.e., surrounding terrain). The algorithm calculates the number of corner and middle units per floor (a_c and a_M) and loads the corresponding unit vulnerability curves (V_c and V_M). Vulnerability curves are aggregated for each story and weighted by the relative proportion of middle and corner units. The result is the story vulnerability V_A. The wind speed value at every story, W_i, is used to get the expected exterior damage ratio (EEDR) from the aggregated vulnerability V_A at each story.

For the interior damage estimation the process is similar. From the wind profile, the corresponding wind speed, W_i, is calculated at each story. For a given story and its corresponding wind speed, the value of the expected breach size for windows, entry door, and sliding door, $B_C^{W.D,S}$ and $B_M^{W.D,S,}$, are retrieved from the corresponding vulnerability curves. The breach size of each component is added to get the total breach size per story. The next step is to estimate the amount of water that will enter a particular story with a given breach size, as described in the section describing the interior damage model. Note that for the sake of simplification, defects are not represented in the flow chart.

A scheme for vertical propagation of water between floors was implemented. The water content is then transformed at each story into an interior damage ratio (ID) based on the bilinear relationship described in Standard V-1. The final product of the interior damage assessment is the Expected Interior Damage Ratio (EIDR).

At this point in the process, the algorithm has computed expected damages, both exterior (EEDR) and interior (EIDR), for the particular building of the policy under study. These damages are then multiplied by the insured value of exterior and interior, respectively. These values are expressed as a percentage of the total insured value V_{Bldg}, thanks to a coefficient k_e, which varies for condos and apartment buildings. The final value is the total expected damage value (EDV).

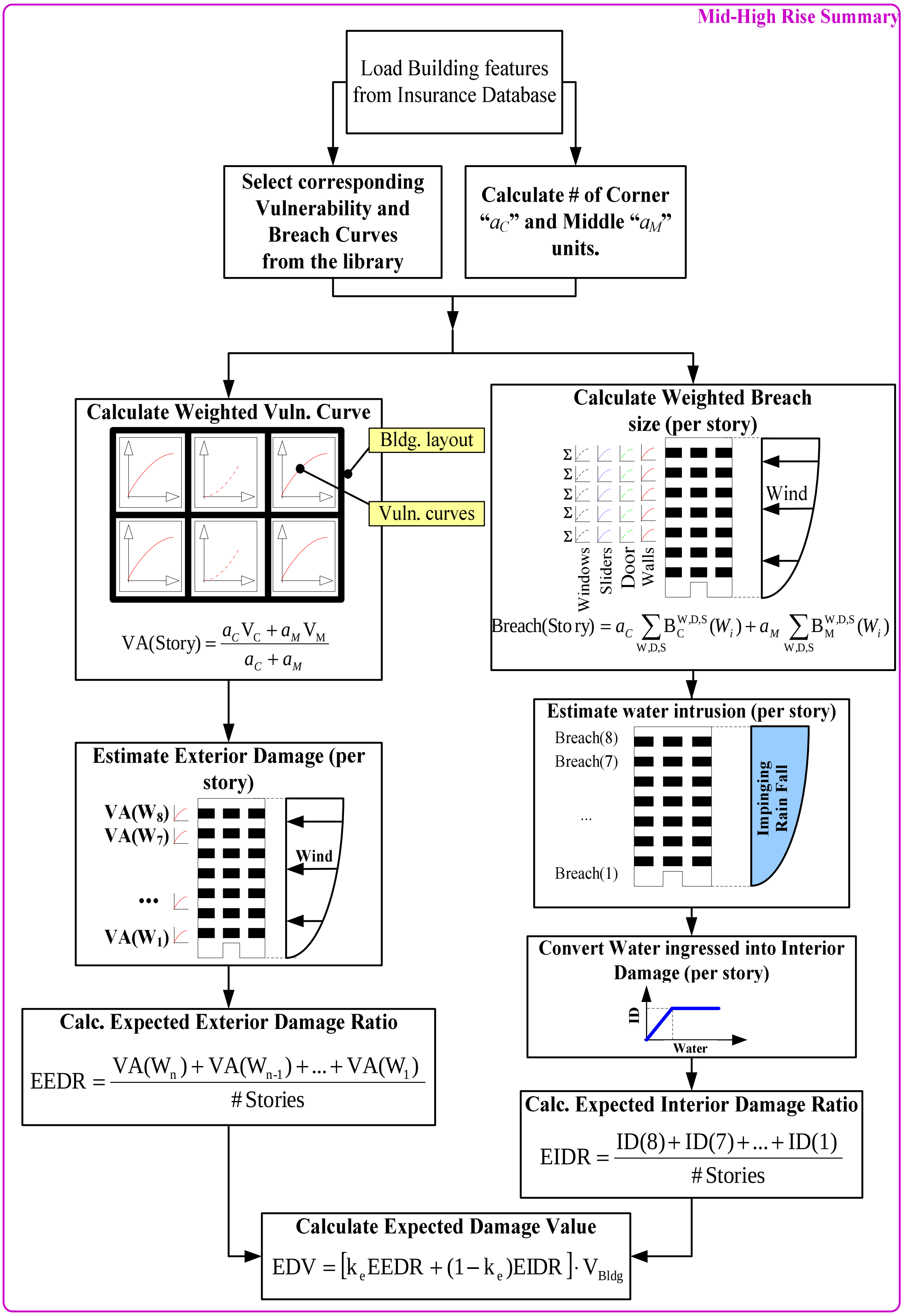

Figure 17. Exterior and interior damage assessment for MHB.

Contents Vulnerability

Contents include anything in the building that is not attached to the structure. In the case of a condo building only the contents of the common areas are covered by the policy. In the case of an apartment building, the personal contents of the renters are not covered by the building policy. In both cases, the contents vulnerability is proportional to the interior vulnerability. The constant of proportionality is based on engineering judgment and is validated using claims data.

Time-Related Expenses

Time-related expenses are coverage for loss of income due to the building damage. The value of a claim is obviously dependent on the time it takes to repair a damaged building as well as the surrounding utilities and infrastructure. This coverage applies only to apartment buildings, where the loss of income is the loss of rent. The time-related expenses are modeled as directly proportional to the interior vulnerability.

Appurtenant Structures

For commercial residential structures, appurtenant structures might include a clubhouse or administration building, which are treated like additional buildings. For other structures such as pools, etc., the appurtenant structures model developed for residential buildings is applicable.

ACTUARIAL COMPONENT

The actuarial component consists of a set of algorithms. The process involves a series of steps: rigorous check of the input data; selection and use of the relevant output produced by the meteorology component; selection and use of the appropriate vulnerability matrices for building structure, contents, appurtenant structure, and additional living expenses; running the actuarial algorithm to produce expected losses; aggregating the losses in a variety of manners to produce a set of expected annual hurricane wind losses; and producing probable maximum losses for various return periods. The expected losses can be reported by construction type (e.g., masonry, frame, manufactured homes), by county or ZIP Code, by policy form (e.g., HO-3, HO-4, etc.), by rating territory, and combinations thereof.

Expected annual losses are estimated for individual policies in the portfolio. They are estimated for building structure, appurtenant structure, contents, and ALE on the basis of their exposures and by using the respective vulnerability matrices or vulnerability curves for the construction types. For each policy, losses are estimated for all the hurricanes in the stochastic set by using appropriate damage matrices and policy exposure data. The losses are then summed over all hurricanes and divided by the number of years in the simulation to get the annual expected loss. These are aggregated at the ZIP Code, county, territory, or portfolio level and then divided by the respective level of aggregated exposure to get the loss costs. This is a computationally demanding method. Each portfolio must be run through the entire stochastic set of hurricanes.

The distribution of losses is driven by both the distribution of damage ratios generated by the engineering component and by the distribution of wind speeds generated by the meteorology component. The meteorology component provides, for each latitude-longitude grid, the associated probabilities for a common set of wind speeds. Thus, locations are essentially differentiated by their probability distribution of wind speeds. The meteorology component uses up to 55,000 year simulations to generate a stochastic set of storms. The storms are hurricane events at landfall or when bypassing closely. Each simulated storm has a track and a set of modeled wind fields at successive time intervals. The wind fields generate the one-minute maximum sustained wind speeds for the storm at various locations (latitude-longitude grid) along its track. These one-minute maximum sustained winds are then converted to three-second peak gust winds and corrected for terrain roughness by using the gust wind model and the terrain roughness model.

The engineering group has produced vulnerability matrices for personal residential buildings and vulnerability curves for commercial residential buildings. The vulnerability matrices are used as input in the actuarial model. Vulnerability matrices are provided for personal residential building structure, contents, appurtenant structures and additional living expenses for a variety of residential construction types and for different policy types. The construction types are masonry, frame, mobile home, and other. The vulnerability matrices are also developed for weak, medium, and strong construction as proxy by year built.

The starting point for the computations of personal residential losses is the vulnerability matrix with its set of damage intervals and associated probabilities. Appropriate vulnerability matrices are applied separately for building structure, content, appurtenant structure, and ALE. Once the matrix is selected for a given wind speed for each midpoint of the damage intervals, the ground up loss is computed, the appropriate deductibles and limits are applied, and the net of deductible loss is calculated. More specifically, for each damage outcome the damage ratio is multiplied by insured value to get dollar damages, the deductible is deducted, and net of deductible loss is estimated, subject to the constraints that net loss is ≥ 0 and $\leq$ limit – deductible. Percentage deductibles are converted into dollar amounts. Both the replacement cost and actual cash value are generally assumed to equal the coverage limit. Furthermore, if there are multiple hurricanes in a year in the stochastic set, the wind deductibles are applied to the first hurricane, and any remaining amount is then applied to the second hurricane. If none remains then the general peril deductible can be applied.

The net of deductible loss is multiplied by the probability in the corresponding cell to calculate the expected loss for the given damage ratio. The results are then averaged across the possible damages for the given wind speed. Next, the wind probability weighted loss is calculated to produce the expected loss for the property. The expected losses are then adjusted by the appropriate expected demand surge factor.

In the case of low-rise commercial residential structures, the mean damage ratios (MDR) are derived from the vulnerability curves for the maximum wind in the given storms. The MDRs are multiplied by the respective coverage limits to produce the expected ground up building loss and expected ground up content loss for the storm. The deductible is then applied to these losses on a pro-rata basis to generate the net of deductible expected losses. The process is repeated across all the storms in the stochastic set to produce the average loss for the policy. The expected losses are then adjusted by the appropriate expected demand surge factor.

In the case of mid-/high-rise commercial residential buildings, the vulnerability component produces the MDR separately for exterior and interior damages for a given storm (or given vertical maximum wind profile) and across all the floors in the building. A weighted average of the interior and exterior MDR is then computed to produce the building MDR. The content MDR is produced based only on the interior damage. The MDRs are applied to the coverage limits to compute the building and the content losses.

The deductible is then applied on a pro-rata basis to generate the expected loss for the storms. The process is repeated across all storms to produce the average loss for the policy. The expected losses are then adjusted by the appropriate expected demand surge factor.

For commercial residential policies, if there are multiple risks (multiple structures) within the policy, the default is to apply the deductible at the risk level. The deductible percentage is applied to each risk based on its individual limit. If information is so available, then the deductible is applied at the policy level.

The demand surge factors are estimated by a separate model and applied appropriately to each hurricane in the stochastic set. The surge factors for structures are a function of the size of statewide storm losses and are produced separately for the different regions in Florida. The surge factors for content and ALE are functionally related to the surge factor for structure. To estimate the impact of demand surge on the settlement cost of structural claims following a hurricane, data from 1992 to 2007 on a quarterly construction cost index produced by Marshall & Swift/Boeckh are used. The approach to estimating structural demand surge was to examine the index for specific regions impacted by one or more hurricanes since 1992. From the history of the index, we projected what the index would have been in the period following the storm had no storm occurred. Any gap between the predicted and actual index was assumed to be due to demand surge. In total ten storm–region combinations are examined. From these ten observations of structural demand surge the functional relationship is generalized.

After the losses are adjusted for demand surge, they are summed across all structures of the type in the grid and also across the grids to get expected aggregate portfolio loss. The model can process any combination of policy type, construction type, deductibles, coverage limits, etc. The model output reports include separate loss estimates for structure, content, appurtenant structure, and ALE. These losses are also reported by construction type (e.g., masonry, frame, manufactured homes), by county or ZIP Code, by policy form (e.g., HO-3, HO-4, etc.), by rating territory, and combinations thereof.

Another function of the actuarial algorithms is to produce estimates of the probable maximum loss for various return periods. The PML is produced non-parametrically using order statistics of simulated annual losses. Suppose the model produces N years of simulated annual losses. The annual losses L are ordered in increasing order so that $L(1) \leq L(2) \leq . . . \leq L(N)$. For a return period of Y years, let $p = 1-1/Y$. The corresponding PML for the return period Y is the pth quantile of the ordered losses. Let $k = (N)*p$. If k is an integer, then the estimate of the PML is the kth order statistic, L(k), of the simulated losses. If k is not an integer, then let k* = the smallest integer greater than k, and the estimate of the pth quantile is given by L(k*).

COMPUTER SYSTEM ARCHITECTURE

FPHLM is a large-scale system that is designed to store, retrieve, and process a large amount of historical and simulated hurricane data. In addition, intensive computation is supported for hurricane damage assessment and insured loss projection. To achieve system robustness and flexibility, a three-tier architecture is adopted and deployed in our system. It aims to solve a number of recurring design and development problems and make the application development work easier and more efficient. The computer system architecture consists of three layers: the user interface layer, the application logic layer, and the database layer.

The interface layer offers the user a friendly and convenient user interface to communicate with the system. To offer greater convenience to the users, the system is prototyped on the Web so that the users can access the system with existing web-browser software.

The application logic layer activates model logic based on the functionality presented to the user, processes data, and controls the information flow. This is the middle tier in the computer system architecture. It aims to bridge the gap between the user interface and the underlying database and to hide technical details from the users.

The database layer is responsible for data modeling to store, index, manage, and model information for the application. Data needed by the application logic layer are retrieved from the database, and the computational results produced by the application logic layer are stored back to the database.

Software, Hardware, and Program Structure

The system is primarily a web-based application that is hosted on an Oracle 9i web application server. The backend server environment is Linux and the server side scripts are written in Java Server Pages (JSP) and JavaBeans. Backend probabilistic calculations are coded in C++ using the IMSL library and called through Java Native Interface (JNI). The system uses an Oracle database that runs on a Sun workstation. Server side software requirements are the IMSL library CNL 5.0, OC4J 9.0.2.0.0, Oracle 9iAS 9.0.2.0.0, JNI 1.3.1, and JDK 1.3.1.

The end-user workstation requirements are minimal. Internet Explorer 5.5 or 6 running on Windows 2000 or XP are the recommended web browsers. However, other web browsers such as Mozilla Firefox should deliver optimal user experience. Typically, the vendor’s minimal feature set for a given web browser and operating system combination is sufficient for an optimal operation of the application.

Translation from Model Structure to Program Structure

FPHLM uses a component-based approach in converting from model to program structure. The model is divided into the following components or modules: Storm Forecast Module, Wind Field Module, Damage Estimation Module, and Loss Estimation Module. Each of these modules fulfills its individual functionality and communicates with other modules via well-defined interfaces. The architecture and program flow of each module are defined in its corresponding use case document following software engineering specifications. Each model element is translated into subroutines, functions, or class methods on a one-to-one basis. Changes to the models are strictly reflected in the software code.

3. Provide a flow diagram that illustrates interactions among major model components.

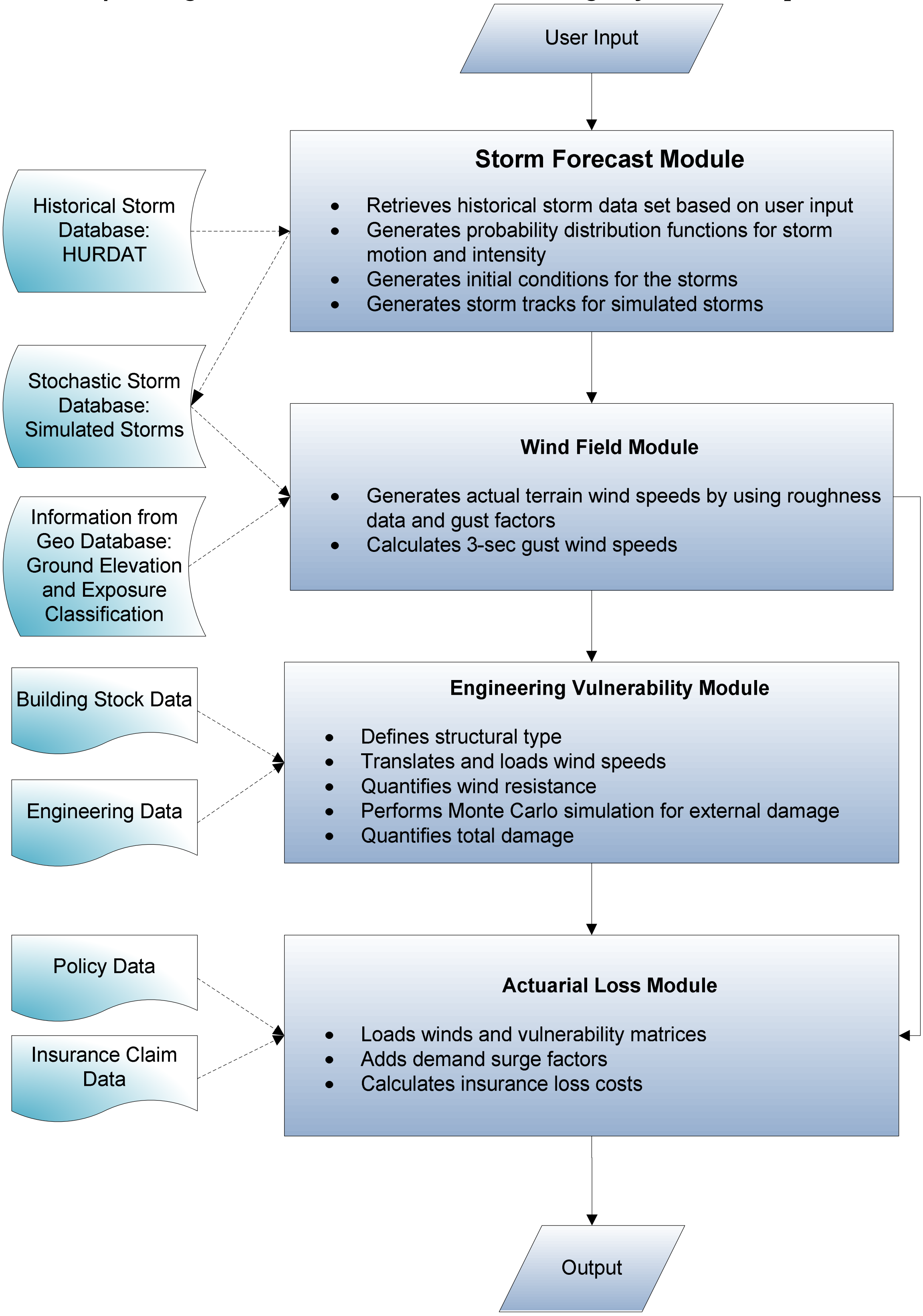

Figure 18. Flow diagram of the computer model.

4. ***Provide a comprehensive list of complete references pertinent to the submission by standard grouping, according to professional citation standards.***

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Panda D. Oracle Container for J2EE (OC4J).
http://www.onjava.com/pub/a/onjava/2002/01/16/oracle.html

PHRLM Manual. http://www.cis.fiu.edu/hurricaneloss

RAMS: Regional Atmospheric Modeling System.
www.atmet.com/html/docs/rams/rams_techman.pdf

R.L. Walko, C.J. Tremback, “RAMS: regional atmospheric modeling system, version 4.3/4.4 - Introduction to RAMS 4.3/4.4.”
http://www.atmet.com/html/docs/rams/ug44-rams-intro.pdf

RMS home page. http://www.rms.com

The JDBC API Universal Data Access for the Enterprise.
http://www.oracle.com/technetwork/java/overview-141217.html

The Interactive Data Language.
http://www.ittvis.com/language/en-us/productsservices/idl.aspx

Track of hurricane Andrew (1992) (Source from NOVA).
http://www.pbs.org/newshour/science/hurricane/facts.html

Tropical cyclone heat potential. http://www.aoml.noaa.gov/phod/cyclone/data/

The Ptolemy Java Applet package.
http://ptolemy.eecs.berkeley.edu/papers/99/HMAD/html/plotb.html

5. ***Provide the following information related to changes in the model from the previously accepted submission to the initial submission this year:***

   A. A summary description of the significant changes and a list of non-significant changes,

   B. Percentage difference in average annual zero deductible statewide loss costs for:

      1. All changes combined,

      2. Each significant model component change, and

   C. Color-coded maps by county reflecting the percentage difference in average annual zero deductible statewide loss costs for each significant model component change.

Significant Changes

1. A new methodology for treating surface friction (conversion of marine winds to actual terrain) has been implemented. The previous method used the Large and Pond (1981) parameterization of the marine drag coefficient, capped at Cd=0.0023 for winds above 35 m/s. The conversion of marine wind to open terrain wind, and subsequently to actual terrain conditions, was based on Simiu and Scanlan (1996). The new method is based on Vickery et al. (2009). In addition, a sea-land transition effect has been incorporated into this new terrain conversion methodology. Previously, the surface roughness near the coast was modified to simulate this transition. Surface roughness estimation has been enhanced using Statewide 2004 Water Management District Land Use classification data. Surface roughness at the ZIP Code level, where used, is now based on population-weighted roughness throughout the ZIP Code rather than on simply the roughness at the ZIP Code centroid, which is often not in residential areas. The new surface friction treatment is based on entirely new code, with tightly coupled, nonlinearly interacting subcomponents, and thus it is not feasible nor meaningful to estimate the losses due to each subcomponent of the new surface friction methodology. The estimated change in statewide loss costs is an approximate 9% decrease.

2. A new, more complete exposure survey led to a new set of statistics of the building population. That led to a new set of weighting factors for the vulnerability matrices. In depth interviews with key figures in the building industry in Florida and an extensive literature survey led to the definition of additional eras for the strength characterization of the Florida building population over time. The estimated change in statewide loss costs due to this change is an approximate 2% increase.

3. The leak model for the Central and North timber vulnerabilities was adjusted to ensure a smoother transition between damage governed by water leaks and damage governed by wind damage, as the wind speed increases. The adjustment also reflects the fact that there is a higher probability of leak-induced damage in timber structures than in masonry structures. The estimated change in statewide loss costs is less than a 1% increase.

4. New variants of the weak and medium masonry and timber site-built home models were created. These additions model older homes with plank decking, homes with stapled OSB decking, and older existing homes reroofed according to modern standards. The new modified and retrofitted weak and medium vulnerability matrices are applicable to the new eras defined in version 4.1 of the FPHLM.

They are also weighted according to the new statistics developed for version 4.1. Therefore, it is not possible to apply these new matrices by themselves into version 4.1 to isolate any change in losses due to this change alone. The best and most meaningful compromise was to evaluate the influence on the overall losses of these matrices in version 4.1.

The combined statewide percentage change in loss costs due to new statistics, new eras, and new non-retrofitted vulnerability matrices is an approximate 12% increase.

The combined statewide percentage change in loss costs due to new statistics, new eras, and new non-retrofitted and retrofitted vulnerability matrices is an approximate 5% increase.

5. A commercial residential model is presented. This is a new feature, so we do not have comparisons of losses with the previous submission.

6. The FPHLM V4.1 includes a new capability to model losses at the "street level." Since this is a new feature, we do not have comparison of losses with the previous submission.

The combined statewide percentage change in loss costs due to all the changes in the model is an approximate 1% increase.

Special Note on Cat Fund Exposure Data Processing

The mapping of year built for mobile homes in the 2007 Cat Fund exposure data was changed. At first, the mapping of year built was based solely on the code for year built, which was not very informative. Therefore statistics from the survey of housing stock were used to assign year built in the previous version. In the current version, the mapping follows a better interpretation of the instructions for year built. This change has no impact on the estimation for loss cost using company data. It does affect the loss costs in the forms that use Cat Fund data. The new method of mapping results in a decline of 7.6% in state wide zero deductible losses for mobile homes.

Non significant Changes

- A new nomenclature was developed for the vulnerability matrices to better identify and archive the matrices.

- New HURDAT database

- New 2009 ZIP Codes

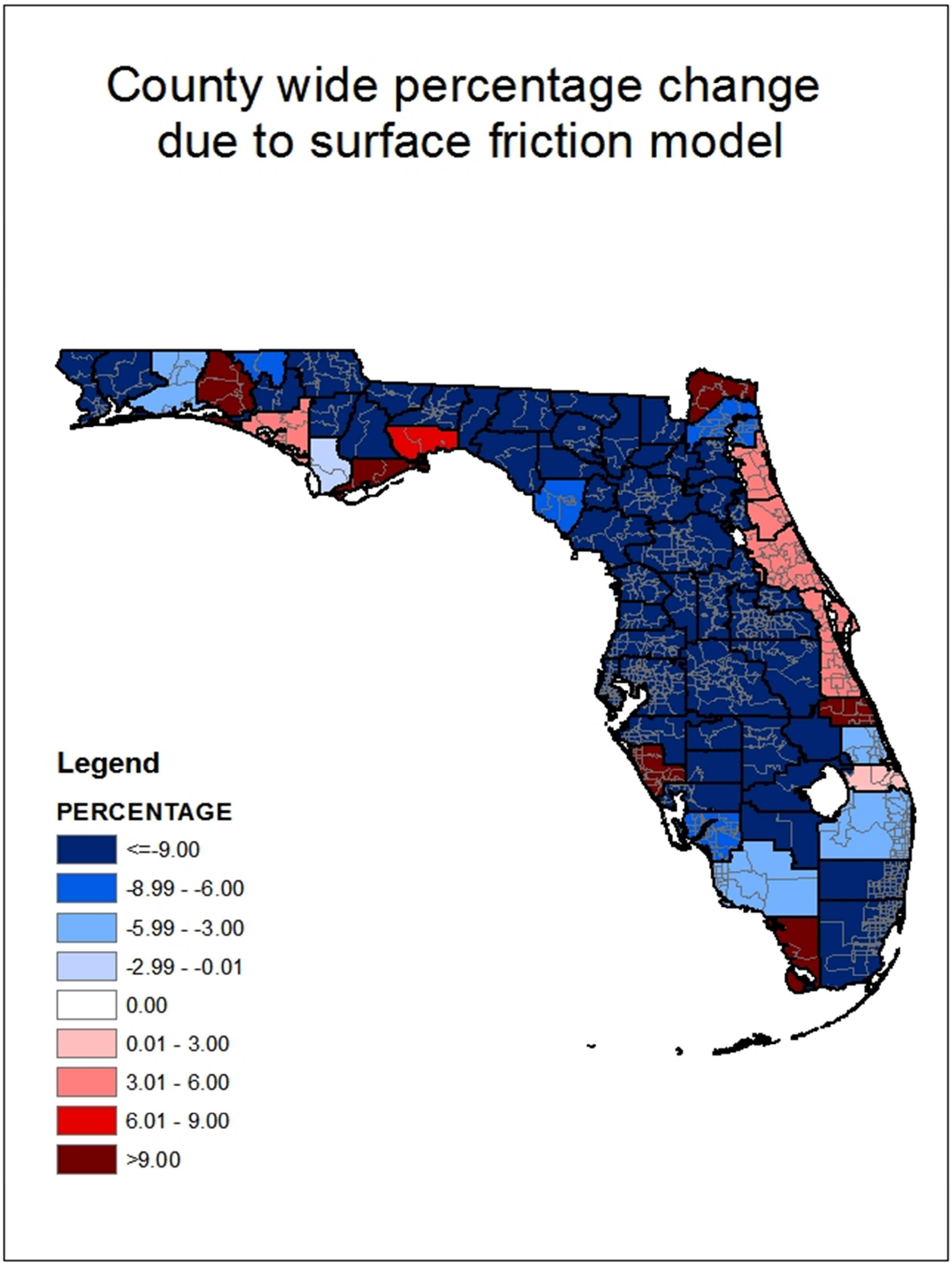


Figure 19. County wide percentage change due to surface friction model.

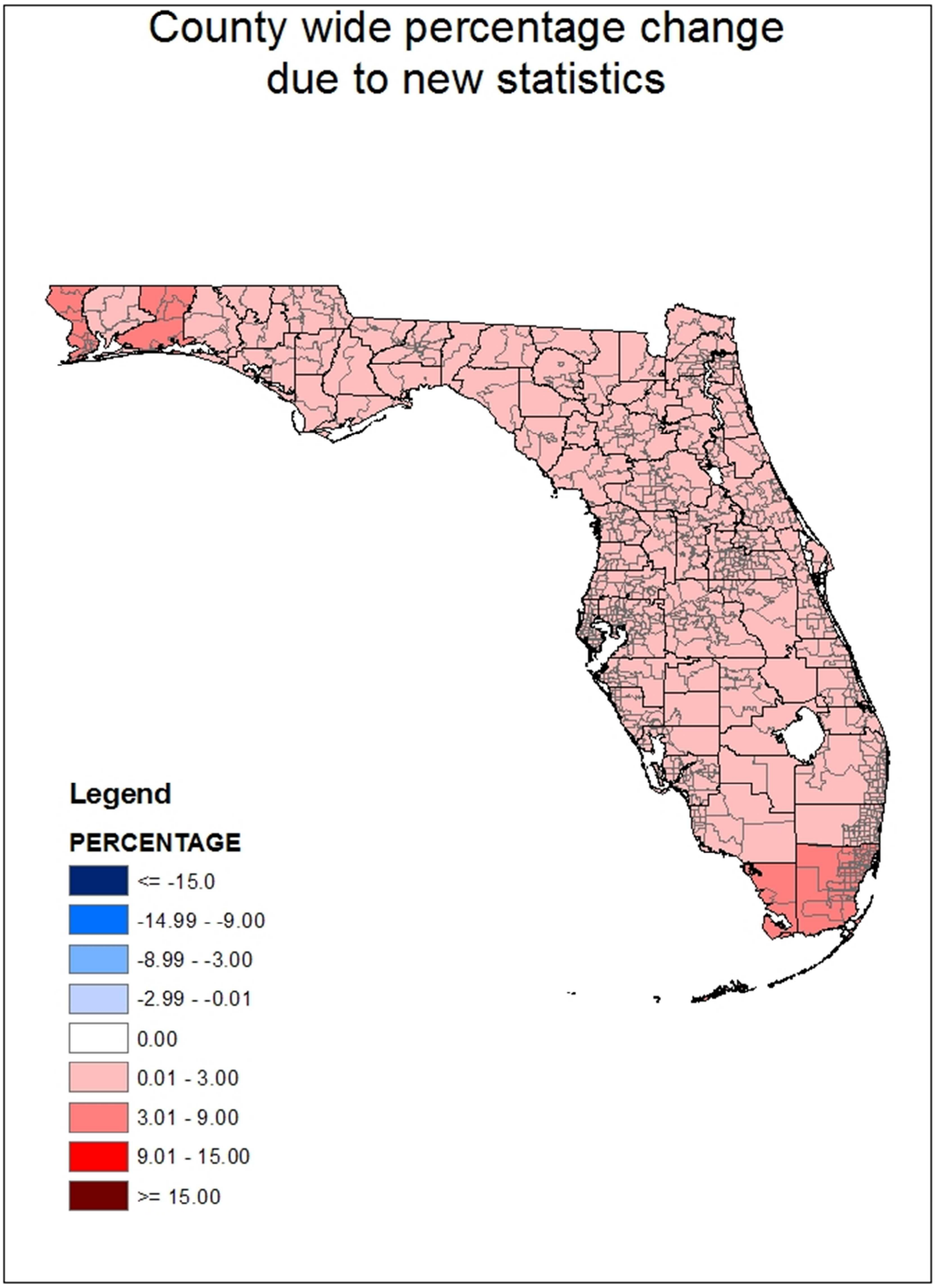


Figure 20. County wide percentage change due to new statistics.

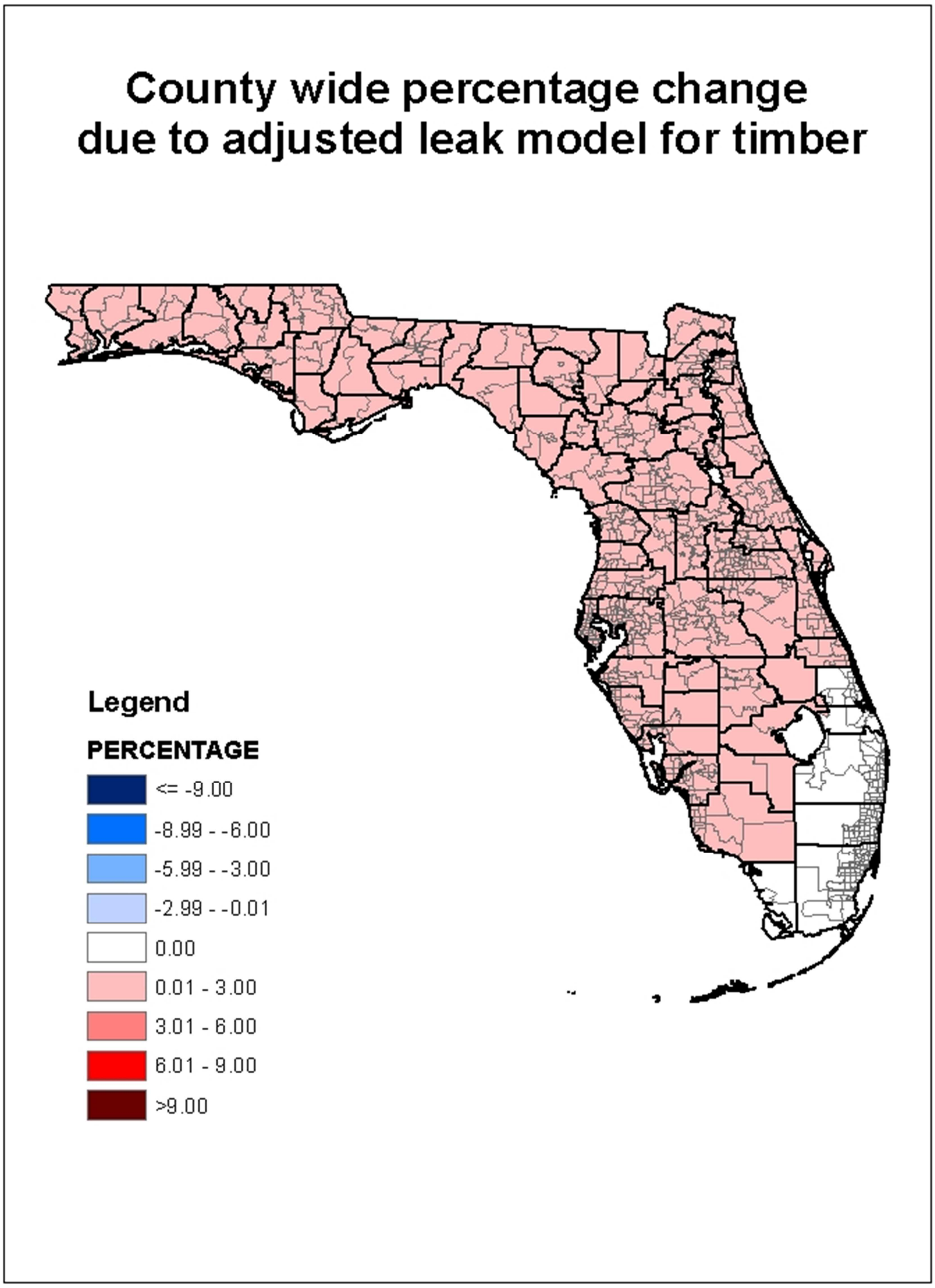


Figure 21. County wide percentage change due to adjusted leak model for timber.

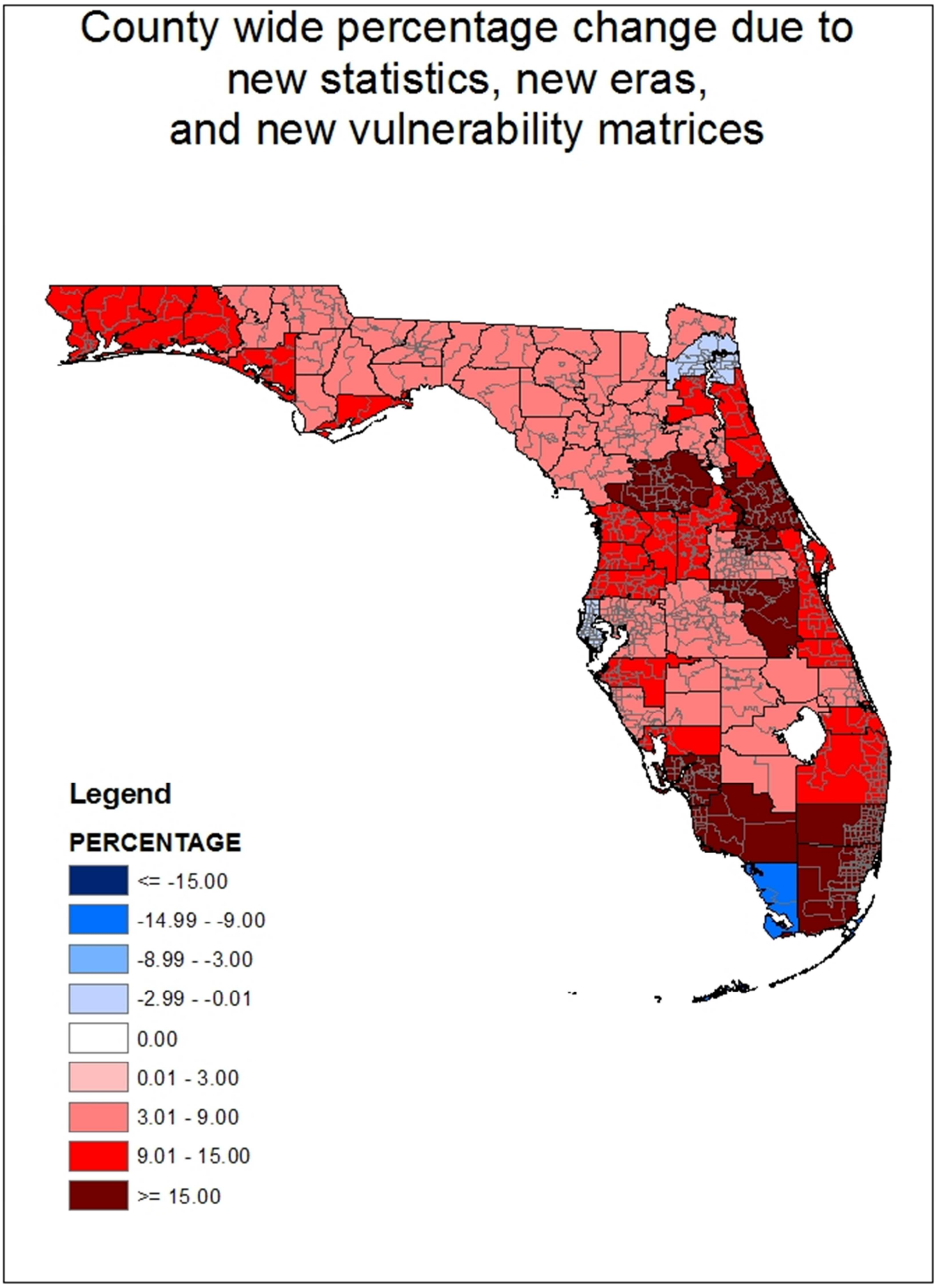


Figure 22. County wide percentage change due to new statistics, new eras, and new vulnerability matrices.

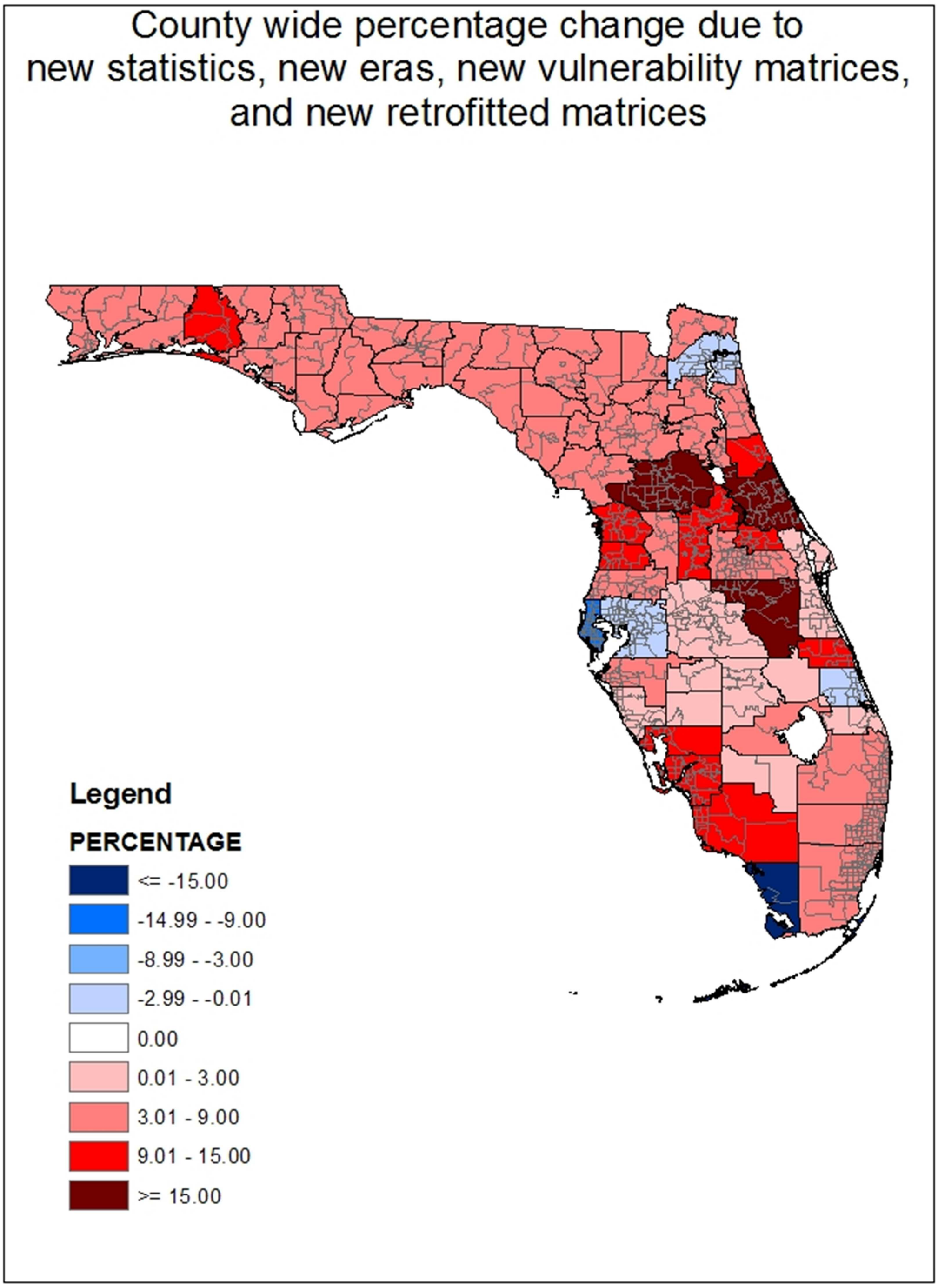


Figure 23. County wide percentage change due to new statistics, new eras, new vulnerability matrices, and new retrofitted matrices.

G-2 Qualifications of Modeling Organization Personnel and Consultants

A. 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.

The model was developed, tested, and evaluated by a multi-disciplinary team of professors and experts in the fields of meteorology, wind and structural engineering, computer science, statistics, finance, economics, and actuarial science. The experts work primarily at Florida International University, Florida Institute of Technology, Florida State University, University of Florida, Hurricane Research Division of NOAA, and University of Miami.

B. The model or any modifications to an accepted model shall be reviewed by either modeling organization personnel or consultants in the following professional disciplines: structural/wind engineering (licensed Professional Engineer), statistics (advanced degree), actuarial science (Associate or Fellow of Casualty Actuarial Society), meteorology (advanced degree), and computer/information science (advanced degree). These individuals shall be signatories on Forms G-1 through G-6 as applicable and shall abide by the standards of professional conduct if adopted by their profession.

The model has been reviewed by modeler personnel and consultants in the required professional disciplines. These individuals abide by the standards of professional conduct as adopted by their profession.

Disclosures

1. Organization Background

A. Describe the ownership structure of the modeling organization. Describe affiliations with other companies and the nature of the relationship, if any. Indicate if your organization has changed its name and explain the circumstances.

The model was developed independently by a multi-disciplinary team of professors and experts. The lead university is the Florida International University. The model was commissioned by the Florida Office of Insurance Regulation.

B. If the model is developed by an entity other than a modeling company, describe its organizational structure and indicate how proprietary rights and control over the model and its critical components is exercised. If more than one entity is involved in the development of the model, describe all involved.

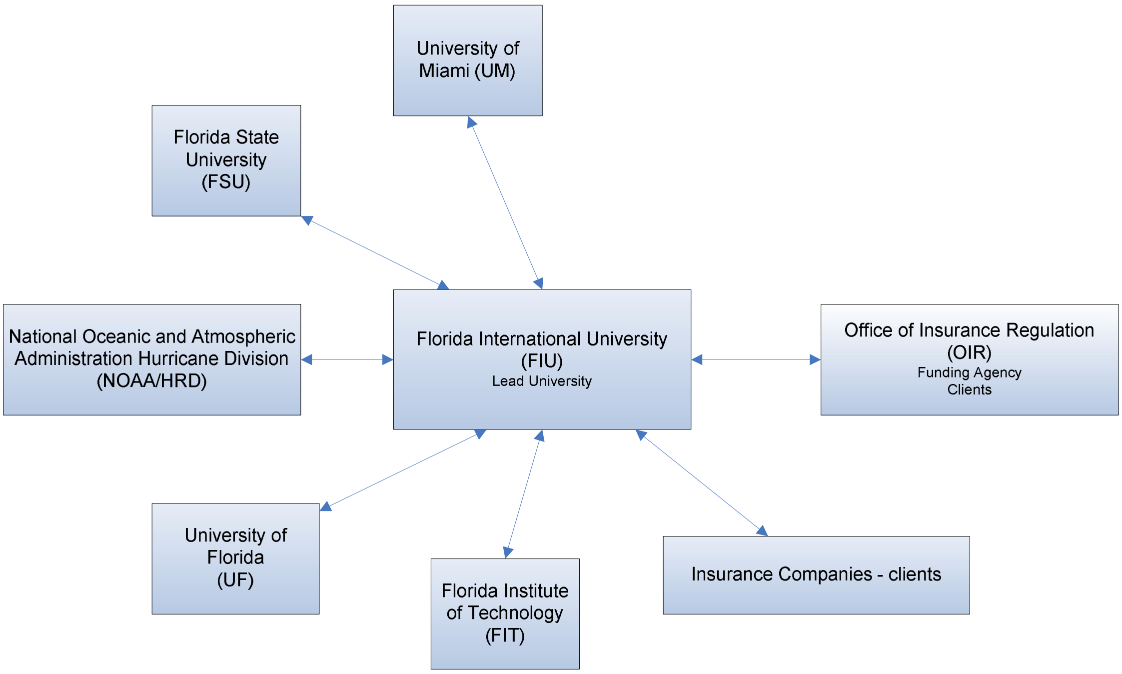


Figure 24. Organizational structure.

The Florida Office of Insurance Regulation (OIR) contracted and funded Florida International University to develop the Florida Public Hurricane Loss Model. The model is based at the Laboratory for Insurance, Financial and Economic Research, which is part of the International Hurricane Research Center at Florida International University. The OIR did not influence the development of the model. The model was developed independently by a team of professors, experts, and graduate students working primarily at Florida International University, Florida Institute of Technology, Florida State University, University of Florida, Hurricane Research Division of NOAA, and University of Miami. The copyright for the model belongs to OIR.

C. If the model is developed by an entity other than a modeling company, describe the funding source for the model.

The model was funded by the state legislature at the request of the Florida Office of Insurance Regulation.

D. Describe the modeling organization's services.

Until recently the modeler provided services to only one major client, the FL-OIR. Effective January 2009 the modeler is providing services to the firms and organizations in the insurance and reinsurance industries. It has expanded the infrastructure and computational capacity to handle the added load.

The first version of the model was completed in May 2005 and was based on the knowledge and the limited data available prior to the 2004–2005 hurricane seasons. It was not used for purposes of estimating loss costs for insurance company exposures. Essentially, it was an internal model that was never implemented.

The next version of the model was developed upon the acquisition of a limited amount of meteorological, engineering, and insurance claim data from the 2004–2005 hurricane events and was implemented in March 2006. This version was used to process the insurance company data on behalf of the Florida Office of Insurance Regulation.

In summer 2007 a revised and updated version of the model, 2.6, was accepted by the Florida Commission on Hurricane Loss Projection Methodology and put to immediate use. Another revised and updated version, 3.0, was accepted by the Commission in June 2008. The latest updated version of the model is 3.1, which was accepted by the Commission in June 2009.

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

None.

2. Professional Credentials

A. Provide in a chart 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 model:

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

See below.

Table 10. Professional credentials.

Key Personnel	Degree/ Discipline	University	Employment Status	Tenure	Experience
Meteorology:					
Dr. Mark Powell	Ph.D. Meteorology	Florida State University	Senior Atmospheric Scientist HRD/NOAA	32	Meteorology wind field model
Dr. Steve Cocke	Ph.D. Physics	Univ. Texas Austin	Scholar/Scientist FSU, Dept of Meteorology	15	Meteorology track, intensity, roughness models
Bachir Annane	M.S. Meteorology, M.S. Mathematics	Florida State University	Meteorologist, Univ. of Miami	17	Meteorology
Neal Durst	B.S. Meteorology	Florida State University	Meteorologist, HRD/NOAA	27	Meteorology
Engineering:					
Dr. Jean-Paul Pinelli	Ph.D. Civil Engineering	Georgia Tech	Professor, CE Florida Institute of Technology	15	Wind engineering, vulnerability functions
Dr. Kurt Gurley	Ph.D. Civil Engineering	University of Notre Dame	Assoc professor, CE Univ. of Florida	12	Wind engineering, simulations
Gonzalo Pita	M.S. Structural Engineering	National University of	Ph.D. Candidate (FIT)	7	Wind engineering, vulnerability functions

Key Personnel	Degree/ Discipline	University	Employment Status	Tenure	Experience
		Cordoba			
Bobak Torkian	M.S. Structural Engineering	Florida Tech	Ph.D. Candidate (FIT)	3	Wind engineering, mitigation
Timothy Johnson	B.S. Civil Engineering	Florida Tech	M.S. Candidate (FIT)	1	Wind engineering, vulnerability functions
Johann Weekes	M.S. Civil Engineering	University of Florida	Ph.D. Candidate (UF Civil)	5	Wind and structural engineering
Juan Antonio Balderrama	M.S. Civil Engineering	University of Florida	Ph.D. Candidate (UF Civil)	3	Wind and structural engineering
Actuarial/Finance:					
Dr. Shahid Hamid Project manager, PI	Ph.D. Economics (Financial), CFA	University of Maryland	Professor of Finance Florida International University	22	Insurance and finance
Gail Flannery	FCAS, Actuary	CAS	VP, AMI Risk Consultants	28	Reviewer, demand surge
Aguedo Ingco	FCAS, Actuary	CAS	President, AMI Risk Consultants	38	Reviewer, demand surge
Crisanto Dorado	Ph.D. Statistics	Florida State University	Consulting Actuary, AMI Risk Consultants	21	Reviewer
Mario Madarang	B.S. Commerce and minor in Accounting	University of San Jose-Recoletos	Actuarial Assistant, AMI Risk Consultants	29	Reviewer
Computer Science					
Dr. Shu-Ching Chen	Ph.D. Electrical and Computer Engineering	Purdue University	Professor of Computer Science at FIU	11	Software and database development
Dr. Mei-ling Shyu	Ph.D. Electrical and Computer Engineering	Purdue University	Associate Professor of Electrical and Computer Engineering at University of Miami	11	Software quality assurance
Fausto Fleites	B.S. Computer Science	Florida Int'l University	Ph.D. Student FIU	9	Software development and database development
Ronald Ocampo	B.S. Computer Science	Florida Int'l University	Ph.D. Student FIU	3	Software development and database development
Hsin-Yu Ha	B.S. Information Management	Chang Gung University	Ph.D. Student FIU	5	Data processing
Yimin Yang	M.S. Engineering	Xidian University	Ph.D. Student FIU	2	Software development
Chao Chen	M.S. Engineering	Shanghai Jiaotong University	Ph.D. Candidate UM	2	Software development
Statistics					
Dr. S. Gulati	Ph.D. Statistics	University of South Carolina	Professor, Statistics, FIU	17	Statistical tests and nonparametric analysis
Dr. B. M. Golam Kibria	Ph.D. Statistics	University of Western Ontario	Associate Professor of Statistics at FIU	12	Statistical testing and sensitivity analysis
Antonio Hudson	B.S. Mathematics	Florida Int'l University	M.S. Student (Statistics), High School Teacher	3	Statistics and programming in R
Technical Editor					
Kathy Fearon	M.A. English	Middlebury College	Researcher, Writing Coach, Florida State University	22	Technical editing and design and coordination of training programs
Diane Ripandelli	B.A. English	Florida State University	Technical Writer and Editor, URS Corporation	15	Technical writing and editing
Dr. Jennie Dautermann	Ph.D. English	Purdue University	Faculty in English , FIU	16	Technical writing, editing and instruction

B. Identify any new employees or consultants (since the previous submission) working on the model or the acceptability process.

Bobak Torkian, Timothy Johnson, Johann Weekes, Juan Antonio Balderrama, Yimin Yang, Chao Chen, Antonio Hudson, Kathy Fearon, Diane Ripandelli, and Jennie Dautermann.

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

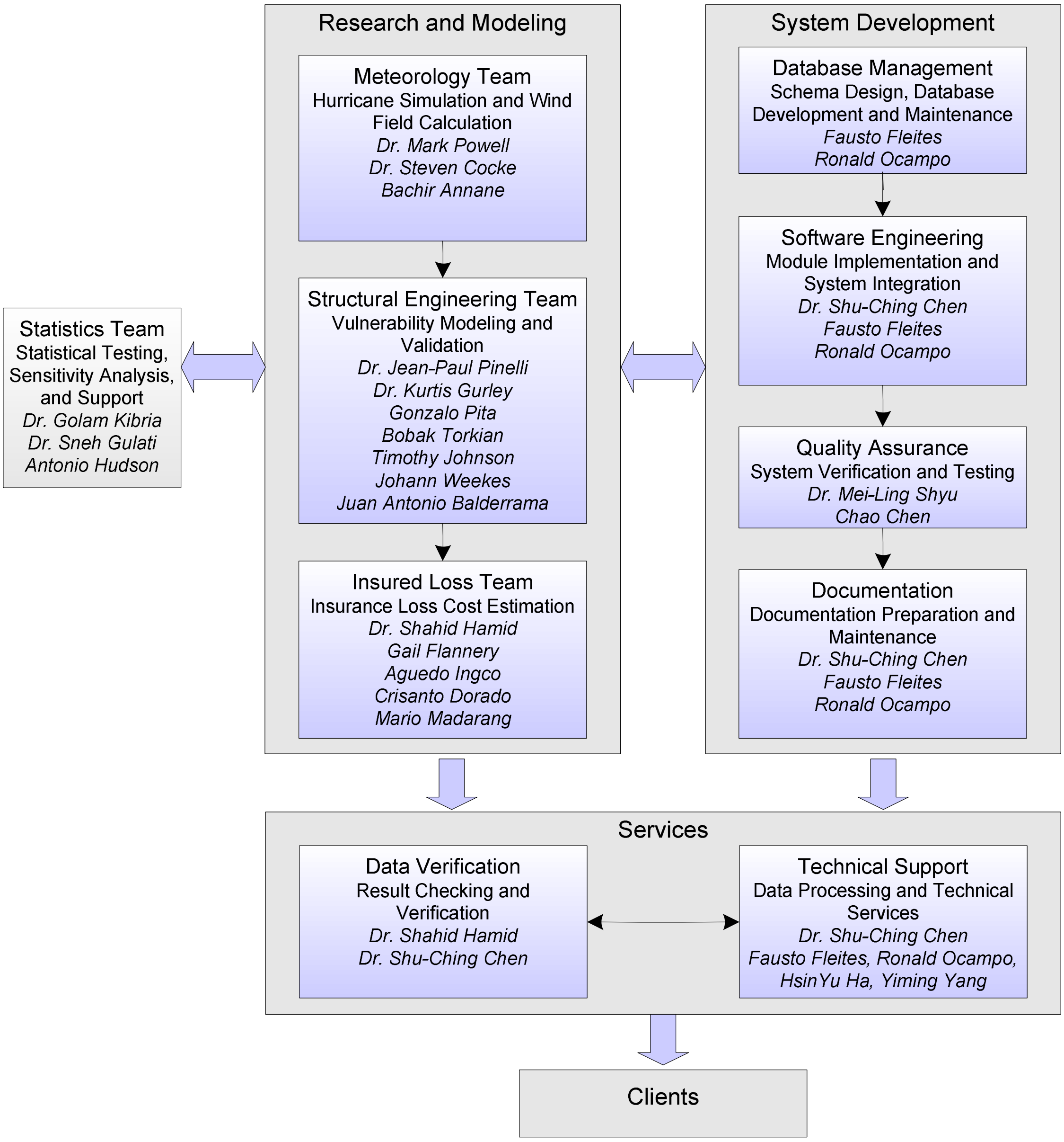


Figure 25. Florida Public Hurricane Loss Model workflow.

D. Indicate specifically whether individuals listed in A. and B. are associated with the insurance industry, a consumer advocacy group, or a government entity, as well as their involvement in consulting activities.

Dr. Mark Powell and Neal Dorst work for the Hurricane Research Division of NOAA.

3. Independent Peer Review

A. Provide dates of external independent peer reviews that have been performed on the following components as currently functioning in the model:

1. Meteorology
1. Vulnerability
2. Actuarial Science
3. Statistics
4. Computer Science

Dr. Gary Barnes, Professor of Meteorology at University of Hawaii, performed the external review of the meteorology component in December 2006. The current version was reviewed by modeler personnel.

Gail Flannery, FCAS, and Aguedo Ingco, FCAS, actuaries and vice president and president, respectively, of AMI Risk Consultants in Miami, performed the external review of the actuarial component and submission. Gail Flannery was also involved in the development of the demand surge model and the commercial residential model.

The vulnerability, statistical, and computer science components were reviewed by modeler personnel.

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

The written independent review of the wind component by Dr. Gary Barnes is presented in Appendix A. No unresolved outstanding issues remain after the review.

Gail Flannery, FCAS, performed the independent review of the actuarial component. She attended many on-site meetings with the model team and helped in the understanding of the requirements of the actuarial standards, disclosures, and forms. She was provided with all relevant forms and supporting documents. She conducted independent analysis of the A forms and asked questions and provided feedback and suggestions; her questions were addressed, and the feedback and suggestions were acted upon so that no unresolved outstanding issues remain. She largely prepared the submission document for the actuarial standards. A letter from Gail Flannery can be found in Appendix A. See also Form G-4.

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

Dr. Gary Barnes, Professor of Meteorology at University of Hawaii, performed the external review of the version 2.6 meteorology component of the model, particularly the wind field model. He has no ongoing or functional relationship to FIU or the modeling organization, other than as an independent reviewer. He did not take part in the development or testing of the model. His role in the model has been confined to being an independent external reviewer.

4. Provide a completed Form G-1, General Standards Expert Certification.

See Form G-1

5. Provide a completed Form G-2, Meteorological Standards Expert Certification.

See Form G-2

6. Provide a completed Form G-3, Vulnerability Standards Expert Certification.

See Form G-3

7. Provide a completed Form G-4, Actuarial Standards Expert Certification.

See Form G-4

8. Provide a completed Form G-5, Statistical Standards Expert Certification.

See Form G-5

9. Provide a completed Form G-6, Computer Standards Expert Certification.

See Form G-6

G-3 Risk Location

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

Our model uses ZIP Code data exclusively from a third-party developer, which bases its information on the ZIP Code definitions issued by the United States Postal Service. The version we used has a USPS vintage of December 2009. The ZIP Code data have been changed in the current release of the model from last year's submission.

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

ZIP Code centroids used in the model are population centroids and are updated at least every 24 months.

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

The methodology employed by the vendor of our model for computing population centroids is identical to the computational methods promulgated by the U.S. Census Bureau.

ZIP Code information is also checked for consistency by experts developing our model. Maps showing the ZIP Code boundaries and the associated centroids will be provided to the professional team during the on-site visit.

Disclosures

1. ***List the current ZIP Code databases used by the model and the components of the model to which they relate. Provide the effective (official United States Postal Service) date corresponding to the ZIP Code databases.***

FPHLM uses Dynamap 5-Digit ZIP Codes distributed by MapInfo. The source of the data is Geographic Data Technology, Inc. (GDT). GDT created the data using a combination of its DYNAMAP/2000 data, the United States Postal Service (USPS) ZIP+4 Data File, the USPS National 5-Digit ZIP Code and Post Office Directory, USPS ZIP+4 State Directories, and the USPS City State File.

The ZIP Code data are updated quarterly. The release we used in this submission has a Tele Atlas (GDT, Inc.) vintage of 2009.12 (December 2009) and a USPS vintage of December 2009. The 5-Digit ZIP Code aligns with StreetPro v2009.12, MapMarker Plus v14.6 & US v22.1, Routing J Server v2009.12, and Census Boundary Products (block groups, counties, census tracks, places, MCDs, and municipal boundaries) v2009.12.

The ZIP Code data are used in the Wind Field Module of the model.

2. Describe in detail how invalid ZIP Codes are handled.

For historical loss costs where street addresses are not available, we use contemporaneous ZIP Codes and associated population-based centroids to locate the exposure. The Wind Speed Correction module subsequently determines the current (2009) ZIP Code that contains the historical centroid, and the exposure is then modeled on the basis of the 2009 ZIP code centroid location.

If a policy has a ZIP Code that cannot be found in the contemporaneous database of ZIP Codes, it is not modeled.

G-4 Independence of Model Components

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

The meteorology, vulnerability, and actuarial components of the model are theoretically sound and were developed and validated independently before being integrated. The model components were tested individually.

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.

The current submission document has been reviewed and edited by persons who are qualified to perform such tasks. Future revisions and related documentation will likewise be reviewed and edited by the qualified individual listed in Form G-7.

Disclosures

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.***

All submission document revisions are passed to the Editor prior to inclusion in the document. Several Word tools are utilized to automate the process of formatting and editing the document. For example, we used Source Manager for APA-style bibliographies, consistent formatting via styles for standards, forms and disclosures, cross-references to cite figures and tables, and multi-level lists to ensure consistent numbering. In addition, Word's track changes tool is used to keep track of modifications to the document since the initial submission. An export filter to PDF format is used to export the document directly to PDF format, which subsequently is printed directly to paper via a printer. The PDF and printed document should be identical barring unforeseen bugs in the PDF export plug-in or PDF printing software.

2. ***Describe the process used by the signatories on Forms G-1 through G-6 to ensure that the information contained under each set of standards is accurate and complete.***

Each signatory was responsible for doing a final review of the standards related to their expertise prior to submission to verify the accuracy and completeness of the information in the submission document. A professional technical editor was hired to perform a thorough edit of the document. All signatories were required to proof-read a PDF version of the document to ensure accuracy and completeness. On-site meetings were held to perform a thorough review of the final version of the document.

3. ***Provide a completed Form G-7, Editorial Certification.***

See Form G-7.

Forms G1-7

Form G-1: General Standards Expert Certification

I hereby certify that I have reviewed the current submission of Florida Public Hurricane Loss Model
(Name of Model)

Version 4.0 for compliance with the 2009 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1) The model meets the General Standards (G1 – G5);
2) The disclosures and forms related to the General Standards section 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 in order to bias or prejudice my opinion.

Shahid Hamid — Name

PhD (Financial Economics), CFA — Professional Credentials (area of expertise)

S. Hamid — Signature (original submission) — Date 11/10/2010

S. Hamid — Signature (response to deficiencies, if any) — Date 1/6/2010

S. Hamid — Signature (revisions to submission, if any) — Date 3/1/2011

S. Hamid — Signature ~~(final submission)~~ revision — Date 4/21/2011

S. Hamid ~~final submission~~ — 6/8/2011

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

S. Hamid — 7/8/2011

77

Form G-2: Meteorological Standards Expert Certification

I hereby certify that I have reviewed the current submission of Florida Public Hurricane Loss Model
(Name of Model)
Version 4.1 for compliance with the 2009 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1) The model meets the Meteorological Standards (M1 – M6);
2) The disclosures and forms related to the Meteorological Standards section 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 in order to bias or prejudice my opinion.

Mark Powell	PhD, Atmospheric Scientist
Name	Professional Credentials (area of expertise)
	11-1-2010
Signature (original submission)	Date
	3-1-2011
Signature (response to deficiencies, if any)	Date
Signature (revisions to submission, if any)	Date
	6-8-2011
Signature (final submission)	Date
	7-7-2011

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

78

Form G-3: Vulnerability Standards Expert Certification

I hereby certify that I have reviewed the current submission of Florida Public Hurricane Loss Model (Name of Model) Version 4.1 for compliance with the 2009 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1) The model meets the Vulnerability Standards (V1 – V2);
2) The disclosures and forms related to the Vulnerability Standards section 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 in order to bias or prejudice my opinion.

Jean-Paul Pinelli	Structural and wind engineering PhD, Florida PE license 53310
Name	Professional Credentials (area of expertise)
	11/08/10
Signature (original submission)	Date
	04/18/11
Signature (revisions to submission, if any)	Date
	06/08/11
Signature (revisions to submission, if any)	Date
	07/08/11
Signature (final submission)	Date

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Form G-4: Actuarial Standards Expert Certification

I hereby certify that I have reviewed the current submission of Florida Public Hurricane Loss Model
(Name of Model)

Version 4.0 for compliance with the 2009 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1) The model meets the Actuarial Standards (A1 – A11);
2) The disclosures and forms related to the Actuarial Standards section 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 in order to bias or prejudice my opinion.

Gail Flannery	FCAS, MAAA
Name	Professional Credentials (area of expertise)
Gail Flannery	11/8/10
Signature (original submission)	Date
Gail Flannery	1/4/11
Signature (response to deficiencies, if any)	Date
Gail Flannery	3/1/11
Signature (revisions to submission, if any)	Date
Gail Flannery	4/19/11
Signature (final submission)	Date
Gail Flannery	7/8/11

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

Form G-5: Statistical Standards Expert Certification

I hereby certify that I have reviewed the current submission of Florida Public Hurricane Loss Model
(Name of Model)

Version 4.0 for compliance with the 2009 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1) The model meets the Statistical Standards (S1 – S6);
2) The disclosures and forms related to the Statistical Standards section 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 in order to bias or prejudice my opinion.

Sneh Gulati	PhD in Statistics
Name	Professional Credentials (area of expertise)
[signature]	11/12/10
Signature (original submission)	Date
[signature]	01/04/11
Signature (response to deficiencies, if any)	Date
[signature]	03/07/11
Signature (revisions to submission, if any)	Date
[signature]	04/18/11
Signature (final submission)	Date

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

[signature] 07/07/11

81

Form G-6: Computer Standards Expert Certification

I hereby certify that I have reviewed the current submission of Florida Public Hurricane Loss Model
(Name of Model)
Version 4.1 for compliance with the 2009 Standards adopted by the Florida Commission on Hurricane Loss Projection Methodology and hereby certify that:

1) The model meets the Computer Standards (C1 – C7);
2) The disclosures and forms related to the Computer Standards section 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 in order to bias or prejudice my opinion.

Shu-Ching Chen	PhD in Electrical and Computer Engineering MS in Computer Science
Name	Professional Credentials (area of expertise)
[signature]	11/11/10
Signature (original submission)	Date
[signature]	3/1/11
Signature (response to deficiencies, if any)	Date
[signature]	4/19/11
Signature (revisions to submission, if any)	Date
[signature]	6/8/11
Signature (final submission)	Date

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

[signature] 7/7/11

82

Form G-7: Editorial Certification

I/We hereby certify that I/we have reviewed the current submission of Florida Public Hurricane Loss M
(Name of Model)

Version 4.0 4.1 for compliance with the "Process for Determining the Acceptability of a Computer Simulation Model" adopted by the Florida Commission on Hurricane Loss Projection Methodology in its *Report of Activities as of November 1, 2009*, and hereby certify that:

1) The model submission is in compliance with the Commission's Notification Requirements and General Standard G-5;
2) The disclosures and forms related to each standards section 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, inaccurate citations, charts or graphs, or extraneous text or references;
4) The current version of the 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/our opinion I/we have not been influenced by any other party in order to bias or prejudice my/our opinion.

Kathy Fearon — Name

Technical Editor — Professional Credentials (area of expertise)

Kathy Fearon — Signature (original submission)

11/12/2010 — Date

(Steven Cocke) — Signature (response to deficiencies, if any)

Date

Signature (revisions to submission, if any)

Date

Jennie Dautermann — Signature (final submission)

April 22, 2011 — Date

Jennie Dautermann final submission — June 8, 2011

An updated signature and form is required following any modification of the model and any revision of the original submission. If a signatory differs from the original signatory, provide the printed name and professional credentials for any new signatories.

Note: A facsimile or any properly reproduced signature will be acceptable to meet this requirement.

July 9, 2011

83

METEOROLOGICAL STANDARDS

M-1 Base Hurricane Storm Set

A. Annual frequencies used in both model calibration and model validation shall be based upon the National Hurricane Center HURDAT starting at 1900 as of June 7, 2009 (or later). Complete additional season increments based on updates to HURDAT approved by the Tropical Prediction Center/National Hurricane Center are acceptable modifications to these storm sets. Peer reviewed atmospheric science literature can be used to justify modifications to the Base Hurricane Storm Set.

Validation of the FPHLM is based on the 1900–2009 period of historical record as provided in the June 2010 version of HURDAT released by the National Hurricane Center.

B. Any trends, weighting, or partitioning shall be justified and consistent with currently accepted scientific literature and statistical techniques. Calibration and validation shall encompass the complete Base Hurricane Storm Set as well as any partitions.

Validation and comparison of the FPHLM encompasses the complete Base Hurricane Storm Set provided in HURDAT. We conduct no trending, weighting, or partitioning of the Base Hurricane Set.

Disclosures

1. Identify the Base Hurricane Storm Set, the release date, and the time period included to develop and implement landfall and by-passing hurricane frequencies into the model.

The National Hurricane Center HURDAT file from June 2010 for the period 1900–2009 is used to establish the official hurricane base set used by our model. All HURDAT storm tracks that have made landfall in Florida or bypassed Florida but passed close enough to produce damaging winds are documented in our archives.

2. If the modeling organization has made any modifications to the Base Hurricane Storm Set related to landfall frequency and characteristics, provide justification for such modifications.

For stochastic hurricane loss modeling, the HURDAT database indicated in Disclosure 1 is used, unmodified, to develop the probability distribution functions for track and intensity changes and to determine storm frequency.

To model historical losses, NOAA's Hurricane Research Division (HRD) has developed a Historical Base Set. This base set is based on the latest HURDAT but includes additional data, such as central pressure and Rmax, that may not be available in HURDAT but that is needed by the wind model.

To evaluate model landfall frequencies in Form M-1, some storms were classified based on the 6 h HURDAT reports rather than the impact codes. No changes were made to the HURDAT 6 h report data.

3. Where the model incorporates short-term or long-term modification of the historical data leading to differences between modeled climatology and that in the entire Base Hurricane Storm Set, describe how this is incorporated.

The FPHLM incorporates no short-term or long-term modifications of the climate record. Storm frequencies are based on historical occurrences derived from HURDAT and thus implicitly contain any long- or short-term variations that are contained in the historical record. No attempt is made to explicitly model long- or short-term variations.

4. Provide a completed Form M-1, Annual Occurrence Rates.

See Form M-1.

M-2 Hurricane Parameters and Characteristics

Methods for depicting all modeled hurricane parameters and characteristics including but not limited to windspeed, radial distributions of wind and pressure, minimum central pressure, radius of maximum winds, strike probabilities, tracks, spatial and time variant windfields, and conversion factors, shall be based on information documented in currently accepted scientific literature.

All methods used to depict storm characteristics are based on methods described in the peer-reviewed scientific literature. Our scientists developed datasets using data from published reports, the HURDAT database, archives, observations, and analyses from NOAA's Hurricane Research Division, The Florida State University, Florida International University, and the Florida Coastal Monitoring Program.

Disclosures

1. ***Identify the hurricane parameters (e.g., central pressure or radius of maximum winds) that are used in the model.***

Hurricane parameters used in the model include storm track (translation speed and direction of the storm), radius of maximum wind (*Rmax*), Holland surface pressure profile parameter (*B*), the minimum central sea level pressure (*Pmin*), the damage threshold distance, and the pressure decay as a function of time after landfall.

The storm initial position and motion are modeled using the HURDAT database (June 2010). For pressure decay we use the Vickery (2005) decay model. Vickery developed the model on the basis of pressure observations in HURDAT and NWS -38, together with *Rmax* and storm motion data as described in the publication. The radius of maximum winds at landfall is modeled by fitting a gamma distribution to a comprehensive set of historical data published in NWS-38 by Ho et al. (1987) and supplemented by the extended best track data of DeMaria, NOAA HRD research flight data, and NOAA-AOML-HRD H*Wind analyses (Powell & Houston, 1996; Powell et al., 1996; Powell & Houston, 1998; Powell et al., 1998).

Additional research was used to construct a historical landfall *Rmax-Pmin* database using existing literature (Ho et al., 1987), extended best track data, HRD Hurricane field program data, and the H*Wind wind analysis archive (Demuth et al., 2006). We developed an *Rmax* model using the revised landfall *Rmax* database, which includes 108 measurements for hurricanes up to 2005. We have opted to model the *Rmax* at landfall rather than the entire basin for a variety of reasons. One is that the distribution of landfall *Rmax* may be different than that over open water. An analysis of the landfall *Rmax* database and the 1988–2007 extended best track data shows that there appears to be a difference in the dependence of *Rmax* on central pressure (*Pmin*) between the two datasets (Demuth et al., 2006). The landfall dataset provides a larger set of independent measurements (more than 100 storms compared to about 31 storms affecting the Florida threat area region in the best track data). Since landfall *Rmax* is most relevant for loss cost estimation and has a larger independent sample size, we have chosen to model the landfall dataset. Future studies will examine how the extended best track data can be used to supplement the landfall dataset.

Recent research results by Willoughby and Rahn (2004) based on the NOAA-AOML-HRD annual hurricane field program and Air Force reconnaissance flight-level observations are used to create a model for the "*Holland B*" parameter. Ongoing research on the relationship between horizontal surface wind distributions (based on Stepped Frequency Microwave Radiometer observations) to flight level distributions (Powell et al., 2009) is used to correct the flight-level *Rmax* to a surface *Rmax* when developing a relationship for the *Holland B* term. We multiply the flight-level *Rmax* from the Willoughby and Rahn (2004) dataset by 0.815 to estimate the surface *Rmax* (based on SFMR, flight-level maxima pair data). This adjustment keeps the Holland pressure profile parameter consistent with a surface *Rmax* and because of the negative term in the equation produces a larger value of *B* than if a flight-level value of *Rmax* were used. This is consistent with the concept of a stronger radial pressure gradient for the mean boundary layer slab than at flight level (due to the warm core of the storm), which agrees with GPS dropsonde wind profile observations showing boundary layer winds that are stronger than those at the 10,000 ft flight level, which is the level for most of the *B* data in Willoughby and Rahn (2004). The *B* adjustment for a surface *Rmax* produces an overall stronger surface wind field than if *B* were not adjusted. In addition, surface pressures from the "best track" information on HURDAT are used to associate a particular flight-level pressure profile *B* with a surface pressure.

The NOAA-AOML-HRD H*Wind analysis archive was used to develop a relationship between *Rmax* and the extent of damaging winds to make sure that the model would only consider land locations that have potential for damaging winds. HRD wind modeling research initiated by Ooyama (1969) and extended by Shapiro (1983) has been used to develop the HRD wind field model. This model is based on the concept of a slab boundary layer model, a concept pioneered at NOAA-AOML-HRD and now in use by other modelers for risk applications (Thompson & Cardone, 1996; Vickery & Twisdale, 1995; Vickery et al., 2000b). The HURDAT historical database is used to develop the track and intensity model. Historical data used for computing the potential intensity is based on the National Centers for Environmental Prediction (NCEP) sea surface temperature archives and the NCEP reanalysis for determining the upper tropospheric outflow temperatures. Use cases describing the various model functions and their research bases are available with the model documentation.

2. ***Describe the dependencies among variables in the windfield component and how they are represented in the model, including the mathematical dependence of modeled windfield as a function of distance and direction from the center position.***

B depends linearly on latitude and *Rmax*, and quadratically on *DelP*. The gradient wind for the slab boundary layer depends on *Pmin* (through *DelP*) and *B*; the mean slab planetary boundary layer (PBL) wind depends on the gradient wind, the drag coefficient (which depends on wind speed), the air density, the gradients of the tangential and radial components of the wind, and the Coriolis parameter (which also depends on latitude). The wind field model solves the equations of motion on a polar grid with a 0.1 R/*Rmax* radial grid resolution. The input *Rmax* is reduced by 10% to correct a small bias in *Rmax* caused by a tendency of the wind field solution to place *Rmax* radially outward by one grid point. The wind field model terms and dependencies are further described in Powell et al. (2005).

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

Initial storm positions and motion changes derived from HURDAT are modified by the addition of small uniform random error terms. Subsequent storm motion change and intensity are obtained by sampling from empirically derived PDFs as described in Section G-1.2. The random error term for the *B* parameter is a normal distribution with zero mean and a standard deviation derived from observed reconnaissance aircraft pressure profile fits for *B* (Willoughby & Rahn, 2004). The radius of maximum winds is sampled from a gamma distribution based on landfall *Rmax* data and is described in more detail below.

On the basis of the semiboundedness and skewness of *Rmax*, we sought to model the distribution using a gamma distribution. Using maximum likelihood estimators, we found the parameters for the gamma distribution, k=5.53547, θ=4.67749. With these parameters, we show a plot of the observed and expected distribution in Figure 26. The *Rmax* values are binned in 5 sm intervals, with the *x*-axis showing the end value of the interval. The gamma distribution proved to be a reasonable fit.

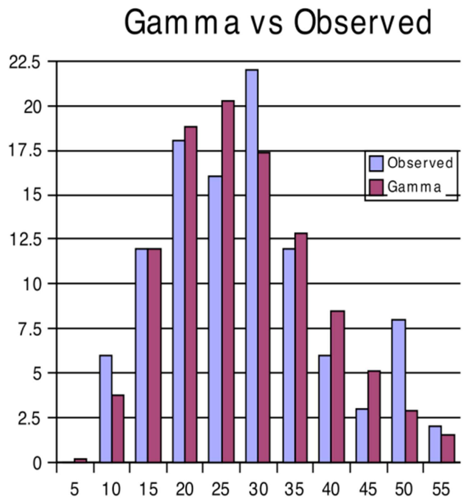


Figure 26. Comparison of observed landfall *Rmax* (sm) distribution to a gamma distribution fit of the data.

An examination of the *Rmax* database shows that intense storms, essentially Category 5 storms, have rather small radii. Thermodynamic considerations (Willoughby, 1998) also suggest that smaller radii are more likely for these storms. Thus, we model Category 5 (*DelP*>90 mb, where *DelP*=1013-*Pmin* and *Pmin* is the central pressure of the storm) storms using a gamma distribution, but with a smaller value of the θ parameter, which yields a smaller mean *Rmax* as well as smaller variance. We have found that for Category 1–4 (*DelP*<80) storms there is essentially no discernable dependence of *Rmax* on central pressure. This is further verified by looking at the mean and variance of *Rmax* in each 10 mb interval. Thus, we model Category 1–4 storms with a single set of parameters. For a gamma distribution, the mean is given by $k\theta$, and variance is $k\theta^2$. For Category 5 storms, we adjust θ such that the mean is equal to the mean of the three Category 5 storms in the database: 1935 No Name, 1969 Camille, and 1992 Andrew. An intermediate zone between *DelP*=80 mb and *DelP*=90 mb is established where the mean of the distribution is linearly interpolated between the Category 1–4 value and the Category 5 value. As the θ value is reduced, the variance is likewise reduced. Since there are insufficient observations to determine what the variance should be for Category 5 storms, we rely on the assumption that variance is appropriately described by the rescaled θ, via $k\theta^2$.

A simple method is used to generate the gamma-distributed values. A uniformly distributed variable, a product of the random number generator that is intrinsic to the FORTRAN compiler, is mapped onto the range of *Rmax* values via the inverse cumulative gamma distribution function. For computational efficiency, a lookup table is used for the inverse cumulative gamma distribution function, with interpolation between table values. Figure 27 shows a test using 100,000 samples of *Rmax* for Category 1–4 storms, binned in 1 sm intervals, and compared with the expected values.

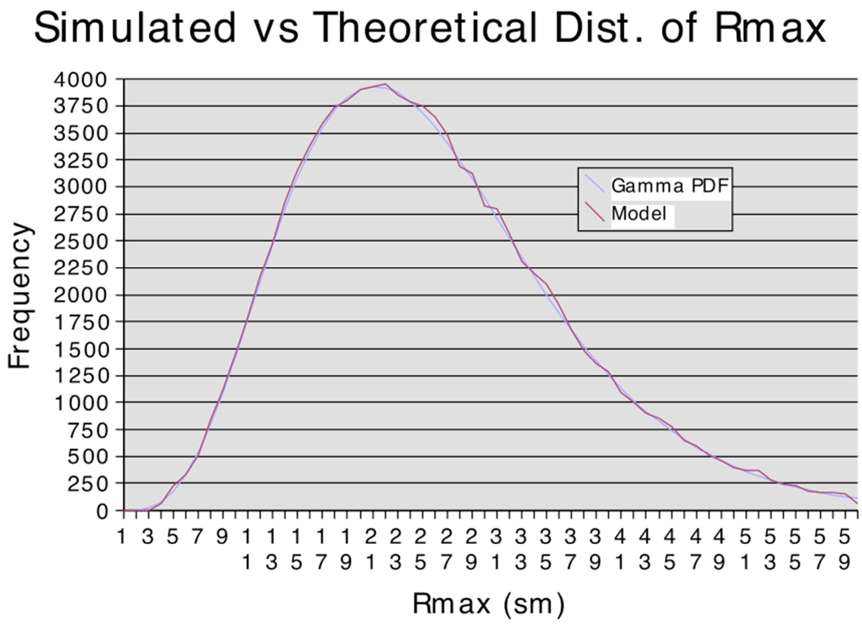


Figure 27. Comparison of 100,000 *Rmax* values sampled from the gamma distribution for Cat 1–4 storms to the expected values.

For Category 5 and intermediate Category 4–5 storms, we use the property that the gamma cumulative distribution function is a function of (k,x/θ). Thus, by rescaling θ, we can use the same function (lookup table), but just rescale x (*Rmax*). The rescaled *Rmax* will then still have a gamma distribution but with different mean and variance.

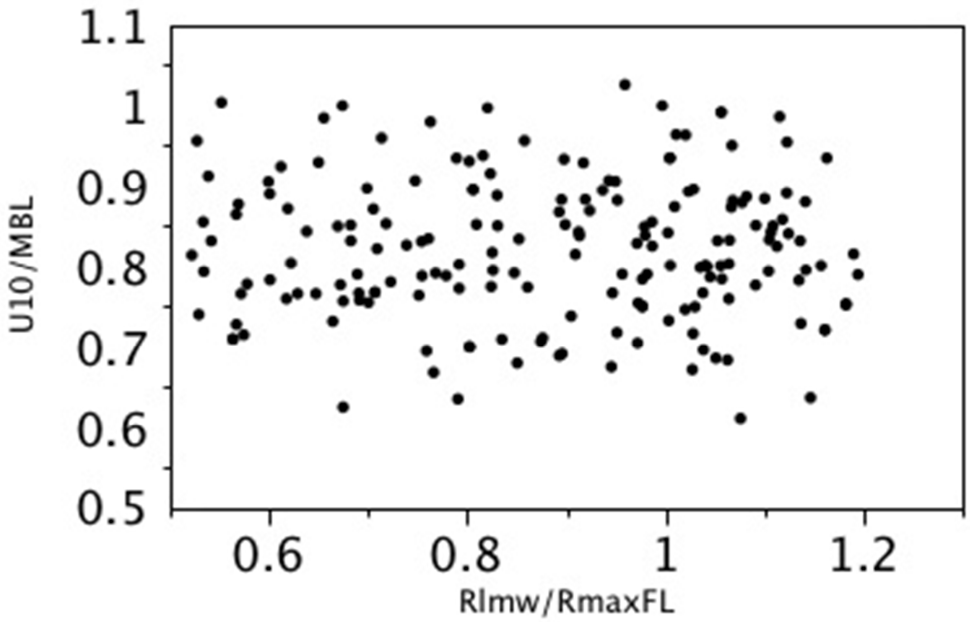
The storms in the stochastic model will undergo central pressure changes during the storm life cycle. When a storm is generated, an appropriate *Rmax* is sampled for the storm. To ensure the appropriate mean values of *Rmax* as pressure changes, the *Rmax* is rescaled every time step as necessary. As long as the storm has *DelP* < 80 mb, there is in effect no rescaling. In the stochastic storm generator, we limit the range of *Rmax* from 4 sm to 60 sm. The wind field solution, after including the translation speed, results in values of *Rmax* that are outside this range less than 2% of the time.

4. ***Describe how any hurricane parameters are treated differently in the historical and stochastic storm sets (e.g., has a fixed value in one set and not the other).***

All historical storm sets consist of input files containing information derived from HURDAT or other observation sources as described in Standard M-1. All stochastic input storm tracks are modeled.

5. State whether the 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 vortex winds to surface winds including the treatment of the inherent uncertainties in the conversion factor with respect to location of the site compared to the radius of maximum winds over time. Justify the variation in the surface winds conversion factor as a function of hurricane intensity and distance from the hurricane center.

The mean boundary layer winds computed by the model are adjusted to the surface using results from Powell et al. (2003), which estimated a mean surface wind factor of 77.5% on the basis of over 300 GPS sonde wind profile observations in hurricanes. The surface wind factor is based on the ratio of the surface wind speed at 10 m to the mean wind speed for the 0–500 m layer (mean boundary layer wind speed or MBL) published in Powell et al. (2003). This ratio is far more relevant to a slab boundary layer model than using data based on higher, reconnaissance aircraft flight levels. The depth of the slab boundary layer model is assigned a value of 450 m, which is the level of the maximum mean wind speed from GPS sonde wind profiles published in Powell et al. (2003). The uncertainty of the surface wind factor is ~8%, based on the standard deviation of the measurements, but no attempt is made to model this uncertainty. No radial distance from center or intensity dependent variation of reduction factor is used at this time because of a lack of dependency on these quantities based on examination of GPS dropsonde data (Figure 28).



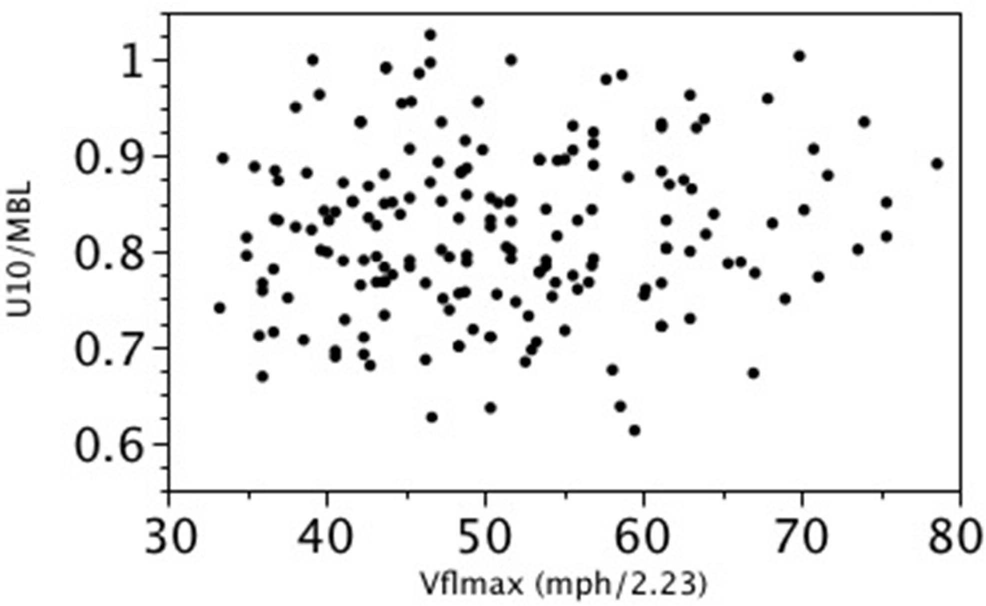


Figure 28. Analysis of 742 GPS dropsonde profiles launched from 2-4 km with flight-level winds at launch greater than hurricane force and with measured surface winds. Upper figure: Dependence of the ratio of 10 m wind speed (U10) to the mean boundary layer wind speed (MBL) on the scaled radius (ratio of radius of last measured wind (Rlmw) to the radius of maximum wind at flight level (RmaxFL). Lower figure: Surface wind factor (U10/MBL) dependence on maximum flight level wind speed (Vflmax, in units of miles per hour / 2.23).

6. ***Describe how the windspeeds generated in the windfield model are converted from sustained to gust and identify the averaging time.***

Wind speeds from the HRD slab boundary layer wind field model are assumed to represent ten-minute averages. A sustained wind is computed by applying a gust factor to account for the highest one-minute wind speed over the ten-minute period. A peak three-second gust is also computed. Gust factors depend on wind speed and the upstream fetch roughness, which in turn depends on wind direction at a particular location. Gust factor calculations were developed using research in the Engineering Sciences Data Unit (ESDU) series papers as summarized and applied to tropical cyclones by Vickery and Skerlj (2005).

7. ***Describe the historical data used as the basis for the model's hurricane tracks. Discuss the appropriateness of the model stochastic hurricane tracks with reference to the historical hurricane database.***

The hurricane tracks are modeled as a Markov process. Initial storm conditions are derived from HURDAT. Small uniform random perturbations are added to the historical initial conditions, including initial storm location, change in motion, and intensity.

Storm motion is determined by sampling empirical distributions, based on HURDAT, of change in speed and change in direction, as well as change in relative intensity. These functions are also spatially dependent, binned in variable box sizes (typically 2.5 degrees), and enlarged as necessary to ensure sufficient density of storms for the distribution.

The model has been validated by examining key hurricane statistics relative to HURDAT at roughly 30 sm milepost locations along the Gulf and Atlantic coasts. The parameters examined include average central pressure deficit, average heading angle and speed, and total occurrence by Saffir-Simpson category.

8. ***If the historical data are partitioned or modified, describe how the hurricane parameters are affected.***

The FPHLM does not partition or modify the historical data.

9. ***Describe how the coastline is segmented (or partitioned) in determining the parameters for hurricane frequency used in the model. Provide the hurricane frequency distribution by intensity for each segment.***

The model does not use coastline segmentation to determine hurricane frequency.

10. ***Describe any evolution of the functional representation of hurricane parameters during an individual storm life cycle.***

Upon landfall, the evolution of the central pressure changes from sampling a PDF to a decay model described in Vickery (2005). When the storm exits back over water, the pressure is again modeled via the PDF. After landfall, the slab boundary layer, surface drag coefficient changes from a functional marine form to a constant based on a mean aerodynamic roughness length of 0.2 m. The slab boundary layer height increases from 450 m to 1 km after the center makes landfall and decreases back to 450 m if the center exits land to go back to sea.

M-3 Hurricane Probabilities

A. Modeled probability distributions of hurricane parameters and characteristics shall be consistent with historical hurricanes in the Atlantic basin.

Hurricane motion (track) is modeled based on historical geographic probability distributions of hurricane translation velocity and velocity change, initial intensity, intensity change, and potential intensity. Modeled probability distributions for hurricane intensity, forward speed, *Rmax*, and storm heading are consistent with historical hurricanes in the Atlantic basin.

B. Modeled hurricane landfall strike probabilities shall reflect the Base Hurricane Storm 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).

As shown in Form M-1 and the accompanying plots, our model reflects reasonably the 1900–2009 Base Hurricane Set for hurricanes of Saffir-Simpson Categories 1–5 in each coastal region of Florida, as well as in the neighboring states. In addition, a finer scale coastal milepost study of model parameters (occurrence rate, storm translation speed, storm heading, and *Pmin*) was conducted during the development of the model.

C. Models shall use maximum one-minute sustained 10-meter windspeed when defining hurricane landfall intensity. This applies both to the Base Hurricane Storm Set used to develop landfall strike probabilities 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 Scale.

Saffir-Simpson Hurricane Scale:

Category	Winds (mph)	Damage
1	74 – 95	Minimal
2	96 – 110	Moderate
3	111 – 130	Extensive
4	131 – 155	Extreme
5	Over 155	Catastrophic

The HRD wind field model simulates landfall intensity according to the maximum one-minute sustained wind for the 10 m level for both stochastic simulations and the Base Hurricane Set. The Saffir-Simpson damage potential scale is used to further categorize the intensity at landfall, and the range of simulated wind speeds (in miles per hour) is within the range defined in the scale.

Disclosures

1. List assumptions used in creating the hurricane characteristic databases.

The *Holland B* database is based on flight-level pressure profiles corresponding to constant pressure surfaces at 700 mb and below. Because of a lack of surface pressure field data, an assumption is made that the *Holland B* at the surface is equivalent to a *B* determined from information collected at flight level. The surface pressure profile uses *Pmin*, *DelP*, and *Rmax* at the surface. It would be ideal to have a *B* dataset also corresponding to the surface, but such data are not available. The best available data on *B* are flight-level data from Willoughby and Rahn (2004). Willoughby and Rahn (2004) reveal that during major hurricanes most flights flew at 3km (700 mb). Few lower-level data are available for mature hurricanes, so their plot (Figure 3) of *B* vs. flight level does not provide data about average vertical structure. In lieu of lower-level data, we model *B* using flight data supplied by Willoughby, but with *Rmax* adjusted to a surface *Rmax*, and with surface *DelP* added from NHC best track data for each flight. Since we are modeling hurricane winds during landfall, our *Rmax* model applies only to landfall and is not designed to model the life cycle of *Rmax* as a function of intensity.

2. Provide a brief rationale for the probability distributions used for all hurricane parameters and characteristics.

Form S-3 provides a list of probability distributions used to model hurricane parameters. Further discussion and rationale for these functions are provided in Standard M-2, Disclosure 1 and Standard S-1, Disclosure 1. Some of the details pertaining to data sources used are described below.

Monthly geographic distributions of climatological sea surface temperatures (Reynolds et al., 2002) and upper tropospheric outflow temperatures (Kanamitsu et al., 2002) are used to determine physically realistic potential intensities that help to bound the modeled intensity. Terrain elevation and bathymetry data were obtained from the United States Geological Survey. The radius of maximum wind at landfall is modeled from a comprehensive set of historical data published in NWS-38 by Ho et al. (1987) but supplemented by the extended best track data of DeMaria (Pennington et al., 2000), NOAA HRD research flight data, and NOAA-HRD H*Wind analyses (Powell et al., 1996, 1998). The development of the *Rmax* frequency distribution fit and its comparison to historical hurricane data are discussed in M-2.1 and M-2.3. Comparisons of the modeled radius of maximum wind to the observed data are shown in Form M-3. H*Wind wind field analyses of historical hurricanes are available from the NOAA-AOML-HRD web site: http://www.aoml.noaa.gov/hrd/data_sub/wind.html.

M-4 Hurricane Windfield Structure

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

As described in Statistical Standards S-1, Disclosure 2, comparisons of FPHLM to gridded H*Wind fields indicate that the FPHLM wind fields are consistent with observed historical wind fields from Florida landfalling hurricanes.

B. 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.

Land friction is modeled according to the currently accepted, state-of-the-science principles of surface layer similarity theory as described in the disciplines of micrometeorology, atmospheric turbulence, and wind engineering. The geographic distribution of surface roughness is determined by careful studies of aerial photography and satellite remote sensing measurements used to create land use-land cover classification systems. We use the MRLC NLCD 2001 land use dataset as well as the Statewide 2004 Land Use/Land Cover dataset developed and maintained by the Florida Water Management Districts (WMD) and compiled and distributed by the Florida Department of Environmental Protection. The NLCD dataset became available in Spring 2007 and provides detailed (30 m) land use characteristics circa 2001. The datasets of the individual water management districts were recently combined in the statewide WMD dataset to form a unified dataset. The WMD data are based on 2004 imagery. We have developed a roughness dataset at 90 meter resolution covering the state of Florida to enable modeling losses at the "street level." For modeling losses at the ZIP Code level, we use population-weighted roughness.

All street level locations (at 90 m resolution) and population-weighted ZIP Code centroids are assigned roughness values as a function of upstream fetch for each wind direction octant. After landfall, the surface drag coefficient used in the hurricane PBL slab model changes from a marine value to a fixed value associated with a roughness of 0.2 m.

C. With respect to multi-story structures, the model windfield shall account for the effects of the vertical variation of winds if not accounted for in the vulnerability functions.

The modeled wind fields take into account vertical variation through the new terrain conversion methodology based on Vickery et al. (2009). The coastal transition function also takes into account variation of wind with height.

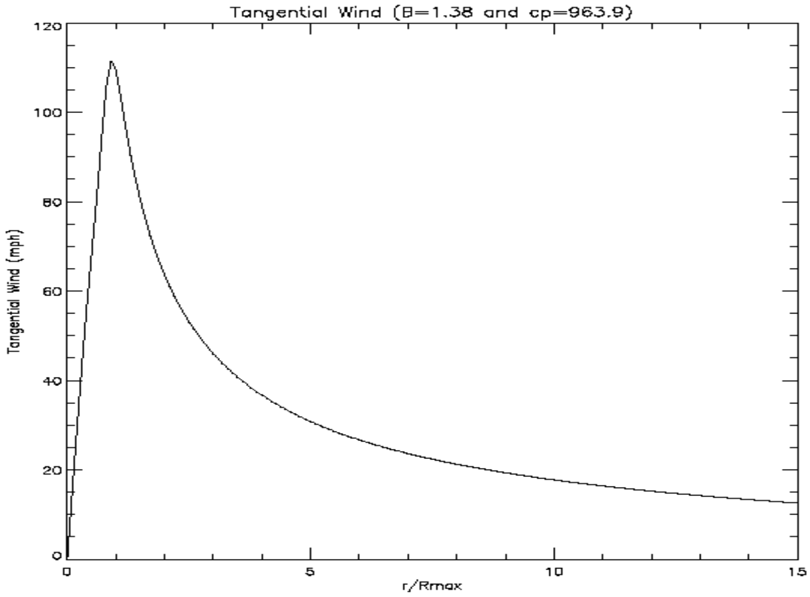


Figure 29. Axisymmetric rotational wind speed (mph) vs. scaled radius for B = 1.38, DelP = 49.1 mb.

Disclosures

1. ***Provide a rotational windspeed (y-axis) versus radius (x-axis) plot of the average or default symmetric wind profile used in the model and justify the choice of this wind profile.***

See Figure 29. The *Holland B* profile has been compared extensively to historical data (Holland, 1980; Willoughby & Rahn, 2004) and found to be a reasonable fit.

2. ***If the model windfield has been modified in any way from the previous submission, provide a rotational windspeed (y-axis) versus radius (x-axis) plot of the average or default symmetric wind profile for both the new and old functions. The choice of average or default shall be consistent for the new and old functions.***

The wind field model has not been modified since the previous submission.

3. ***If the model windfield has been modified in any way from the previous submission, describe variations between the new and old windfield functions with reference to historical storms.***

The wind field model has not been modified since the previous submission.

4. ***Describe how the vertical variation of winds is accounted for in the model where applicable. Document and justify any difference in the methodology for treating historical and stochastic storm sets.***

Vertical variation of wind is accounted for in the terrain conversion methodology described in Vickery et al. (2009). This methodology is a modification of the log wind profile and has been validated against dropsonde data. The coastal transition function, which is based on the above methodology, also incorporates variation of height so that the impact of a larger marine fetch on taller structures in coastal regions can be modeled. The treatment of vertical variation of winds is the same for both historical and stochastic storm sets.

5. ***Describe the relevance of the formulation of gust factor(s) used in the model.***

The gust factors used in the model were developed from hurricane wind speed data and the Engineering Sciences Data Unit methods as described in Vickery and Skerlj (2005).

6. ***Identify all non-meteorological variables that affect windspeed estimation (e.g., surface roughness, topography, etc.).***

Upstream aerodynamic surface roughness within a fixed 45-degree sector extending upstream has an effect on the determination of wind speed for a given street location (latitude and longitude) or ZIP Code centroid and is a significant variable that affects estimation of surface wind speeds. The upstream sectors are defined according to the Tropical Cyclone Winds at Landfall Project (Powell et al., 2004), which characterized upstream wind exposure for each of eight wind direction sectors at over 200 coastal automated weather stations (Figure 30). In additional, a coastal transition function is employed to account for the smooth marine fetch near coastal regions.

Figure 30. Upstream fetch wind exposure photograph for Chatham, MS (left, looking north), and Panama City, FL (right, looking northeast). After Powell et al. (2004).

7. ***Provide the collection and publication dates of the land use and land cover data used in the model and justify their timeliness for Florida.***

We use the 2001 Multi-Resolution Land Characteristics Consortium (MRLC) National Land Cover Database released April 25, 2007. This is a high-resolution (30 m) land cover dataset that covers not only Florida, but the entire United States, and roughly depicts land characteristics circa 2001 [see Homer et al. (2004) for more details]. We also use the Statewide 2004 Florida Water Management District Land Use/Land Cover dataset based on 2004 imagery. This dataset was published by the Florida Department of Environmental Protection on August 12, 2009.

8. ***Describe the methodology used to convert land use and land cover information into a spatial distribution of roughness coefficients in Florida and adjacent states.***

The land cover classifications provided by the 2001 MRLC Land Cover Database and the WMD land use/land cover data are first mapped to roughness values using a lookup table that associates a representative roughness for the land use category on the basis of peer-reviewed literature. An algorithm was developed to merge the datasets based on how well each dataset classified the land surface with respect to surface roughness. An effective roughness model (Axe, 2004) is then used to incorporate upstream roughness elements to provide a more realistic roughness on a 90 m (295 ft) grid covering Florida.

9. ***Demonstrate the consistency of the spatial distribution of model-generated winds with observed windfields for hurricanes affecting Florida.***

As shown below in Disclosure 10 and in Statistical Standard 1, Disclosure 2, the spatial distribution of model-generated winds is consistent with observed wind fields for hurricanes affecting Florida.

10. ***Describe how the model's windfield is consistent with the inherent differences in windfields for such diverse hurricanes as Hurricane Charley (2004), Hurricane Katrina (2005), and Hurricane Wilma (2005).***

The model can represent a wide variety of storms through variation of parameters for radius of maximum winds, central pressure deficit, and *Holland B*. Snapshots of model wind fields at landfall are compared to NOAA-AOML-HRD H*Wind analyses below (for further details see Disclosure 2 for Standard S-1). In these cases, rather than tuning the model to best fit the observations by varying the *Holland B* parameter, we derived the input *B* from the H*Wind analyses. Hurricane Charley, a small, fast moving hurricane, was modeled quite well; the motion asymmetry and extent of strong winds in the core of the storm were captured. Hurricane Katrina was developing an eyewall while making landfall. The FPHLM depicts a mature storm whereas the observed H*Wind field shows a storm with an incomplete eyewall. The reason for the difference in wind fields for Hurricane Katrina is likely due to the FPHLM lacking the complicated physics needed to represent convective processes associated with initial eyewall development. Wilma made landfall in Florida as a very large hurricane. The FPHLM captures the location of maximum winds in the core of the storm and represents the left-right motion asymmetry, but tends to produce too broad of a wind field.

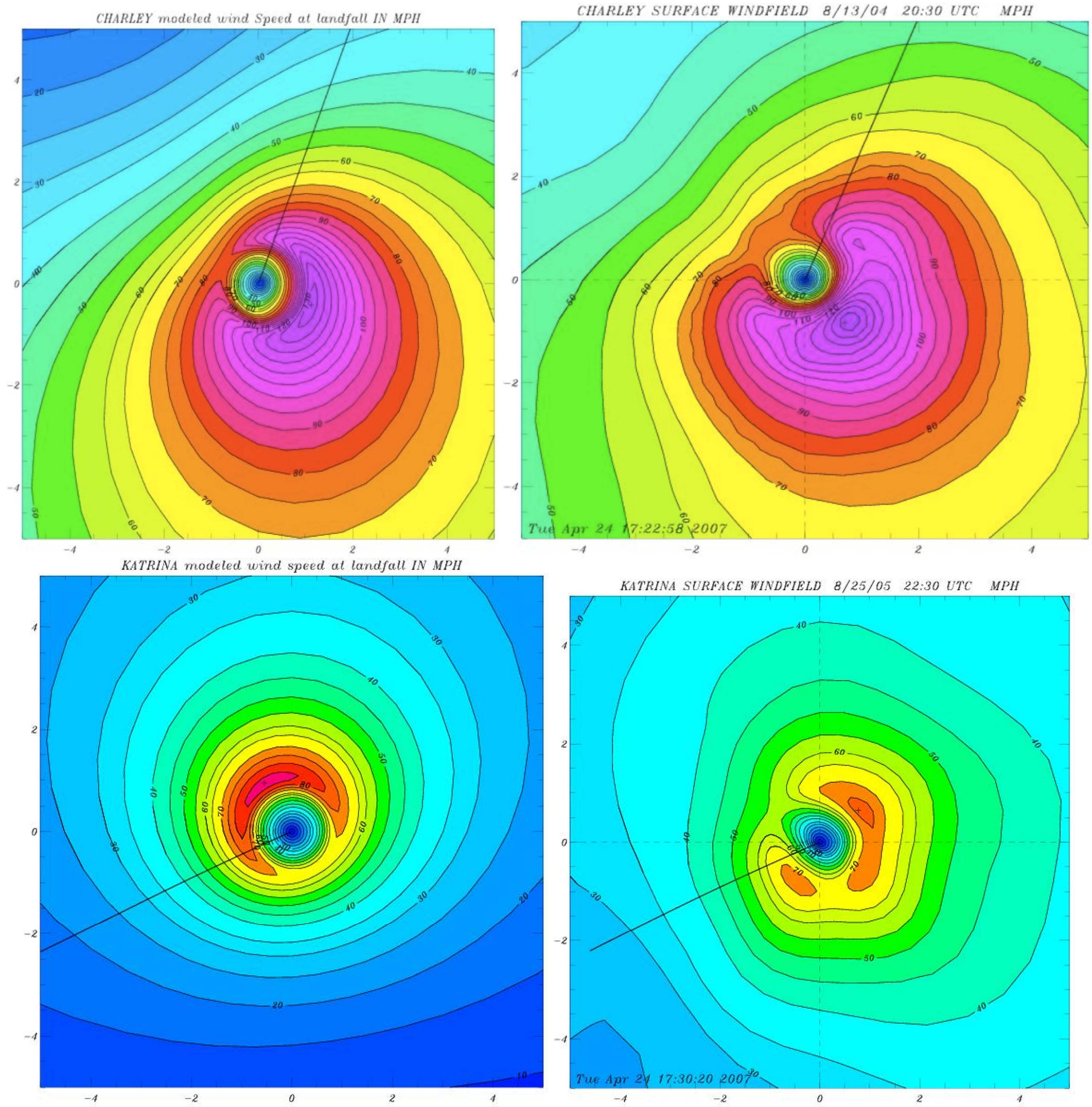


Figure 31. Comparison of observed (right) and modeled (left) landfall windfields of Hurricane Charley (2004, top) and Hurricane Katrina in South Florida (2005, bottom). Line segment indicates storm heading. Horizontal coordinates are in units of R/Rmax and winds units of miles per hour.

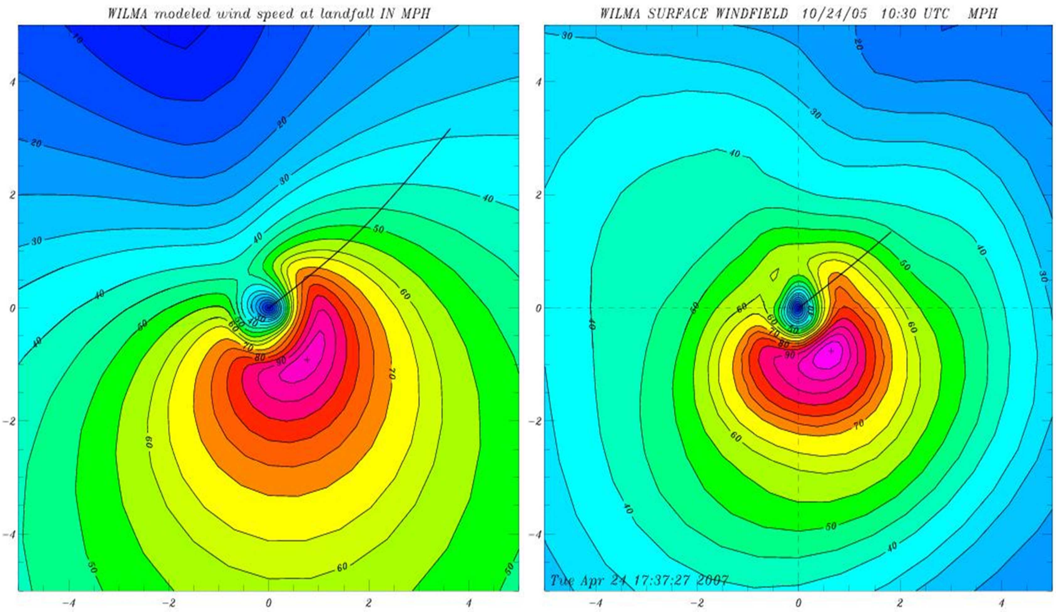


Figure 32. Hurricane Wilma (2005).

11. Describe any variations in the treatment of the model windfield for stochastic versus historical storms and justify this variation.

All historical storm sets consist of input files containing information derived from HURDAT or other observation sources as described in Standard M-1. All stochastic input storm tracks are modeled. The wind field is modeled from the stochastic or historical input files in the same manner.

12. Provide a completed Form M-2, Maps of Maximum Winds. Explain the differences between the spatial distributions of maximum winds for open terrain and actual terrain for historical storms.

See Form M-2. The open terrain winds are based on the common assumption that the wind is in equilibrium with open terrain roughness (0.03 m) with infinite fetch. The actual terrain winds are assumed to be in equilibrium with the local (effective) roughness near the surface, but near coastal regions the winds aloft may be more in equilibrium with marine roughness. Thus, it is possible for regions near the coast to have actual terrain winds that are larger than open terrain winds. The spatial distributions of open and actual terrain wind can be quite different because of the coastal transition and the fact that surface roughness in general has a large impact on the wind field. Spatial variations of roughness on the order of a few miles can cause large differences in the wind on that spatial scale.

M-5 Landfall and Over-Land Weakening Methodologies

A. The hurricane over-land weakening rate methodology used by the model shall be consistent with historical records and with current state-of-the-science.

Overland weakening rates are based on a pressure decay model developed from historical data as described by a recent paper published in peer-reviewed atmospheric science literature (Vickery, 2005).

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

The transition of winds from over-water to over-land is consistent with the current state of the science through the use of a pressure decay model (Vickery, 2005), a terrain conversion model from marine to actual roughness, and a coastal transition function (Vickery et al., 2009).

Disclosures

Describe and justify the functional form of hurricane decay rates used by the model.

The hurricane decay rate function acts to decrease the *DelP* with time after landfall. The functional form is an exponential in time since landfall and is based on historical data (Vickery, 2005).

1. Provide a graphical representation of the modeled decay rates for Florida hurricanes over time compared to wind observations.

The degradation of the wind field of a landfalling hurricane is associated with the filling of the central sea level pressure and the associated weakening of the surface pressure gradient; also the hurricane is over land, where the flow is subject to friction while flowing across obstacles in the form of roughness elements. Maximum wind degradation is shown according to how the maximum sustained surface wind (at the location containing the maximum winds in the storm) changes with time after landfall. At landfall the marine exposure wind is assumed to be representative of the maximum winds occurring onshore. After landfall the open terrain wind is chosen to represent the maximum envelope of sustained winds over land. The NOAA-HRD H*Wind system is used to analyze the maximum winds at a sequence of times following landfalls of Hurricanes Katrina, Charley, Frances, Jeanne, and Wilma. H*Wind uses all available wind observations. The landfall wind field is used as a background field for times after landfall and compared to the available observations at a sequence of times after landfall. An empirical decay is applied to the background field based on the comparisons to the observations. These data are then objectively analyzed to determine the wind field at each time. The model maximum sustained winds are compared to the maximum winds from the H*Wind analyses for the same times and roughness exposures. In general, points after landfall are given for open terrain exposure. At times, even though the storm center is over land, the maximum wind speed may remain over water. For example, in the Hurricane Frances plot, the first three pairs of points represent marine exposure, the next three open terrain, and the final three marine exposure again, while all Hurricane Wilma point pairs represent marine exposure. The plots indicate that the public wind field model realistically simulates decay of the maximum wind speed during the landfall process, as well as subsequent strengthening after exit.

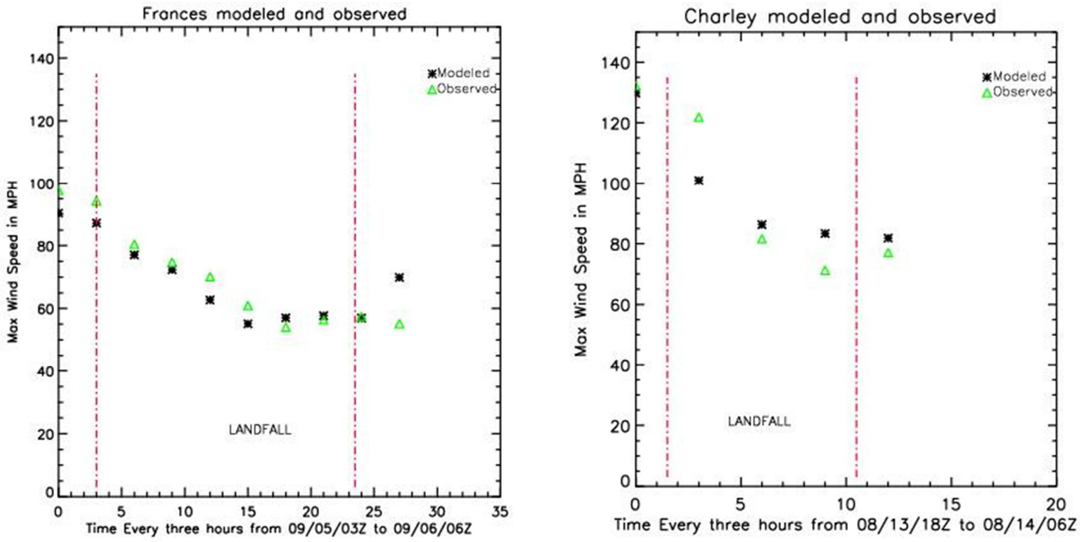


Figure 33. Observed (green) and modeled (black) maximum sustained surface winds as a function of time for 2004 Hurricanes Frances (left) and Charley (right). Landfall is represented by the vertical dash-dot red line at the left and time of exit as the red line on the right.

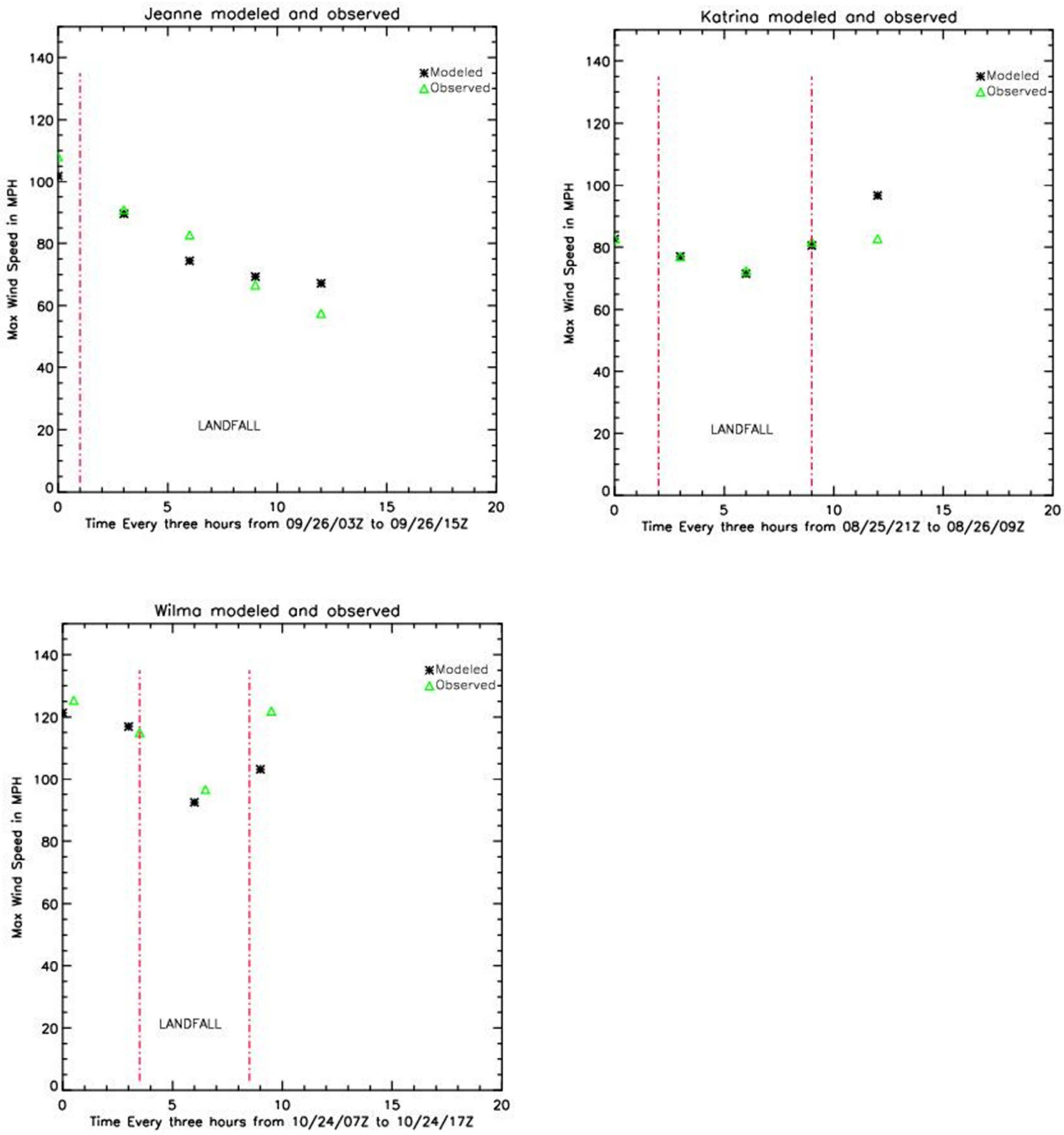


Figure 34. Observed (green) and modeled (black) maximum sustained surface winds as a function of time for Hurricanes Jeanne (2004, top left), Katrina (2005 in South Florida, top right), and Wilma (2005, lower left). Landfall is represented by the vertical dash-dot red line at the left and time of exit as the red line on the right.

2. Describe the transition from over-water to over-land boundary layer simulated in the model.

After landfall, the slab boundary layer, surface drag coefficient changes from a functional marine form to a constant based on a mean aerodynamic roughness length of 0.2 m. The slab boundary layer height increases from 450 m to 1 km after the center makes landfall and decreases back to 450 m if the center exits land to go back to sea. To determine surface winds, an effective roughness model is used along with a coastal transition function. The coastal transition function is based on the concept of a growing internal boundary layer (Arya, 1988) for the sea-to-land transition. Within the equilibrium layer, assumed to be one tenth of the internal boundary layer (IBL) height in depth, the wind is assumed to be in equilibrium with the local effective roughness. Above the IBL the wind is assumed to be in equilibrium with marine roughness. Between the equilibrium layer and the IBL we assume that the wind is in equilibrium with vertically varying, stepwise increments of roughness that decay linearly from the local roughness to marine roughness. This is similar in concept to the methodology described in ESDU, and the modeled transition is very close to the ESDU values reported in Vickery et al. (2009).

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

See Standard M-2, Disclosure 10. The *Holland B* parameter has a weak dependence on pressure and will undergo slight change. The radius of maximum winds has an implicit dependence on pressure through the scale and shape parameters of the gamma distribution (see M-2, Disclosure 3), and thus strong storms making landfall could undergo some expansion.

4. Describe the representation in the model of passage over non-continental U.S. land masses on hurricanes affecting Florida.

Noncontinental U. S. land masses are identified by a land-ocean mask that keeps track of whether the storm center is over the land or ocean. Storms that pass over noncontinental U.S. land masses (e.g., Cuba) undergo decay, just as storms do crossing continental land masses (e.g., mainland U. S.) using a pressure-filling model (Vickery, 2005).

5. Document any differences between the treatment of decay rates in the model for stochastic hurricanes compared to historical hurricanes affecting Florida.

In the FPHLM model, decay is defined as the change in minimum sea level pressure (*Pmin*) with time after landfall. The input file for the wind field model consists of a hurricane track file that contains storm position, *Pmin, Rmax,* and *Holland B* at 1 h frequency. The wind field model is exactly the same for scenario (historical) or stochastic events. When running the model in scenario mode for historical hurricanes affecting Florida, we use a set of historical hurricane tracks as input to the model. When the model is run in stochastic mode, the input hurricane tracks are provided by the track and intensity model. The track and intensity model uses the Vickery (2005) pressure decay after landfall. When a hurricane exits land, the *Pmin* over water is determined on the basis of the Markov process as described in Disclosure G-1.2.

The historical tracks based on HURDAT are detailed on our web site at:

http://www.aoml.noaa.gov/hrd/lossmodel/

For historical hurricane tracks the landfall pressure is determined from HURDAT or from the Ho et al. (1987) report. If post-landfall pressure data are available in HURDAT, we interpolate pressure values over land. If post-landfall pressure data are not available, we apply the Vickery (2005) pressure decay model to the landfall pressure. After the storm exits land, the pressure is based on HURDAT data. Therefore, decay rates for historical hurricanes are based on HURDAT data if available, or the Vickery decay rate model applied to the HURDAT or Ho et al. (1987) landfall *Pmin*, and decay rates for stochastic hurricanes are based on Vickery (2005).

M-6 Logical Relationships of Hurricane Characteristics

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

With all other factors held constant, the wind field asymmetry increases with translation speed. The storm translation speed causes a major right-left (looking in the direction the storm is moving) asymmetry in the wind field, which in turn causes an asymmetry in surface friction since the surface stress is wind-speed dependent. The magnitude of the asymmetry increases as the translation speed increases; there is no asymmetry for a stationary storm except for possible land friction effects if a storm becomes stationary while a large percentage of its circulation is over both land and water.

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

With all other factors held constant, the mean wind speed decreases with increasing surface roughness. However, the gust factor, which is used to estimate the peak one-minute wind and the peak three-second gust over the time period corresponding to the model mean wind increases as a function of turbulence intensity, which increases with surface roughness (Paulsen et al., 2003; Masters, 2004; Powell et al., 2004). For roughness values representative of ZIP Codes in Florida, with residential roughness values on the order of 0.2–0.3 m, the roughness effect on decreasing the mean wind speed overwhelms the enhanced turbulence intensity effect that increases the gust factor.

Disclosures

1. Describe how the asymmetric structure of hurricanes is represented in the model.

The asymmetry of the wind field is determined by the storm translation motion (right-left asymmetry) and the associated asymmetric surface friction. A set of form factors for the wind field also contributes to the asymmetry, and the proximity of the storm to land introduces an additional asymmetry because of the effect of land roughness elements on the flow. Azimuthal variation is introduced through the use of two form factors [see Appendix of Powell et al. (2005) for more detail]. The form factors multiply the radial and tangential profiles and provide a “factorized” ansatz for both the radial and tangential storm–relative wind components. Each form factor contains three constant coefficients that are variationally determined in such a way that the ansatz constructed satisfies (as far as its numerical degrees of freedom permit) the scaled momentum equations for the storm-relative polar wind components.

2. Provide a completed Form M-3, Radius of Maximum Winds and Radii of Standard Wind Thresholds.

See Form M-3.

3. Discuss the radii values for each wind threshold in Form M-3 with reference to available hurricane observations.

The Extended Best Track Database (EXBT) [DeMuth et al. (2006), available for download from http://rammb.cira.colostate.edu] contains NHC’s estimated *Rmax* and advisory outermost radii of hurricane and tropical storm magnitude winds, which are included in the Supplemental Form M-3 table.

The EXBT does not contain estimates of the 110 mph wind radius (R110), so we found examples of the R110 from the H*Wind archive. We should mention that NHC considers the outer wind radii quality to be poor because of data sparseness, and therefore it does not validate wind radii forecasts. Furthermore, the values in Form M-3 and Form M-3 Supplemental represent relatively small samples at particular pressure values, so the ranges in the radii listed on the forms do not represent the full variability of model outputs or observed radii at a given pressure value. Therefore, comparisons are qualitative.

For *Rmax*, the model minima tend to be smaller than the EXBT for storms with *Pmin* of 930 or less but generally compare well for storms with *Pmin* > 930 mb. Model *Rmax* maxima are greater than the EXBT sample for storms with *Pmin* > of 930–950 mb.

For the outer extent of 110 mph winds (R110), for pressures of 940 mb or less, the model radii minima tend to be smaller than the sampled H*Wind values and either above or below for *Pmin* values at or above 950 mb. The model R110 maxima are all larger than the H*Wind sample.

For the radius of hurricane winds (R73), the model minima tend to be smaller than the EXBT sample; the model R73 maxima also tend to be smaller than the EXBT sample for *Pmin* of 920 mb or less or *Pmin* > 950 mb but are larger than the EXBT sample for storms with *Pmin* of 930–950 mb.

For the outer extent of tropical storm winds (R40), the model minima are generally smaller than the EXBT. The R40 maxima are also typically smaller than the EXBT R40 sample, except for the 930–950 mb range of *Pmin*, in which the model has larger radii.

In general the model maximum radii fall within the range of the EXBT or H*Wind values; however, there are instances where model outer radii exceed the EXBT or H*Wind radii. In such cases it is possible that the EXBT and H*Wind radii are not representative of the full range of tropical cyclone radii.

Form M-1: Annual Occurrence Rates

A. *Provide annual occurrence rates for landfall from the dataset defined by marine exposure that the model generates by hurricane category (defined by maximum windspeed at landfall in the Saffir-Simpson scale) for the entire state of Florida and selected regions as defined in Figure 3 [of the 2009 ROA]. List the annual occurrence rate per hurricane category. Annual occurrence rates shall be rounded to two decimal places. The historical frequencies below have been derived from the Base Hurricane Storm Set as defined in Standard M-1.*

Form M-1 follows. The historical counts are determined primarily from HURDAT impact (or "trailer") codes for the storms, but in some cases the intensities are based on the HURDAT 6 h wind reports near landfall. A report detailing the counts will be available for review.

Statewide counts are determined using two different methods. Under the heading "Entire State," we provide the counts using the most intense landfall for each storm affecting Florida; that is, there is only one landfall per storm. Under the heading "Entire State Landfalls," we provide the counts of all landfalls for each storm, using only one storm per region. This table is the sum of the counts for Regions A–D.

Form M-1. Modeled Annual Occurrence Rates

	Entire State				Region A – NW Florida			
	Historical		Modeled		Historical		Modeled	
Category	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1	26	0.24	27.23	0.25	15	0.14	14.43	0.13
2	13	0.12	13.35	0.12	4	0.04	5.55	0.05
3	16	0.15	13.56	0.12	5	0.05	4.48	0.04
4	7	0.06	7.23	0.07	0	0	1.71	0.02
5	2	0.02	2.59	0.02	0	0	0.27	0
	Region B – SW Florida				Region C – SE Florida			
	Historical		Modeled		Historical		Modeled	
Category	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1	9	0.08	7.89	0.07	7	0.06	7.69	0.07
2	1	0.01	4.89	0.04	6	0.05	3.84	0.03
3	6	0.05	4.91	0.04	5	0.05	4.51	0.04
4	2	0.02	2.30	0.02	5	0.05	3.34	0.03
5	1	0.01	0.54	0	1	0.01	1.83	0.02
	Region D – NE Florida				Florida By-Passing Hurricanes			
	Historical		Modeled		Historical		Modeled	
Category	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1	1	0.01	1.38	0.01	3	0.03	5.62	0.05
2	2	0.02	0.67	0.01	5	0.05	2.90	0.03
3	0	0	0.72	0.01	3	0.03	3.01	0.03
4	0	0	0.27	0	1	0.01	1.31	0.01
5	0	0	0.05	0	0	0	0.83	0.01
	Region E – Georgia				Region F – Alabama/Mississippi			
	Historical		Modeled		Historical		Modeled	
Category	Number	Rate	Number	Rate	Number	Rate	Number	Rate
1	3	0.03	1.57	0.01	6	0.05	4.92	0.04
2	0	0	0.50	0	3	0.03	2.61	0.02
3	0	0	0.26	0	3	0.03	2.71	0.02
4	0	0	0.19	0	1	0.01	1.07	0.01
5	0	0	0.08	0	1	0.01	0.66	0.01

Form M-1 continued

	Entire State Landfalls			
	Historical		Modeled	
Category	Number	Rate	Number	Rate
1	32	0.29	31.39	0.29
2	13	0.12	14.95	0.14
3	16	0.15	14.63	0.13
4	7	0.06	7.63	0.07
5	2	0.02	2.68	0.02

B. Describe model variations from the historical frequencies.

Form M-1 landfall frequencies were determined from the impact codes listed in the "trailer" information provided in the HURDAT database. In some cases the HURDAT codes did not agree with the 6 h HURDAT information. We revised landfall intensities indicated by the codes according to the supplemental data provided by the Commission in the 2009 ROA materials. These revisions were based on HURDAT 6 h winds near landfall. In addition, we revised a few additional storm intensity codes using the 6 h HURDAT winds.

The modeled frequencies are consistent with the historical record, to the extent that we may consider the historical record reliable. Statewide, the model produces 71.3 Florida landfalls (64.0 storms) in 110 years, compared to 70 landfalls (64 storms) historically. For major (Category 3–5) storms, the model produces 24.9 landfalls, compared to about 25 landfalls historically.

On a regional basis, the model is also consistent with the historical record. In Table 11 we show goodness-of-fit tests for three Florida regions (A–C) and landfalls for the entire state of Florida. Tests performed were (1) a chi-square goodness-of-fit using a chi-square distribution with K degrees of freedom, where K is the number of bins based on Saffir-Simpson category (aggregated to have at least 5 counts per bin); (2) a chi-square test using a Monte Carlo (MC) approach; and (3) a Kolmogorov-Smirnov (KS) test using a Monte Carlo approach. All tests show relatively high p-values, indicating that the differences between the modeled and historical distributions are not statistically significant. However, there is large uncertainty in the historical record, primarily of hurricane intensity, which leads to large uncertainty in the p-values.

Table 11. Goodness-of-Fit for Florida by Region.

	Region A – NW			Region B – SW			Region C – SE			Entire State LF	
	Obs	Model		Obs	Model		Obs	Model		Obs	Model
Cat 1	15	14.43	Cat 1+2	10	12.78	Cat 1	7	7.69	Cat 1	32	31.39
Cat 2	4	5.55	Cat 3+	9	7.75	Cat 2+3	11	8.35	Cat 2	13	14.95
Cat 3+	5	6.47				Cat 4+5	6	5.17	Cat 3	16	14.63
									Cat 4+5	9	10.31
Total	24	26.45		19	20.53		24	21.22		70	71.29
Chi Sq	K=3	0.85		K=2	0.67		K=3	0.79		K=4	0.9673
Chi Sq	MC	0.86			0.66			0.79			0.9601
KS	MC	0.56			0.38			0.71			0.9314

C. Provide vertical bar graphs depicting distributions of hurricane frequencies by category by region of Florida (Figure 3 [of the 2009 ROA]) and for the neighboring states of Alabama/Mississippi and Georgia. For the neighboring states, statistics based on the closest milepost to the state boundaries used in the model are adequate.

Vertical bar charts are shown in the figure below. These charts show the number of hurricanes in a 110-year period. Note that there are two charts for Florida statewide hurricanes. The “FL Landfalls” chart shows the total number of landfalls in the state (basically the sum of Regions A–D), whereas the “FL Hurricanes” chart shows only the number of hurricanes making at least one landfall, and the intensity is the maximum intensity landfall in the case of multiple landfalls.

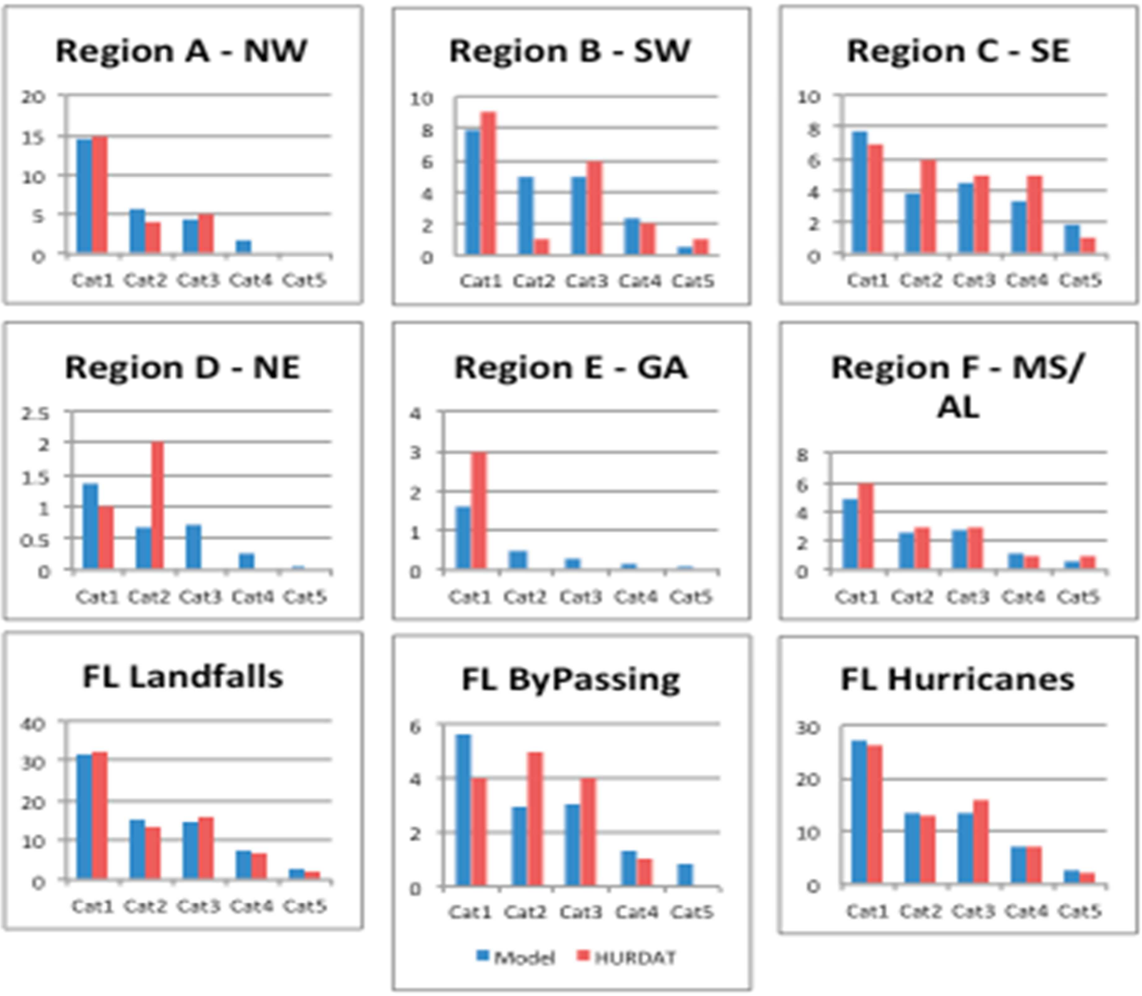


Figure 35. Form M-1 comparison of modeled and historical landfalling hurricane frequency (storms occurring in 110 years) for Regions A–F, FL statewide landfalls (one per FL region), FL bypassing storms, and FL state-wide hurricanes.

D. If the data are partitioned or modified, the modeler shall provide the historical annual occurrence rates for the applicable partition (and its complement) or modification as well as modeled annual occurrence rates in additional Form M-1s.

Not Applicable.

E. List all hurricanes added, removed, or modified from the previously accepted submission version of the Base Hurricane Storm Set.

For storms counted in Form M-1, no storms were added or removed. The intensities of three storms were revised on the basis of the HURDAT 6 h reports at or near landfall: Unnamed Storm #2, 1935 (second landfall lowered to Category 1); Unnamed Storm #6, 1921 (intensity raised to Category 3); and

Unnamed Storm #6, 1926 (intensity lowered to Category 2). Two by-passing storms were added; Ike (Category 1) and Gustav (Category 3).

F. *Provide this Form on CD in Excel format. The file name shall include the abbreviated name of the modeler, the Standards year and the Form name. A hard copy of Form M-1 shall be included in the submission.*

The form is provided on CD and is included above.

Form M-2: Maps of Maximum Winds

A. *Provide color maps of the maximum winds for the modeled version of the Base Hurricane Storm Set for both open terrain and actual terrain.*

B. *Provide color maps of the maximum winds for a 100-year and a 250-year return period from the stochastic storm set for both open terrain and actual terrain.*

C. *Provide the maximum winds plotted on each contour map and plot their location.*

"Actual terrain" is the roughness distribution used in the standard version of the model. "Open terrain" uses the same roughness value of 0.03 meters at all land points.

All maps shall be color coded at the ZIP Code level.

Maximum winds in these maps are defined as the maximum one-minute sustained winds over the terrain as modeled and recorded at each location.

The same color scheme and increments shall be used for all maps.

Use the following seven isotach values and interval color coding:

50 mph	*Blue*
65 mph	*Medium Blue*
80 mph	*Light Blue*
95 mph	*White*
110 mph	*Light Red*
125 mph	*Medium Red*
140 mph	*Red*

Contouring in addition to these isotach values may be included.

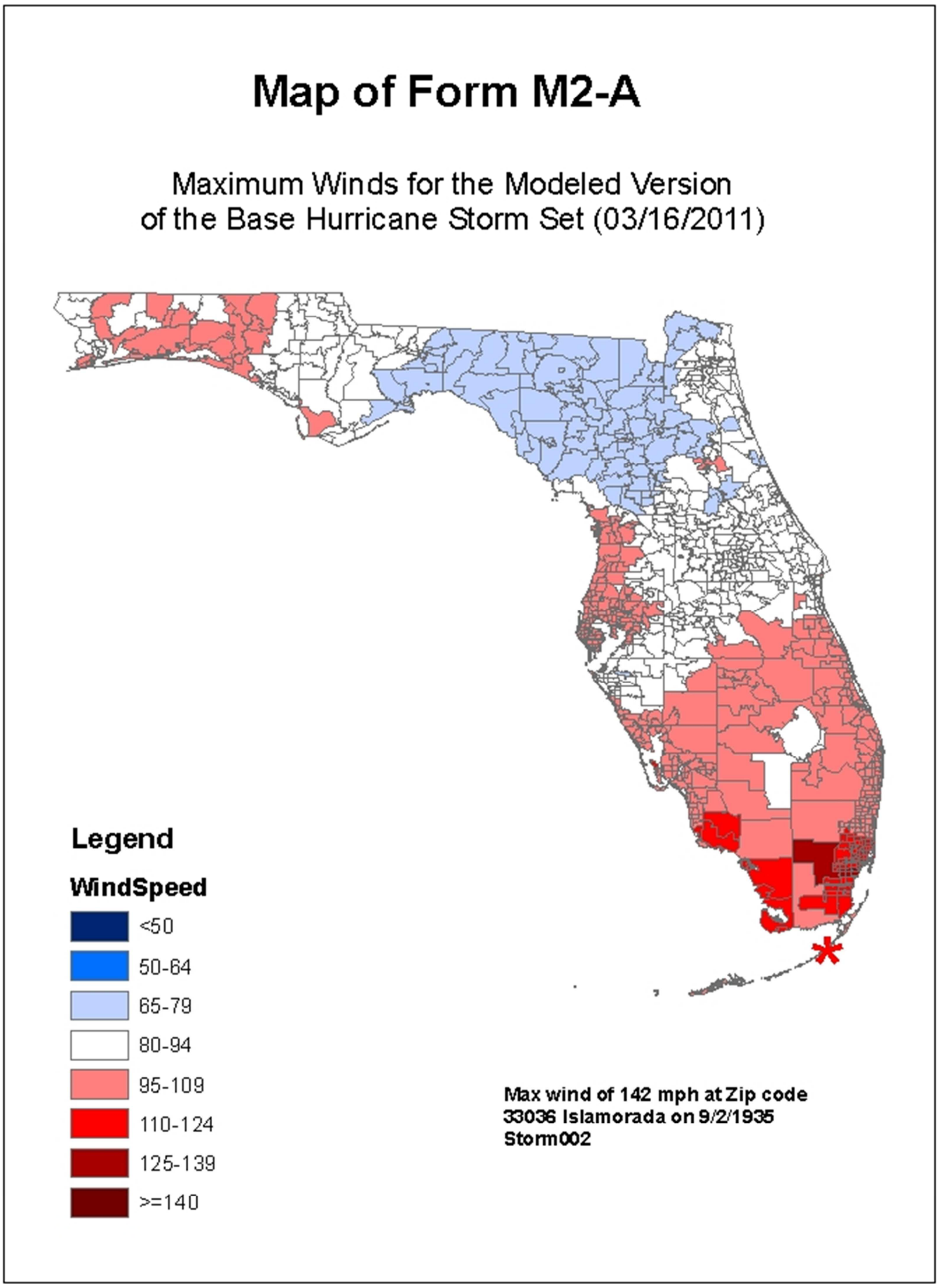


Figure 36. Maximum ZIP Code wind speed for open terrain wind exposure based on simulations of the historical storm set.

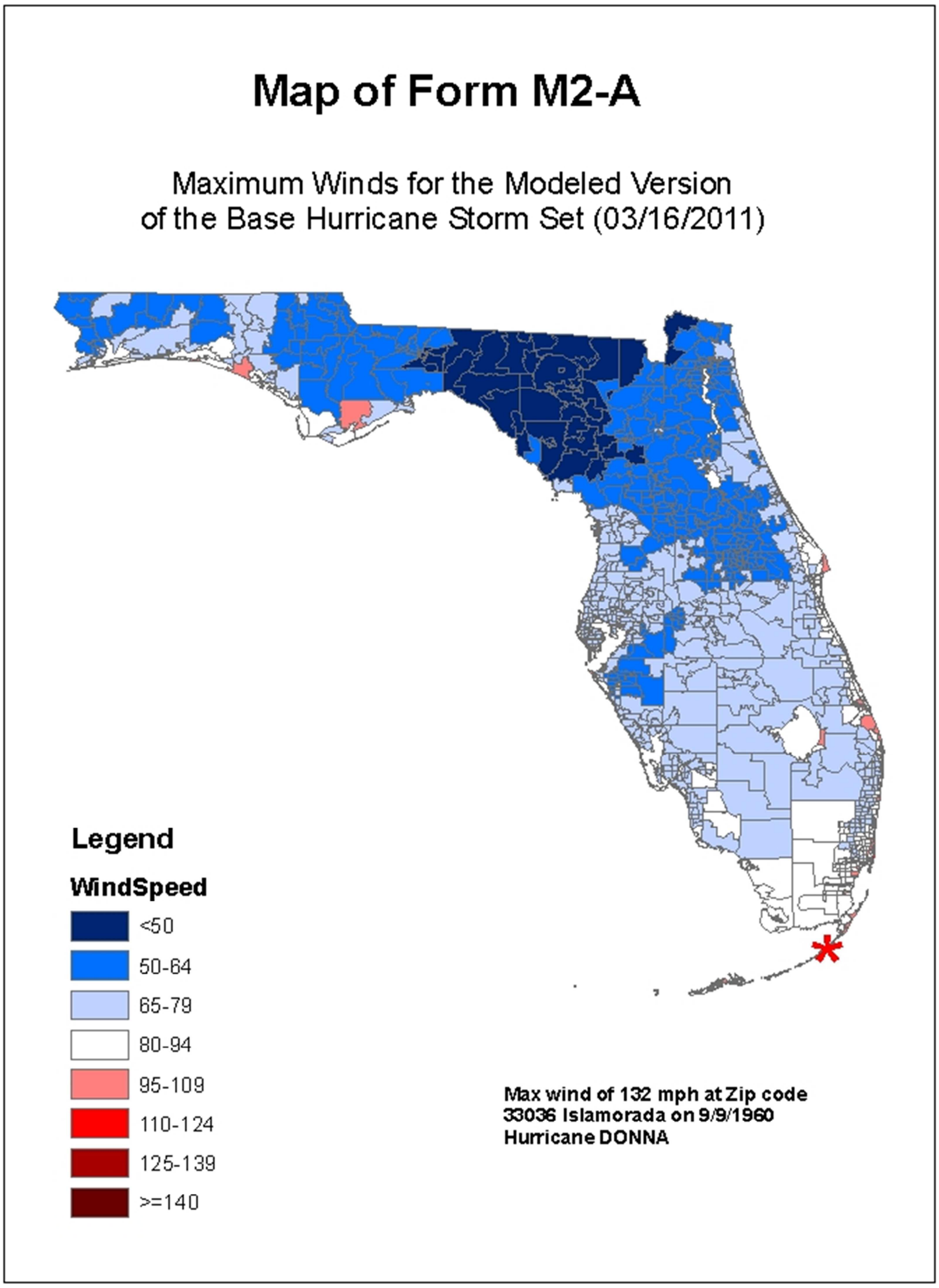


Figure 37. Maximum ZIP Code wind speed for actual terrain wind exposure based on simulations of the historical storm set.

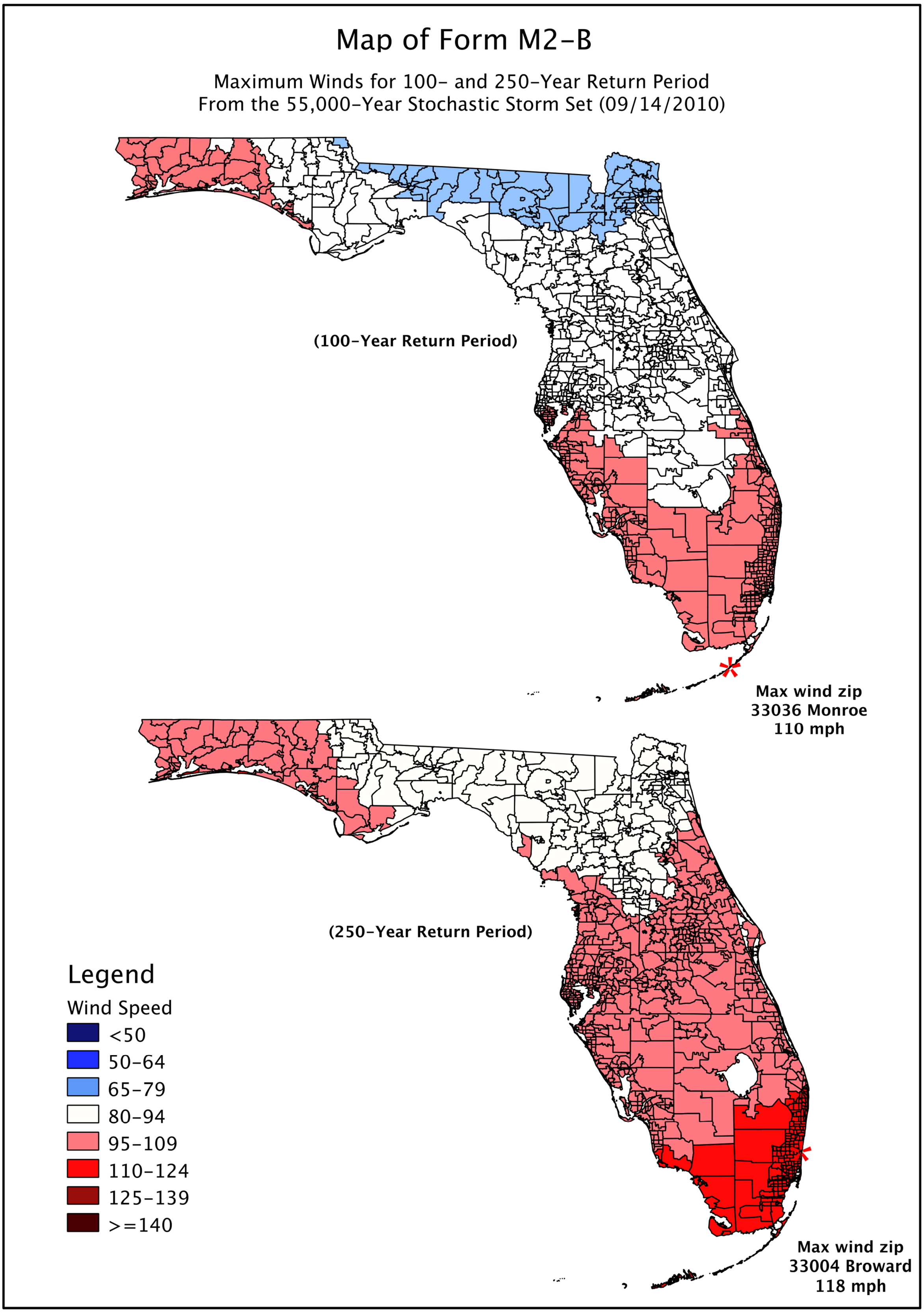


Figure 38. 100- and 250-year return period wind speeds at Florida ZIP Codes for open terrain wind exposure.

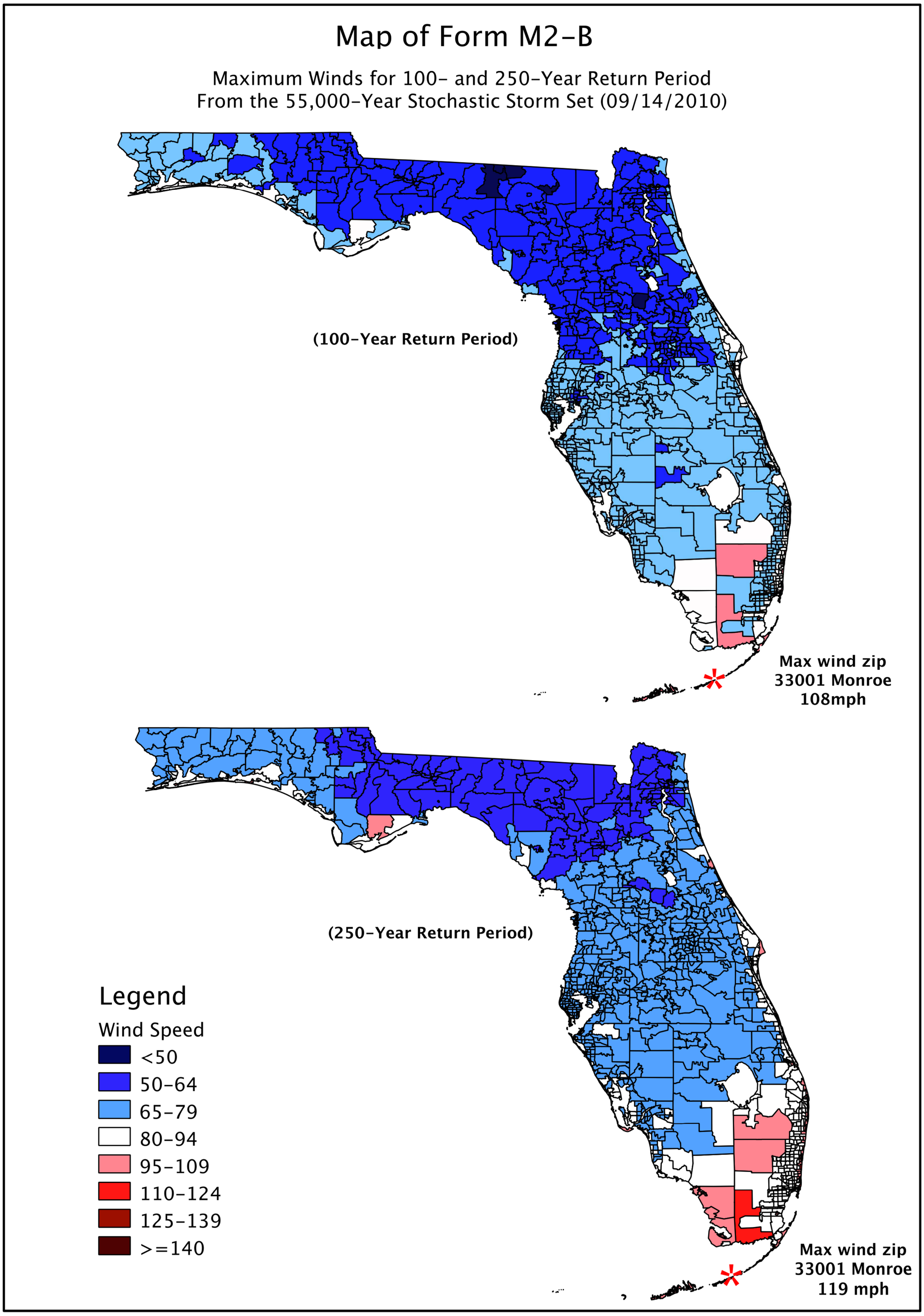


Figure 39. 100- and 250-year return period wind speeds at Florida ZIP Codes for actual terrain wind exposure.

Form M-3: Radius of Maximum Winds and Radii of Standard Wind Thresholds

A. *For the central pressures in the table below, provide the minimum and maximum values for 1) the radius of maximum winds (Rmax) used by the model to create the stochastic storm set and mimimum and maximum values for the outer radii (R) of 2) Category 3 winds (>110 mph), 3) Category 1 winds (>73 mph), and 4) gale force winds (>40 mph). This information should be readily calculated from the windfield formula input to the model and does not require running the stochastic storm set. Describe the procedure used to complete this Form.*

From the entire set of stochastic track files, 10 sets of track files (totaling 400) were extracted; each set was selected on the basis of the central pressure at landfall as listed in Form M-3. The tracks were processed and the model output from the range of solutions for all times in each track (2600 wind field snapshots) was used to populate the table. Note that the table represents a subset of the possible ranges of *Rmax* because of the selection of landfall tracks close (+/- 0.05 to 0.5 mb) to the pressure values in the table. Note that the *Rmax* values listed also represent model wind field snapshots from when the storms are offshore, while Form M-3 "C" (below) is limited to values at landfall. Input *Rmax* can vary slightly from *Rmax* determined from the gridded wind field because of the effects of translation speed on the wind field and interpolation truncation over the 0.1 *R*/*Rmax* model grid.

Table 12. Range of outer wind radii (sm) as a function of central sea level pressure (mb).

Central Pressure (mb)	Rmax (mi)		Outer Radii (>110 mph) (mi)		Outer Radii (>73 mph) (mi)		Outer Radii (>40 mph) (mi)	
	Min	Max	Min	Max	Min	Max	Min	Max
900	3.52	19.69	8.21	41.80	13.30	78.24	25.03	186.22
910	3.35	20.83	7.82	41.80	12.91	81.86	25.03	211.03
920	3.52	36.04	7.43	66.07	12.12	129.15	24.25	258.21
930	5.19	72.12	10.96	84.85	18.08	199.40	35.62	448.46
940	6.66	91.91	12.11	72.93	20.59	202.85	44.83	433.95
950	7.57	87.32	12.29	69.30	21.34	169.51	47.06	394.28
960	6.14	82.27	8.94	60.36	16.76	144.86	39.68	356.91
970	6.14	81.37	6.14	51.30	12.29	137.32	28.50	367.30
980	6.14	75.11	7.26	29.50	9.83	97.69	24.59	318.57
990	6.14	71.98	NA	NA	6.76	76.23	20.12	314.32

Table 13. Extended Best-Track and H*Wind wind radii ranges based on Atlantic basin hurricanes.

Storms Ext. Best Track (DeMaria 2010)	Central Pressure (mb)	Rmax (sm)		Outer Radii (>110 mph) (sm) From H*Wind		Outer Radii (>73 mph) (sm)		Outer Radii (>40 mph) (sm)	
		min	max	min	max	min	max	min	max
Katrina, Rita, Wilma 2005	900	6	23	21 Rita	31 Wilma	69	103	102	230
Mitch 98, Ivan 04, Katrina, Wilma 05	910	14	29	33 Wilma	34.5 Mitch	57	115	172	230
Isabel 03, Ivan 04, Rita 05, Dean 07	920	11	29	26 Ivan	34.5 Isabel	34	144	161	287
Andrew 92, Floyd 99, Ivan 04, Dennis 05, Dean 07	930	11	34	22 Andrew	32 Ivan	29	126.5	115	287
Luis 95, Lili 02, Floyd 99	940	6	40	16Lili	55 Isabel	29	138.0	115	287
Gabrielle 89, Iris 01, Bret 99	950	6	63	7 Iris	46 Wilma	17	172	98	345
Gustav 02, Dennis 05, Gilbert 88, Claudette 01	960	6	86	13 Gustav	n/a	23	161	86	402
Joan 88, Felix 95, Lili 96, Karl 10	970	6	103	6 Karl	n/a	17	287	57	621
Gabrielle 01, Emily 05, Noel 07, Beta 05	980	11	138	n/a	n/a	17	144	57	690
Lili 02, Olga 01, Lisa 04	990	11	207	n/a	n/a	17	138.0	34	632

B. Identify the other variables that influence Rmax.

For our input values of *Rmax* that determine the initial boundary layer mean vortex, we sample *Rmax* from a gamma distribution, which only explicitly depends on central pressure. For *Rmax* determined from the wind field, the translation speed (which is added after the steady state boundary layer model solution is obtained) may also influence *Rmax*.

C. Provide a box plot and histogram of Central Pressure (x-axis) versus Rmax (y-axis) to demonstrate relative populations and continuity of sampled hurricanes in the stochastic storm set.

A scatter plot with histograms and box plot is shown below.

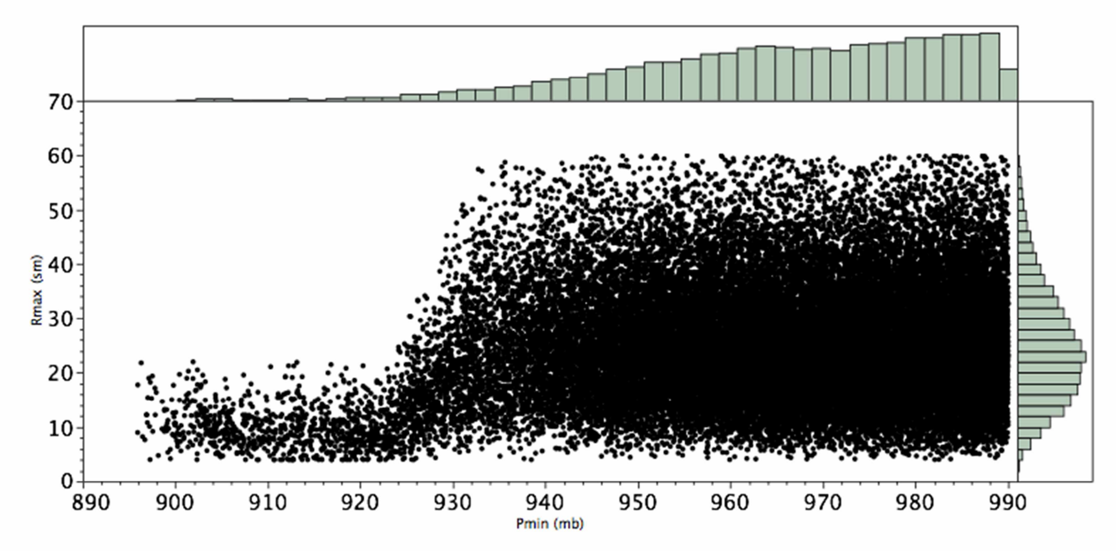


Figure 40. Representative scatter plot of the model input radius of maximum wind (y axis) versus minimum sea-level air pressure at landfall (mb). Relative histograms for each quantity are also shown. Extracted from simulation of 50,000 years conducted on 01-11-2008.

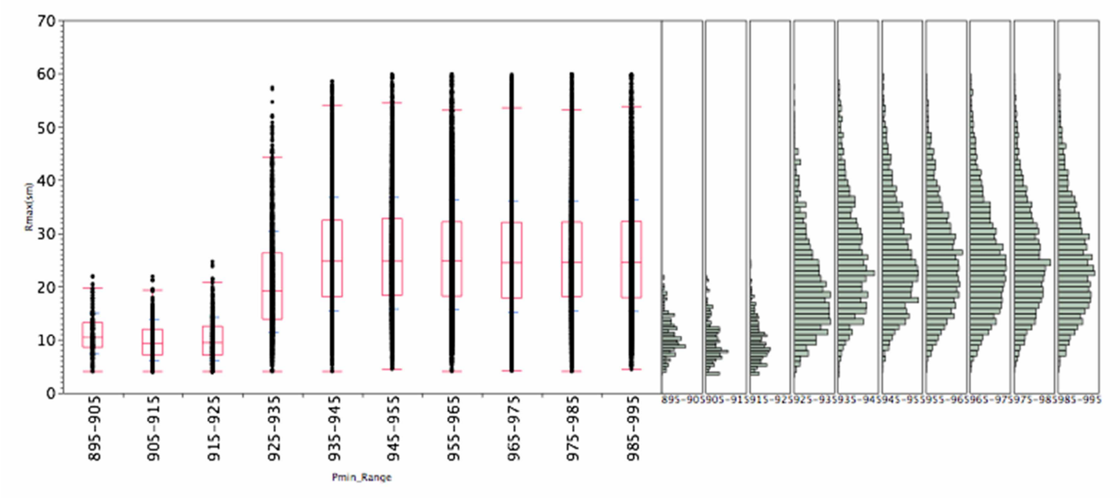


Figure 41. Oneway box plot (left) of Rmax (continuous) response across 10 mb Pmin groups. Boxes (and whiskers) are in red; standard deviations are in blue. Histograms (right) for each Pmin group. Representative sample from 50,000-year simulation of January 2008.

D. *Provide this Form on CD in Excel format. The file name shall include the abbreviated name of the modeler, the Standards year and the Form name. A hard copy of Form M-3 shall be included in the submission.*

The form is provided on CD and is included above.

VULNERABILITY STANDARDS

V-1 Derivation of Vulnerability Functions

A. Development of the vulnerability functions is to be based on a combination of the following: (1) historical data, (2) tests, (3) structural calculations, (4) expert opinion, or (5) site inspections. Any development of the vulnerability functions based on structural calculations or expert opinion shall be supported by tests, site inspections, and historical data.

The development of the vulnerabilities is based on a component approach that combines engineering modeling, simulations with engineering judgment, and observed (historical) data. The determination of external damage to buildings is based on structural calculations, tests, and Monte Carlo simulations. The wind loads and strength of the building components in the simulations are based on laboratory and in-situ tests, manufacturer's data, expert opinion based on post-hurricane site inspections of actual damage, and codes and standards. The internal and content damage are extrapolated from the external damage on the basis of expert opinion and are confirmed using historical claims data and site inspections of areas impacted by recent hurricanes.

B. The method of derivation of the vulnerability functions and associated uncertainties shall be theoretically sound.

The method used in the derivation is based on extrapolating the results of Monte Carlo simulations of physical exterior damage through simple equations based on engineering judgment, expert opinion, and claims data. Uncertainties at each stage are accounted for by distributing the damage according to reasonable probability distributions and are validated with claims data.

The Monte Carlo component models take into account many variations in structural characteristics, and the result clearly filters through the cost estimation model. There are also different and clearly defined costing considerations applied to each structural type. These adjustments come directly from resources developed exclusively for defining repair costs to structures and therefore are theoretically sound.

C. Building height, construction type and construction characteristics shall be used in the derivation and application of vulnerability functions.

A detailed exposure study was carried out to define the most significant (prevalent) construction types and characteristics in the Florida residential building stock for different regions. The corresponding engineering models were built for each of the identified common structural types. In the case of the residential model and the low-rise, commercial residential model, the models include differing wall types (wood and masonry) of varying strengths (e.g., reinforced or not, various sill-plate connection types), differing roof shapes (hip and gable end) and their effect on uplift loading, various strengths of roof-to-wall connections (toe nail up through straps), varying window types and sizes, opening protection systems, varying garage door pressure capacities, and one and two story houses and one-to-three story commercial residential buildings.

Models of varying combinations of the above characteristics (e.g., wood frame, gable end, no window shutters) were created for four different regions in Florida, where the region dictates the square footage footprint of the model. In all cases, the probabilistic capacities of the various components were determined by a variety of sources, including testing, test results in the literature, in-field data collection (post-hurricane damage evaluations), manufacturer's specifications and manufacturer's test data, and expert opinion.

In the case of the mid-/high-rise commercial residential model (buildings with more than three stories), the models include different apartment units corresponding to different building layouts (exposed or nonexposed entry door), different locations within the floor plan (corner or middle units), different heights (subject to different probabilities of missile impact and wind speed), and different openings (windows, doors, sliders) with different protection options (none or impact resistant).

D. *In the derivation and application of vulnerability functions, assumptions concerning building code revisions and building code enforcement shall be justified.*

The structural models include options that allow the representation of building code revisions. Three models were derived for each structural type: weak construction, medium construction, and strong construction (post-SSTD 10, "Standard for Hurricane Resistant Residential Construction," deemed to comply standard). For example, each model for northern wood frame and gable roof homes has weak, medium, and strong versions. The assignment of a given strength level is based on the assumed age of the home being modeled and the available information on construction practice in that region of the state in that era of construction. Florida Building Code requirements that apply to the repair of existing homes are also taken into consideration when computing the repair costs of a structure. Separate models were also developed for manufactured housing constructed based on pre- and post-1994 HUD regulations and for different wind zones.

In addition to the various models that reflect construction type, region of Florida, and era of construction (weak, medium, or strong construction), each model has numerous additional strength features that can be adjusted before simulations are conducted to represent various combinations of mitigation features. For example, a weak constructed home in central Florida with masonry walls (no reinforcing) may have been recently re-roofed with renailed roof decking and modern code-approved shingles. The simulation model is capable of reflecting this combination of weak original construction and new, strong roof sheathing and roof cover mitigation.

E. *Vulnerability functions shall be separately derived for building structures, mobile homes, appurtenant structures, contents, and time element coverages.*

This requirement is fully met. The building structures, mobile homes, and appurtenant structures are independently derived. The contents and time element coverages are separate vulnerabilities, which are functions of (receiving input from) the results of structure vulnerability simulations.

F. *The minimum wind speed that generates damage shall be reasonable.*

The minimum one-minute average sustained wind speed at which some damage is observed is 38 mph (3-second gust 50 mph) for appurtenant structures. Site-built and manufactured homes have a very small probability of some very minor damage at 42 mph (3-second gust 55 mph). This probability becomes more significant at 46 mph (3-second gust 60 mph) and increases with higher wind speed. Simulations are run for 3-second gusts ranging from 50 mph to 250 mph.

G. Vulnerability functions shall include damage due to hurricane hazards such as wind speed and wind pressure, water infiltration, and missile impact. Vulnerability functions shall not include explicit damage due to flood, storm surge, or wave action.

The vulnerability functions do not explicitly include damage due to flood, storm surge, or wave action. The vulnerability functions for all models (site-built residential, manufactured homes, low-rise commercial residential, and mid-/high-rise commercial residential) include damage due to the wind hazard (wind speed and wind pressure), missile impact, and water infiltration.

Disclosures

1. Provide a flow chart documenting the process by which the vulnerability functions are derived and implemented.

The flow chart in Figure 42 summarizes the procedure used in the Monte Carlo simulations to predict the external damage to the different structural types for the case of residential buildings and commercial residential buildings. The random variables include wind speed, pressure coefficients, and the resistances of the various building components (roof cover, roof sheathing, openings, walls, connections).

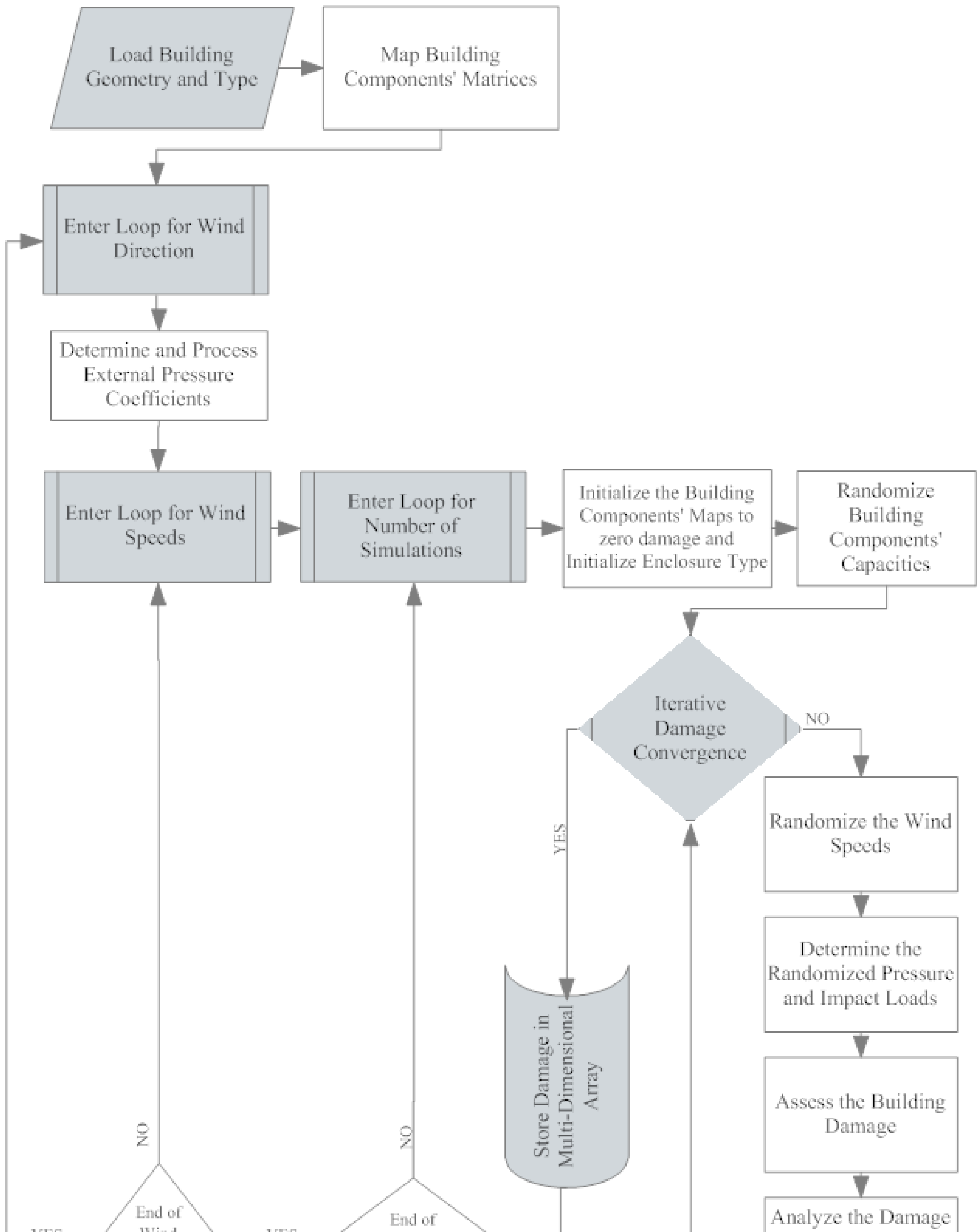


Figure 42. Monte Carlo simulation procedure to predict damage.

The flow chart in Figure 43 summarizes the procedure used to convert the results of the Monte Carlo simulations of physical external damage into a vulnerability matrix.

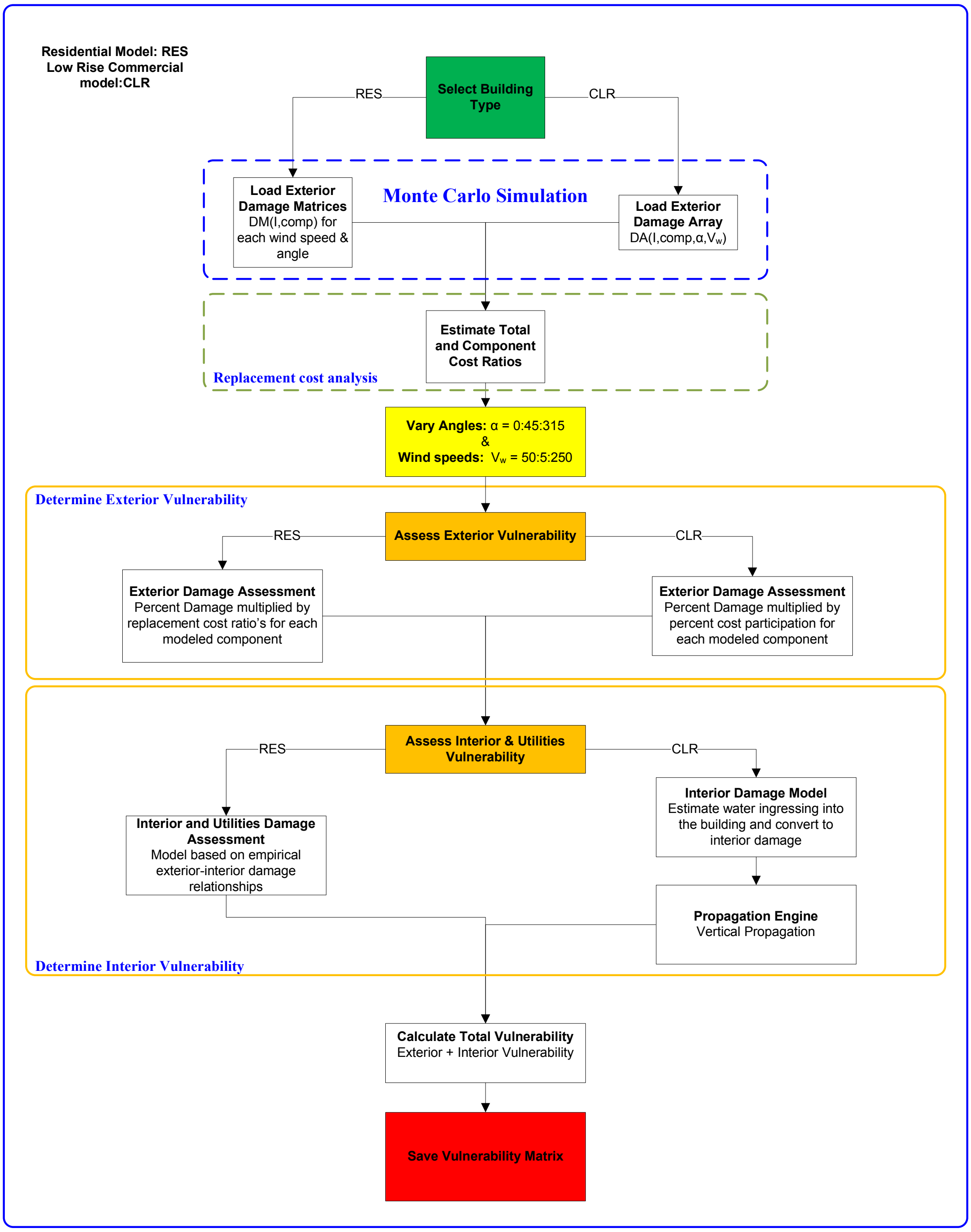


Figure 43. Procedure to create vulnerability matrix.

The flowchart in Figure 43 is also applicable to the apartment facades of the mid-/high-rise commercial residential model, in which building components modeled include windows, entry doors, and balcony (sliding-glass) doors. The flow chart in Figure 44 summarizes the procedure used to convert the apartment unit vulnerabilities into an overall estimate of building vulnerability. This figure is already presented in Standard G-1, as Figure 17, where the values represented in the flow chart are explained in detail.

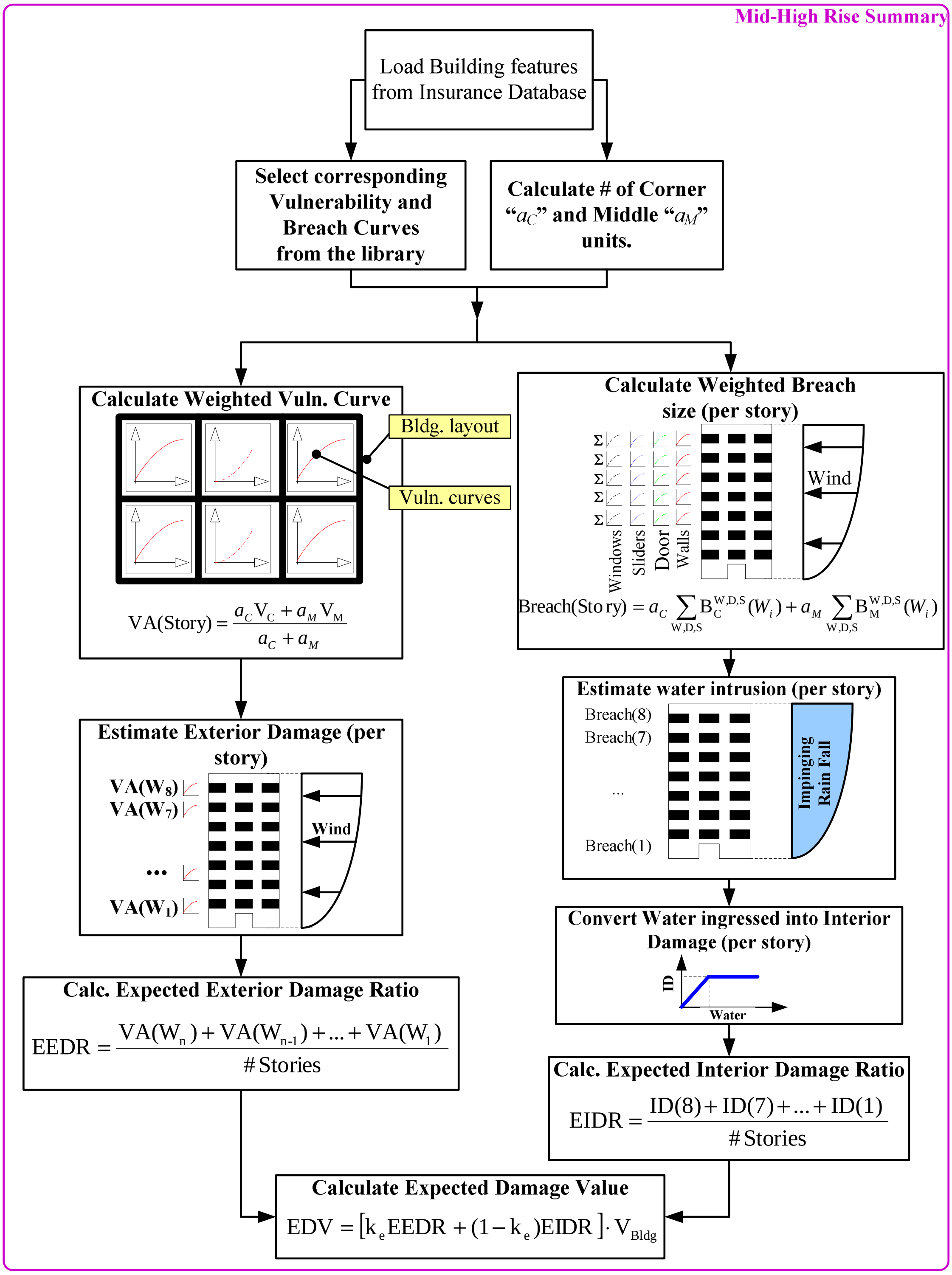


Figure 44. Exterior and interior damage assessment for MHB.

2. ***Describe the nature and extent of actual insurance claims data used to develop the model's vulnerability functions. Describe in detail what is included, such as, number of policies, number of insurers, date of loss, and number of units of dollar exposure, separated into personal residential, commercial residential, and mobile home.***

At the request of the Florida Department of Financial Services (FDFS), four insurance companies provided insurance claims data for several hurricanes that impacted Florida prior to 2004, including Andrew. The companies provided the following two types of files:

1. Sample files with 10% of the exposure selected at random, plus the claims on this 10% exposure since 1996

2. Hurricane files with premium files for all hurricane claims since 1996, plus all the corresponding claim data since 1996

Because of a confidentiality agreement, these companies will remain anonymous; they will be referred to as Company A, B, C, or D. These companies represent between 75% and 85% of the insured exposure in the state and approximately 70% of the claims. Most of the data provided come only from minor hurricanes and tropical storms that impacted Florida between 1994 and 2002.

Company A provided the only significant data for storms prior to 2004, in particular for Hurricane Andrew, as shown in Table 14. Wind speed estimates are also available, so validation efforts were primarily concentrated on the use of these data. Attempts were made to make use of additional data from Hurricane Opal and other storms. However, the amount of processed data available was too small to be statistically significant for validation.

Table 14. Summary of processed claims data (number of claims provided).

	Hurricane Andrew	Hurricane Georges	Hurricane Opal	Tropical Storm Irene	Tropical Storm Earl	Hurricane Erin
Company A						
Masonry	78636	266	1973	3638	59	11460
Timber	1603	1078	9166	776	89	11878
Manufactured	1775	0	256	184	16	690

Note: Only building, contents, and appurtenant structure claims were provided by Company A (ALE was not provided).

Claims data for the 2004 hurricane season from a series of insurance companies were also used to validate the FPHLM. Although 21 companies submitted data for a total of almost 675,000 claims, only two main companies are detailed here. These two companies (they will be referred as Company 1 and Company 2) represent 386,000 claims, mainly for site-built homes. These claims are divided between Hurricanes Charley, Frances, and Jeanne for central Florida, and Hurricane Ivan for the Panhandle. The validation consists of a series of comparisons between the actual claim data and the FPHLM results. The claims files were provided by the insurance companies. Table 15, Table 16, and Table 17 show the number of policies provided by the two companies for the four different hurricanes in 2004. As expected, there are more masonry claims in central Florida and more timber claims in the Panhandle.

Table 15. Company 1: Claim Number for each year-built category.

Company	Hurricane	Construction	Year Built	Number of Claims
Company 1	Charley	Masonry	yb<1970	5026
Company 1	Charley	Masonry	1970<=yb<1984	8216
Company 1	Charley	Masonry	1984<=yb<1994	11850
Company 1	Charley	Masonry	yb>=1994	8110
Company 1	Charley	Frame	yb<1970	956
Company 1	Charley	Frame	1970<=yb<1984	1232
Company 1	Charley	Frame	1984<=yb<1994	3044
Company 1	Charley	Frame	yb>=1994	677
Company 1	Charley	Manufactured	yb<1970	2966
Company 1	Charley	Manufactured	yb>=1994	212
Company 1	Frances	Masonry	yb<1970	5009
Company 1	Frances	Masonry	1970<=yb<1984	6989
Company 1	Frances	Masonry	1984<=yb<1994	7903
Company 1	Frances	Masonry	yb>=1994	4384
Company 1	Frances	Frame	yb<1970	902
Company 1	Frances	Frame	1970<=yb<1984	2081
Company 1	Frances	Frame	1984<=yb<1994	5648
Company 1	Frances	Frame	yb>=1994	721
Company 1	Frances	Manufactured	yb<1970	3186
Company 1	Frances	Manufactured	yb>=1994	222
Company 1	Ivan	Masonry	yb<1970	2029
Company 1	Ivan	Masonry	1970<=yb<1984	2099
Company 1	Ivan	Masonry	1984<=yb<1994	1719
Company 1	Ivan	Masonry	yb>=1994	1769
Company 1	Ivan	Frame	yb<1970	3048
Company 1	Ivan	Frame	1970<=yb<1984	3956
Company 1	Ivan	Frame	1984<=yb<1994	4829
Company 1	Ivan	Frame	yb>=1994	3890
Company 1	Ivan	Manufactured	yb<1970	634
Company 1	Ivan	Manufactured	yb>=1994	79
Company 1	Jeanne	Masonry	yb<1970	3601
Company 1	Jeanne	Masonry	1970<=yb<1984	5274
Company 1	Jeanne	Masonry	1984<=yb<1994	5698
Company 1	Jeanne	Masonry	yb>=1994	4999
Company 1	Jeanne	Frame	yb<1970	825
Company 1	Jeanne	Frame	1970<=yb<1984	1386
Company 1	Jeanne	Frame	1984<=yb<1994	3430
Company 1	Jeanne	Frame	yb>=1994	674
Company 1	Jeanne	Manufactured	yb<1970	2717
Company 1	Jeanne	Manufactured	yb>=1994	177

Table 16. Company 2: Claim Number for each year-built category.

Company	Hurricane	Construction	Year Built	Number of Claims
Company 2	Charley	Masonry	yb<1970	8677
Company 2	Charley	Masonry	1970<=yb<1984	15085
Company 2	Charley	Masonry	1984<=yb<1994	18324
Company 2	Charley	Masonry	yb>=1994	6376
Company 2	Charley	Frame	yb<1970	1920
Company 2	Charley	Frame	1970<=yb<1984	1782
Company 2	Charley	Frame	1984<=yb<1994	3786
Company 2	Charley	Frame	yb>=1994	443
Company 2	Charley	Manufactured	yb<1970	1843
Company 2	Charley	Manufactured	yb>=1994	159
Company 2	Frances	Masonry	yb<1970	8276
Company 2	Frances	Masonry	1970<=yb<1984	11978
Company 2	Frances	Masonry	1984<=yb<1994	11394
Company 2	Frances	Masonry	yb>=1994	3224
Company 2	Frances	Frame	yb<1970	1453
Company 2	Frances	Frame	1970<=yb<1984	3202
Company 2	Frances	Frame	1984<=yb<1994	7731
Company 2	Frances	Frame	yb>=1994	601
Company 2	Frances	Manufactured	yb<1970	1590
Company 2	Frances	Manufactured	yb>=1994	131
Company 2	Ivan	Masonry	yb<1970	1399
Company 2	Ivan	Masonry	1970<=yb<1984	746
Company 2	Ivan	Masonry	1984<=yb<1994	449
Company 2	Ivan	Masonry	yb>=1994	275
Company 2	Ivan	Frame	yb<1970	4004
Company 2	Ivan	Frame	1970<=yb<1984	5546
Company 2	Ivan	Frame	1984<=yb<1994	4637
Company 2	Ivan	Frame	yb>=1994	2229
Company 2	Ivan	Manufactured	yb<1970	171
Company 2	Ivan	Manufactured	yb>=1994	41
Company 2	Jeanne	Masonry	yb<1970	6907
Company 2	Jeanne	Masonry	1970<=yb<1984	10767
Company 2	Jeanne	Masonry	1984<=yb<1994	9629
Company 2	Jeanne	Masonry	yb>=1994	4176
Company 2	Jeanne	Frame	yb<1970	1555
Company 2	Jeanne	Frame	1970<=yb<1984	2087
Company 2	Jeanne	Frame	1984<=yb<1994	4561
Company 2	Jeanne	Frame	yb>=1994	484
Company 2	Jeanne	Manufactured	yb<1970	1401
Company 2	Jeanne	Manufactured	yb>=1994	128

Table 17. Company 1 and Company 2: Claim Numbers Combined.

Company	Hurricane	Construction	Number of Claims
Company 1	Charley	Masonry	33202
Company 1	Charley	Frame	5909
Company 1	Charley	Manufactured	3178
Company 1	Charley	Other	260
Company 1	Frances	Masonry	24285
Company 1	Frances	Frame	9352
Company 1	Frances	Manufactured	3408
Company 1	Frances	Other	566
Company 1	Ivan	Masonry	7616
Company 1	Ivan	Frame	15723
Company 1	Ivan	Manufactured	713
Company 1	Ivan	Other	100
Company 1	Jeanne	Masonry	19572
Company 1	Jeanne	Frame	6315
Company 1	Jeanne	Manufactured	2894
Company 1	Jeanne	Other	331
Company 2	Charley	Masonry	48462
Company 2	Charley	Frame	7931
Company 2	Charley	Manufactured	2002
Company 2	Charley	Other	582
Company 2	Frances	Masonry	34872
Company 2	Frances	Frame	12987
Company 2	Frances	Manufactured	1721
Company 2	Frances	Other	1134
Company 2	Ivan	Masonry	2869
Company 2	Ivan	Frame	16416
Company 2	Ivan	Manufactured	212
Company 2	Ivan	Other	87
Company 2	Jeanne	Masonry	31479
Company 2	Jeanne	Frame	8687
Company 2	Jeanne	Manufactured	1529
Company 2	Jeanne	Other	1167

The claims are divided by the type of coverage for structure and contents. Company 1 has two types of coverage, replacement cost and actual cash value, but does not specify whether both structure and contents have the same coverage for each claim.

For Company 2, there are six types of coverage, as shown below.

ACV S/ACV C	Structure Actual-Cash-Value, Contents Actual-Cash-Value
ACV S/RC C	Structure Actual-Cash-Value, Contents Replacement-Cost
RC S/ACV C	Structure Replacement-Cost, Contents Actual-Cash-Value
RC S/RC C	Structure Replacement-Cost, Contents Replacement-Cost
SV S/RC C	Structure Stated-Value, Contents Replacement-Cost
SV S/SV C	Structure Stated-Value, Contents Stated-Value

Table 18 and Table 19 summarize the distribution of claims in both companies.

Table 18. Distribution of coverage for Company 1.

Coverage	Premium Policy Count		Claim Policy Count	
A	44020	1%	2759	2%
R	3706219	99%	163692	98%
Total	3750240		166451	

Table 19. Distribution of coverage for Company 2.

Coverage	Premium Policy Count		Claim Policy Count	
ACV S/ACV C	13173	3%	3496	3%
ACV S/RC C	44805	10%	12150	9%
RC S/ACV C	162122	35%	41484	30%
RC S/RC C	232688	51%	77146	57%
SV S/RC C	235	0%	69	0%
SV S/SV C	6019	1%	1717	1%
Total	459042	100%	136062	100%

There are 29,372 claims with $0 losses (i.e., Loss structure + Loss app + Loss contents + Loss ALE = 0), though they are listed in the claim file of Company 2. They probably correspond to claims whose losses were lower than the deductible.

Claims data for commercial residential from two insurance companies (referred to as Companies Alpha and Beta) were also used to validate the commercial residential module of the FPHLM. The policies for Company Alpha, which included commercial line accounts for condominium association, apartment building, and homeowners association policies, and high risk accounts in coastal areas, totaled 4,851 claims, representing three hurricanes as shown in Table 20. The vast majority of the claims are for Hurricane Wilma. The policies for Company Beta totaled 452 claims, representing only Hurricane Wilma.

Table 20. Distribution of claims per hurricane for Company Alpha.

Hurricane	Claims	Frequency
Charley	231	4.76%
Frances	947	19.52%
Wilma	3673	75.72%

Table 21 shows the distribution of claims by number of stories for Company Alpha. It can be seen that the vast majority of the claims are for low-rise buildings.

Table 21. Distribution of claims per story for Company Alpha.

Stories	Claims	Frequency
1	1664	34.30%
2	2415	49.78%
3	436	8.99%
4	150	3.09%
5	99	2.04%
6	22	0.45%
7	21	0.43%
8	13	0.27%
9	7	0.14%
10	5	0.10%
11+	19	0.39%

Table 22 shows the distribution of claims by number of stories for Company Beta. The vast majority of the claims are for low-rise 1 and 2 story buildings.

Table 22. Distribution of claims per story for Company Beta.

Stories	Claims	Frequency
1	180	39.82%
2	221	48.89%
3	9	1.99%
4	40	8.85%
17	2	0.44%

Table 23 and Table 24 show the distribution of claims by era, and Table 25 and Table 26 show the distribution of claims by type of exterior wall.

Table 23. Distribution of claims per era for Company Alpha.

Year Built	Claims	Frequency
pre1960	892	18.39%
1960-1970	1185	24.43%
1971-1980	1452	29.93%
1981-1993	1215	25.05%
1994-2001	85	1.75%
2002-present	22	0.45%

Table 24. Distribution of claims per era for Company Beta.

YearBuilt	Claims	Frequency
pre1960	0	0.00%
1960-1970	0	0.00%
1971-1980	6	1.33%
1981-1993	147	32.52%
1994-2001	208	46.02%
2002-present	91	20.13%

Table 25. Distribution of claims per type of exterior wall for Company Alpha.

Exterior Wall	Claims	Frequency
Frame	483	9.96%
Masonry	4368	90.04%

Table 26. Distribution of claims per type of exterior wall for Company Beta.

Exterior Wall	Claims	Frequency
Frame	47	10.40%
Masonry	405	89.60%

3. Summarize site inspections, including the source, and provide a brief description of the resulting use of these data in development, validation, or verification of vulnerability functions.

The documentation and statistical analysis of damage caused by landfalling hurricanes has been conducted by a variety of stakeholders, including home builders trade associations (NAHB Research Center, 1993, 1996, 1999; Crandell, 1998), practicing engineers (Keith & Rose, 1994), government agencies (Oliver & Hanson, 1994; FEMA, 1992, 2006), and academic researchers (Kareem, 1985, 1986; Gurley, 2006; Gurley et al., 2006). Some of these studies provide a broad overview of structural performance (FEMA and NAHB reports). Others focus on a particular building component such as roofing (Croft et al., 2006; Meloy et al., 2007) or address a specific building type such as wood frame residential construction (van de Lindt et al., 2007). All such available public access literature regarding the performance of residential infrastructure in hurricane winds was reviewed and used as guidance for the development of the vulnerability model. Those studies that provide statistical assessments of damage to specific building components (Gurley, 2006; Gurley et al., 2006; Meloy et al., 2007) were used as a means of validating the physical damage estimates of the model. Studies that are more qualitative in nature (e.g., FEMA reports) were used to provide guidance regarding the potential failure modes that were important to replicate in the model. For example, the common observation of gable end failures resulted in a gable end failure component in the model.

Several damage surveys were done in 2004. Damage from Hurricane Charley was reported across the state, and the most severe damage occurred where the eye made landfall near the cities of Punta Gorda and Port Charlotte. A team that consisted of approximately 30 members from UF, FIU, Clemson, and FIT, under the leadership of the Institute for Business & Home Safety (IBHS), surveyed the extent of the structural damage to homes and manufactured homes in these cities. For several days following the storm the team conducted a detailed statistical survey of damage in the impacted areas. Results of this survey can be found on the IBHS website http://www.ibhs.org/. Other information regarding the damage of Charley and other storms can be found at the Florida Tech Wind and Hurricane Impact Research Laboratory website, http://www.fit.edu/research/whirl/.

Damage from Hurricane Frances was surveyed in areas from Cocoa Beach to Stuart in eastern Florida. Although damage from Hurricane Frances was not as severe as that from Hurricane Charley, the same extensive survey conducted in Punta Gorda and Port Charlotte was also conducted in the impacted areas. Great efforts were made to monitor the strength and resulting damage from the storm as part of the Florida Coastal Monitoring Program. Towers were set up to record wind speeds along the coast in locations where the storm was forecasted to make landfall. Sensors to record the wind-induced pressure were deployed on the roofs of several homes. Following the storm, members of the same team that surveyed damage from Charley photographed and recorded damage throughout the area. Areas of Fort Pierce appeared to be hardest hit and damage was severe to many homes in some areas.

Similar efforts to monitor the winds and survey the damage were made for Hurricane Jeanne. Towers and pressure sensors were again deployed at various locations near where landfall was forecasted. After the storm, members of the team surveyed areas from Stuart to Cocoa Beach. These surveys consisted primarily of cataloging and photographing various observations of damage in the impacted areas, as was done with Hurricane Frances. Damage from Hurricane Jeanne in many locations was very similar to what was seen from Hurricane Frances. In many cases damage to structures that was initially caused by Frances was compounded by Hurricane Jeanne. Fatigue of structures from the winds of two hurricanes within three weeks most likely played a role in the most severe cases of damage in the areas such as Vero Beach and Fort Pierce. In some areas most of the weak trees and components of homes (shingles, screened porches, fences, etc.) were already damaged by Hurricane Frances, so when Hurricane Jeanne hit little or no further damage was seen. It is very difficult to tell what damage was caused by Hurricane Jeanne and what was caused by Hurricane Frances.

Additionally, engineers working on the physical damage model performed a detailed residential damage study after the 2004 hurricane season to assess the performance of housing built to the Florida Building Code and the Standard Building Code (Gurley, 2006; Gurley et al., 2006). The data were collected as a part of a study conducted by UF and sponsored by the Florida Building Commission. Site-built single-family homes constructed after Hurricane Andrew-related changes to the standard building code went into effect were targeted for a detailed investigation of damage as a result of the 2004 hurricane season. This study provided a quantitative statistical comparison of the relative performance of homes built between 1994 and 2001 with the performance of those built after the 2001 Florida Building Code replaced the Standard Building Code. This evaluation was accomplished through a systematic survey of homes built from 1994 to 2004 in the areas that experienced the highest wind speeds from the 2004 storms (Charlotte, St. Lucie, Escambia, and Santa Rosa counties). A statistically significant number of homes (close to 200) were surveyed in these regions to define correlations between damage, age, and construction type. These relationships are referenced to maximum three-second gust wind speed via wind swath maps. An expanded and more detailed version of the conference publication (Gurley, 2006; Gurley et al., 2006) is now in peer review in the ASCE journal Natural Hazard Review. The data from this study were used to modify the residential component capacities as this model evolved. The final report from this study was submitted in the spring of 2006 to the Florida Building Commission. Another source of field data is the aerial imagery collected by NOAA after Hurricane Katrina. These images provided a quantification of shingle damage relative to estimated wind speed and were used to validate the roof cover damage output from the physical damage model.

4. Describe the research used in the development of the model's vulnerability functions.

The engineering team adopted a "component approach" in the development of the vulnerability functions. Although a number of commercial loss projection models have been developed, only a handful of studies are available in the public domain to predict damage for hurricane prone areas. Boswell et al. (1999) attempted to predict the public costs of emergency management and recovery without taking into account losses to individual homeowners. In 1985, Berke et al. presented a computer system simulating economical and social losses caused by hurricane disasters, and a Vulnerability Assessment and Mapping System known as VAMS (Berke et al., 1984) enabled the user to consider various types of hurricanes with varying surges, wind patterns, and points of landfall. This information is of some interest, but it is not directly applicable to residential construction in Florida.

Most studies for residential losses use post-disaster investigations (FEMA, 1992) or available claims data to fit damage versus wind speed vulnerability curves. For example, a relationship between home damage from insurance data and wind speed was proposed for Typhoons Mireille and Flo (Mitsuta et al., 1996). A study by Holmes (1996) presented the vulnerability curve for a fully engineered building with strength assumed to have lognormal distribution but clearly indicated the need for more thorough post-disaster investigations to better define damage prediction models. A method for predicting the percentage of damage within an area as a function of wind speed and various other parameters was presented by Sill and Kozlowski (1997). The proposed method was intended to move away from curve fitting schemes, but its practical value was hampered by insufficient clarity and transparency. Huang et al. (2001) presented a risk assessment strategy based on an analytical expression for the vulnerability curve. The expression is obtained by regression techniques from insurance claims data for Hurricane

Andrew. Khanduri and Morrow (2003) also presented a similar method of assessment of vulnerability and a methodology to translate known vulnerability curves from one region to another region. Although such approaches are simple, they are highly dependent on the type of construction and construction practices common to the areas represented in the claims data. Recent changes in building codes or construction practices cannot be adequately reflected by regression-derived vulnerability curves. In addition, damage curves obtained by regression from observed data can be misleading because very often, as was the case for Hurricane Andrew, few reliable wind speed data are available. In addition, damage curves regressed from observed data do not adequately represent the influence of primary storm characteristics such as central pressure, forward velocity, radius of maximum wind, the amount of rain, duration, and other secondary parameters such as demand surge and preparedness.

In contrast, a component approach explicitly accounts for both the resistance capacity of the various building components and the load effects produced by wind events to predict damage at various wind speeds. In the component approach the resistance capacity of a building can be broken down into the resistance capacity of its components and the connections between them. Damage to the structure occurs when the load effects from wind or flying debris are greater than the component's capacity to resist them. Once the strength capacities, load demands, and load path(s) are identified and modeled, the vulnerability of a structure at various wind speeds can be estimated. Estimations are affected by uncertainties regarding both the behavior and strength of the various components and the load effects produced by hurricane winds.

Research related to the interior damage module of the commercial residential model

The modelers developed a novel approach to assess interior damage. The method complements the component approach described above to compute the damage to the building envelope (Weekes et al., 2009). The method is summarized in Figure 45. The model estimates the amount of wind-driven rain that enters through the breaches and defects in the building envelope and converts it to interior damage. The approach is described below.

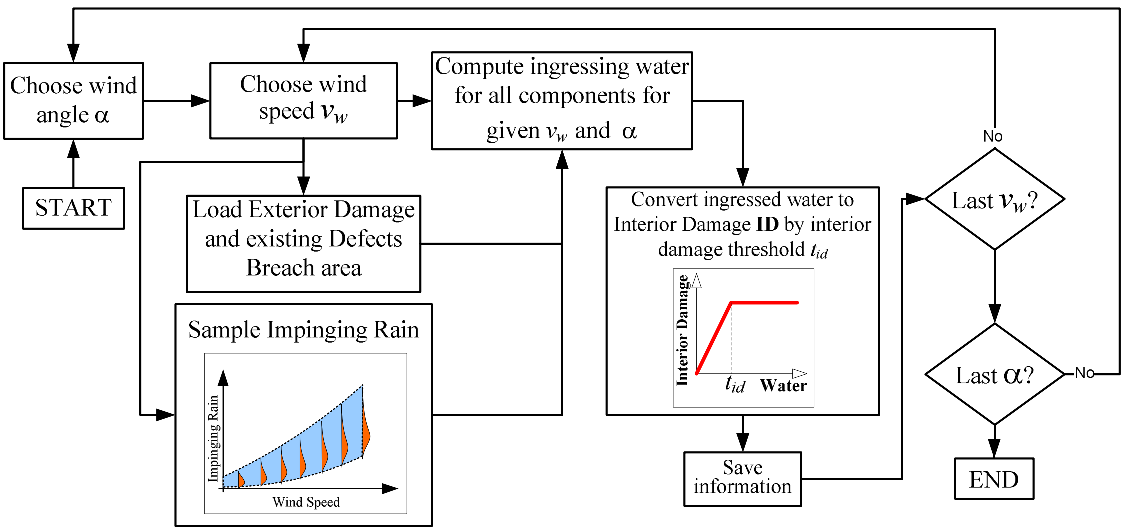


Figure 45. Flowchart of the interior damage model.

The building components that the model considers are roof cover, roof sheathing, wall cover, wall sheathing, gable cover, gable sheathing, windows, doors, and sliding doors. For an initial wind speed, the model starts loading the exterior damage array, expressed as breach areas of each component for thousands of simulation runs. An estimated area of existing defects in envelope components is also accounted for from surveys and engineering experience. It has been demonstrated that in buildings subjected to hurricane winds, the interior damage may start well before there are any breaches in the envelope (Mullens et al., 2006). The interior damage at this early stage is certainly nonnegligible and is caused by the building's existing defects that may be hidden or not, such as cracks, poorly caulked electrical outlets and ventilation ducts, inadequately sealed windows and doors, soffits, baseboards, door thresholds, etc. (Lstiburek, 2005).

The quantification of existing defects is based on the surveys published in Mullens et al. (2006) and the American Society of Heating, Refrigerating and Air-Conditioning (ASHRAE) Handbook for estimating of the infiltration area. To capture the quality of the construction, the model applies defect densities depending on the building's strength, which is related to the year built. Thus, strong buildings will have fewer defects than medium and weak buildings.

As an example Table 27 shows the values adopted for the defects related to windows, doors, and sliders for the case of mid-/high-rise buildings. These values are adopted from the ASHRAE (2001) Handbook.

Table 27. Defects values for mid-/high-rise building openings.

Windows masonry caulked	**Defect area**
cm^2/m^2	1.3
ft^2/ ft^2	0.00013
ft^2/each	**0.0026**
Frame plus door weatherized	
cm^2/each	24
ft^2/each	**0.0258**
Slider	
cm2/each	22
ft^2/each	**0.0237**

More recent studies have shown that water ingress via wind driven rain cannot be attributed exclusively to envelope breach, installation, or product defects. Properly manufactured, installed, and caulked fenestration may nonetheless offer leakage paths in extreme wind conditions, the severity of which is highly dependent on the specific product (Salzano et al., 2010). As this line of research matures, its findings are easily incorporated within the above framework.

In order to estimate water intrusion into the buildings, a study was performed to estimate the likely accumulated horizontally impinging rain on a structure during a hurricane event. This study used a simulation model that is composed of a simplified wind model and the R-CLIPER rain rate model developed at NOAA HRD (Lonfatet al., 2007) and is used operationally at NHC. The simplified wind model is based on Holland (1980) and includes parameters for the pressure profile ("B"), Rmax, translation speed and central pressure. Additionally, the Vickery (2005) pressure filling model was used to decay the storms. Storm parameters are sampled from distributions relevant to Florida. The R-CLIPER model determines the vertically free-falling rain rates at each time step of the simulation. The R-CLIPER rain rate is essentially an azimuthally averaged rain rate that varies as a function of radius and maximum intensity of the storm. A detailed presentation of this subject is presented in the General Standard following Figure 15.

The product of the areas of the breaches and defects by the impinging rain conveys the amount of water that enters the building. The water penetration is computed as follows.

Water penetration through defects:

$$h_{def_i} = k \cdot RAF\left[IR_1 \underbrace{\left(d_{def} A_{comp}\right)}_{\text{Total Defects Area}} + IR_2 \underbrace{\left(d_{def} A_{comp} S\right)}_{\text{Post-breach Defects Area}} \right] A_b^{-1}$$

Water penetration through breaches:

$$h_{B_i} = k \cdot RAF\left[IR_2 \cdot A_B\right]A_b^{-1}$$

Where:

- h_{def}: height of water that accumulates due to defects, in inches
- h_B: height of water that accumulates due to envelope breaches, in inches
- k: adjustment factor
- RAF: rain admittance factor
- d_{def}: defects percentage
- A_{comp}: area of component
- A_B: breach area
- A_b: living area
- IR_1 : accumulated impinging rain prior to maximum wind
- IR_2 : accumulated impinging rain after the occurrence of maximum wind
- S : survival factor = $1 - A_B / A_{comp}$

The adjustment factor k includes the following depending upon the portion of the structure under consideration:

<u>*Adjustment for distribution of breaches and defects in walls as a function of the wind direction*</u>. There are eight possible wind directions (four normal to a building face, four in the direction of a building corner). For each direction, it is assumed that the envelope damage is distributed along the perimeter walls of the building proportionally to the ASCE 7 (2010) wind pressure coefficients. In this manner, for a wind direction normal to a face of the building, the proportion of breaches on the windward face is calculated as the ratio of the windward wall coefficient to the sum of the coefficients on all the walls, producing $k=0.8/(0.8 +0.7x2+0.3)=0.32$, so that 32% of the envelope breaches will be subjected to impinging rain. Similarly, for a wind oriented with a corner of the building, the proportion of breaches

on the two windward faces will be *k=(0.8+0.7)/(0.8 +0.7x2+0.3)=0.60*, so that 60% of the envelope breaches will be subjected to impinging rain.

Adjustment for distribution of breaches and defects in roof as a function of the wind direction. Unlike the previous wall adjustment factor, this roof factor is based on geometry rather than on an ASCE 7 coefficient distribution. If the wind is normal to the ridge, *k=0.5* (half of the roof is on the leeward side). If the wind is parallel to the ridge, *k=1.0* (all the roof is windward). If the wind is at an angle with the ridge, *k* is assumed to be the average value between the two previous cases, *k=0.75*. These factors are used for both gable and hip roof.

Adjustment for projection of roof breach with respect to wind direction. The above two adjustment factors account for the proportion of the breaches that are exposed to the oncoming wind. This adjustment factor accounts for the orientation of the exposed roof openings relative to the wind. If the wind is normal to the ridge, *k=1.0* (the vertically projected surface area of the breach exposed to wind is maximum). If the wind is parallel to the ridge, *k=0.25* (the vertically projected surface area of the breach exposed to wind is minimum, but not zero). If the wind is at an angle with the ridge, k is assumed to be the average value between the two previous cases, *k=0.63*

The rain admittance factor (*RAF*) is the fraction of the approaching rain that strikes the building. It accounts for the effect of a large portion of the rain moving around the structure with the wind rather than striking the building surface and is dependent on the building shape. Straube and Burnett (2000) and Blocken and Carmeliet (2010) suggest values for RAF between 0.2 and 0.5 for low-rise buildings and between less than 0.5 and 1.0 for mid-/high-rise buildings. Accordingly, the FPHLM adopts a value of 0.38 for low-rise buildings and a value of 0.6 for mid-/high-rise buildings, except for the last story where a value of 1.0 is adopted.

For mid-/high-rise structures, the model uses the mean values of the impinging rain and of the opening breaches, both as a function of wind speed. Figure 46 shows the mean IR_1 and IR_2 as a function of peak 3-second gusts at 10 m. As shown in the figure, simple regressions were performed to facilitate calculations in the mid-/high-rise commercial residential Loss Module. Note that for very high wind speeds there is large sampling error as these are rare events; thus the relation between mean rain and wind speed is less reliable.

For low-rise commercial residential structures, the rain distributions from the simulation model are incorporated in the Monte Carlo simulations for exterior damage to compute the vulnerability function, and the equation for water penetration is applied for each simulation (row) of the exterior damage array.

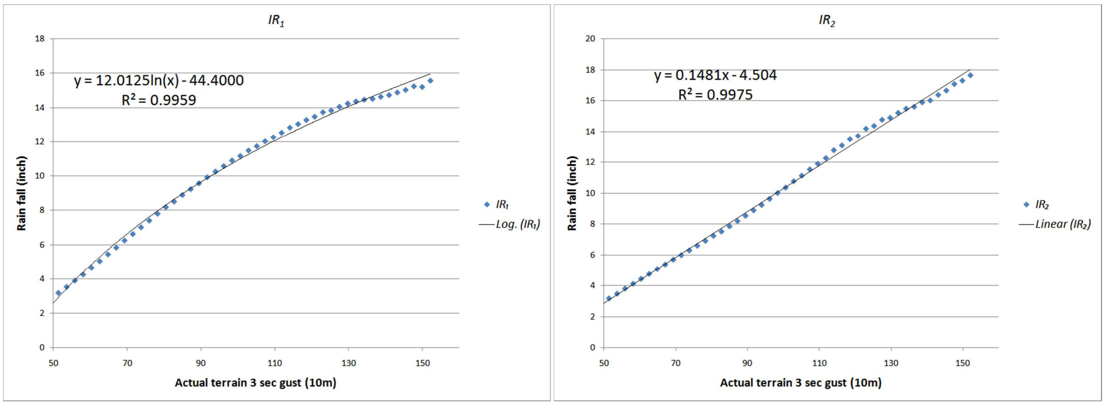


Figure 46. Mean accumulated impinging rain as a function of peak 3-second wind gust.

This approach estimates the amount of water that enters through each component of the envelope. The total amount of water is calculated by adding the contribution of all components for a given wind speed and by estimating the water which percolates from story to story. The final step maps water inside the building to interior damage with a bilinear relationship, where total interior damage is achieved for a certain threshold of height of accumulated water (currently set at 1 inch).

5. ***Describe the categories of the different vulnerability functions. Specifically, include descriptions of the structure types and characteristics, building height, year of construction, and coverages in which a unique vulnerability function is used.***

Vulnerability matrices were derived for manufactured and site-built homes, for low-rise commercial residential buildings (one to three stories), and for apartment units of mid-/high-rise commercial residential buildings (four stories and higher).

A total of 1032 vulnerability matrices were developed for site-built homes. The matrices correspond to different combinations of wall type (frame or masonry), region (north, central, south), subregion (high velocity hurricane zone, wind-borne debris region, inland), roof type (gable or hip), roof cover (tile or shingle), window protection (shuttered or not shuttered), number of stories (one or two), and strength (weak, modified weak, retrofitted weak; medium, modified medium, retrofitted medium; strong—see Table 1 in the General Standards for strength definitions).

These 1032 matrices were then combined to produce weighted matrices for site-built homes. The details of the weighting procedure are given in section 5.2 of Volume III of the Engineering Team final report.

There are equal numbers of contents and additional living expenses matrices.

A total of 432 vulnerability matrices were developed for low-rise, commercial residential buildings. They correspond to different combinations of wall type (frame or masonry), subregion (high velocity hurricane zone, wind-borne debris region, inland), roof shape (gable or hip), roof cover (tile or shingle), window protection (shuttered or not shuttered), number of stories (one, two, or three), and strength (weak, medium, or strong).

These 432 matrices were then combined to produce weighted curves for low-rise, commercial residential buildings.

An interior vulnerability curve corresponds to each structure vulnerability curve. The contents and time-related expenses vulnerabilities are proportional to the interior vulnerabilities.

Finally, one appurtenant structure vulnerability matrix was derived for all site-built homes, all low-rise, commercial residential buildings, and all manufactured homes.

Eight facade vulnerability curves were developed for apartment units of mid-/high-rise commercial residential buildings. They correspond to different combinations of building layout (open or closed), floor location (corner or middle unit), and opening protection (impact resistant or not).

6. Describe the process by which local construction and building code criteria are considered in the model.

In addition to a classification of building by structural types (wood or masonry walls, hip or gable roof), the buildings are classified by relative strength. Residential construction methods have evolved in Florida as experience with severe winds drives the need to reduce vulnerability.

To address this, the vulnerability team has developed strong, medium, and weak models for each site-built home and low-rise, commercial residential building structural type to represent relative quality of original construction as well as post-construction mitigation. In each region of Florida, local construction and building code criteria are reflected in the mix of weak, medium, and strong buildings.

In the case of site-built single-family homes, the models are further refined with a modified weak to reflect pre-1960s decking practices, a retrofitted weak to model weak (older) buildings that have been reroofed and decking re-nailed, a modified medium to reflect loss of quality in the construction process in the high velocity hurricane zone before Andrew, and a retrofitted medium to model medium buildings that have been reroofed and decking re-nailed. The details of these models are provided in Table 1 of standard G-1, in the section describing the building models. These additions to the model inventory were prompted by detailed interviews with several experts on the evolution of construction practice (common practice, codes and enforcement) in Florida. Details of this interview process and its outcomes are addressed in the next section, and in the section of Standard G-1 on “Models’ Distribution in Time.”

On the basis of the exposure study, it was also decided to model four manufactured home (MH) types. These types include pre-1994—fully tied down, pre-1994—not tied down, post-1994—HUD Zone II, and post-1994—HUD Zone III, where 1994 delineates older, much weaker styles of manufactured home construction than the post-1994 homes that meet minimum federal construction standards established by HUD.

Models’ Distribution in Time

Over time, engineers and builders learned more about the interaction between wind and structures. More stringent building codes were enacted, which, when properly enforced, resulted in stronger structures. The weak, medium, and strong models, developed by the vulnerability team, represent this evolution of relative quality of construction in Florida. Each set of models is representative of the prevalent wind vulnerability of buildings for a certain historical period. It is therefore important to define the cut-off dates between the different periods since the overall aggregate losses in any region are determined as a mixture of homes of various strengths (ages). The cut-off dates do not depend only on the evolution of the building code but also on the prevailing local builder/community code enforcement standards in each era.

This issue of code enforcement has also evolved over time, and it is relatively recently that the State of Florida took an active role in uniform enforcement. Thus, a given county may have built to standards that were worse than or better than the code in place at the time. After consulting with building code development experts, the team concluded that the load provisions have had some wind provisions since at least the 1970s, and the issue is not only the code but also the enforcement of the code. The classifications shown in Table 28 were adopted for characterizing the regions by age and model. The specific building eras and classifications per region are based on the evolution of the building codes in Florida and the opinions of the experts consulted. The descriptions of weak, modified weak, medium, modified medium, and strong can be found in Table 1. In Table 28, Strong_OP refers to the strong model with opening protection. The use of opening protection is required by current code in the regions in which Strong_OP is assigned and not required elsewhere. Thus the application of the strong model is regionally dependent.

Table 28. Age classification of the models per region.

	Pre-1960	1960-1970	1971-1980	1981-1993	1994-2001	2002-pres.
HVHZ	⅔ modified Weak, ⅓ Medium	⅔ Weak, ⅓ Medium	½ Weak, ½ modified Medium	⅔ Weak, ⅓ modified Medium	Strong_OP	Strong_OP
Keys	½ modified Weak, ½ Medium	Medium	Medium	Medium	⅓ Medium ⅔ Strong_OP	Strong_OP
WBDR	modified Weak	⅔ Weak, ⅓ Medium	⅓ Weak, ⅔ Medium	⅓ Weak, ⅔ Medium	½ Medium, ½ Strong_OP	Strong_OP
Inland	modified Weak	⅔ Weak, ⅓ Medium	½ Weak, ½ Medium	½ Weak, ½ Medium	½ Medium, ½ Strong	Strong

Strong_OP: Strong model run with opening protection, as per FBC requirement in these regions

Note: HVHZ is high velocity hurricane zone; WBDR is wind-borne debris region.

Table 28 can be modified to include the retrofitted weak and medium matrices. Based on input from roof professionals, the average life span of a shingle roof is assumed to be 20 years. In the case of a real past scenario analysis, for the purpose of model validation, the weak and medium matrices must be replaced by their retrofitted version if

- hurricane year of occurrence, YH, is such that YH >1993, and year built (YB) plus any multiple of 20 is such that, 1993<YB + 20m <YH. in HVHZ and Keys;
- hurricane year of occurrence, YH >2001, and 2001<YB + 20m <YH, in rest of the state.

In the case of a stochastic analysis, or for the purpose of "what if" hypothetical future scenarios, the weak and medium must be replaced by their retrofitted version if

- year built (YB) plus any multiple of 20 is such that, 1993<YB + 20m <TD (today’s date) in HVHZ and Keys;
- year built (YB) plus any multiple of 20 is such that, 2001<YB + 20m <TD (today’s date) in rest of the state.

7. Identify the one-minute average sustained wind speed at which the model begins to estimate damage.

The wind speeds used in the damage model are three-second gusts. The lowest three-second gust is 50 mph. The minimum one-minute sustained wind is approximately 40 mph.

8. Describe how the duration of wind speeds at a particular location over the life of a hurricane is considered.

Duration of the storm is not explicitly modeled. The damage accumulation procedures assume sufficient duration of peak loads to account for duration dependent failures.

9. Provide a completed Form V-1, One Hypothetical Event.

See attached form.

The model computes the damage based on actual terrain three-second gust winds that are obtained from the given open terrain one-minute sustained winds, and the losses are aggregated twice: once among the ZIP Codes with the same actual terrain three-second gust wind and once among the ZIP Codes with the same open terrain one-minute sustained wind. Because all the ZIP Codes do not have the same roughness, identical open terrain one-minute sustained winds result in different actual terrain three-second gust winds. Occasional bumps in the one-minute sustained winds plot are due to this process of conversion and re-aggregation. The modelers do confirm that the structures used in completing the form are identical to those in the table provided in the Standard.

V-2 Mitigation Measures

A. Modeling of mitigation measures to improve a structure's wind resistance and the corresponding effects on vulnerability shall be theoretically sound. These measures shall include fixtures or construction techniques that enhance:

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

Modeling of mitigation measures to improve a structure's wind resistance is theoretically sound and includes the fixtures mentioned above. The following structures were modeled:

Base case as defined by Commission
Mitigated case as defined by Commission
Base plus one mitigation at a time

The mitigations included gable bracing, rated shingles, metal roof, stronger sheathing capacity, stronger roof-to-wall connections, stronger wall-to-sill connections, masonry reinforced walls, multiple opening protection options, and wind/missile resistant glass.

B. Application of mitigation measures shall be empirically justified both individually and in combination.

The base cases are very weak cases, where the interior damage is governed by the sheathing loss at low to moderate wind speeds. The application of mitigation measures is justified and the results show the following.

Bracing the gable end, using rated shingles, using a membrane, or using a metal roof alone does not provide any benefit when all other components remain weak, as required by Form V-2. For example, regardless of the type of roof cover used, if the home loses its weak sheathing panels, there will be little benefit in mitigating the roof cover or gable end alone. Combining mitigation measures, however, does indeed reduce the vulnerability of the home, as demonstrated in the bottom section of Form V-2. The observed negative values in Form V-2 corresponding to the braced gable end mitigation are from round off of smaller values within the uncertainty scatter of the model and indicate zero change.

The hip roof has a greater impact in reducing the losses, especially in the case of frame structures. Because the base frame structure is inherently weaker, there is comparatively a higher gain with the hip timber structure than with the hip masonry structure. For example, a weak home with a hip roof is not vulnerable to gable end collapse.

Improving the roof sheathing capacity (8d nails) alone reduces the damage at wind speeds up to 100 mph and 120 mph sustained winds for wood and masonry structures, respectively, but at higher wind speeds the mitigation becomes counter-effective (Figure 49, Figure 50, Figure 51, Figure 52). The behavior of the damage curve with mitigated sheathing after 100 (wood) and 120 (masonry) mph sustained winds is due to the still very weak roof-to-wall connections. Loss of sheathing reduces the uplift on the roof-to-wall connections. Thus, the stronger deck results in higher loads on the connections, which the connections are not prepared to absorb. This effect was recently experimentally identified through destructive testing of real structures with toe-nail connections and strong decking attachment (Shanmugam et al., 2009).

Clips and straps are very effective for frame structures, less so for masonry structures. The model emphasizes interior damage due to loss of sheathing, roof cover, or gable end, which are all independent of the roof-to-wall connection strength. If the strength of the plywood deck and roof cover is not increased, increasing the roof-to-wall connections alone will do little good at low to moderate wind speeds. At higher wind speeds, the integrity of the box system in the frame structure is improved by the stronger roof-to-wall connection, hence the more pronounced benefit for the frame structure than for masonry.

Clips and straps for wall-to-sill plate connections are very effective at high wind speeds for frame structures because they improve the integrity of the box system. Similarly, the reinforcing of the walls for masonry structures is more effective at high wind speeds when unreinforced walls become vulnerable.

Opening protections are effective, and more so at higher wind speeds. This follows logically, as the internal pressurization caused by an opening breach is critical to the failure of other components only at higher wind speeds.

A mitigated structure with a combination of individual mitigations (as per standards definition) shows improved performance over the base structure and each of the individual mitigations.

The nonzero damage between 40 and 60 mph sustained winds, the convergence of the base, and all mitigation cases in this wind speed range reflect the incorporation of nonexterior damage-related losses in the model. Water penetration through windows and doors is possible even without window or door breach (Salzano et al., 2010). This portion of the model is not dependent upon mitigations, thus the convergence of curves in Figure 49, Figure 50, Figure 51, and Figure 52 in that wind speed range.

Disclosures

1. Provide a completed Form V-2, Mitigation Measures – Range of Changes in Damage.

See Form V-2. Notice that there are no entries for the Wall-Foundation Strength rows for timber structures because the model does not have the capability to model wall-to-foundation anchors or straps for timber structures. The model does account for wall-to-sill plate connections, but not the sill plate-to-foundation connections. There are no field data to indicate that this is a significant failure mode . The connection to the foundation can be weak and is reflected in the wall-to-sill capacity (toe-nails, clips, straps).

2. ***Provide a description of the mitigation measures used by the model that are not listed in Form V-2.***

The model incorporates either a weak or a strong (wind-rated) garage door as a part of the delineation of model strengths.

3. ***Describe how mitigation is implemented in the model. Identify any assumptions.***

The various mitigation options delineated in Forms V-2 and V-3 are implemented in the model by varying the capacity statistics (mean and coefficient of variation) to reflect the strength of a given component. For example, weak (base model) roof covering is represented by a random value for each shingle, with the specific capacity values for a given Monte Carlo simulation randomly assigned on the basis of a specified probability density function, mean, and coefficient of variation assigned to weak shingles. If the strong roof cover mitigation option is chosen, a different mean and coefficient of variation, reflecting higher capacity and less variability, are used to randomly assign capacities to the shingles. This same approach is used for every component for which a mitigation option is modeled. One or any combination of mitigation measures may be selected prior to running the Monte Carlo simulation. The stronger resistances of the mitigated components are directly reflected in the randomly assigned capacities of those components, and the unmitigated components are assigned capacities using distributions with parameters reflecting weaker resistance.

In the case of membrane, the mitigation is modeled through a reduction of the interior damage due to loss of roof cover and subsequent water penetration. In the case of a metal roof, the mitigation is modeled by assuming that there is no loss of roof cover as long as there is no loss of roof sheathing. Thereafter, the loss of roof cover is assumed to be the same as the loss of roof sheathing, which represents the weak link in the load path.

4. ***Describe the process used to ensure that multiple mitigation factors are correctly combined in the model.***

Each mitigation option (e.g., sheathing, roof cover, membrane, roof-to-wall connections) is modeled and accounted for independently, allowing any combination to be chosen. As reflected in the results in Figure 49, Figure 50, Figure 51, and Figure 52, it is assumed that the effect of mitigating one component can change the vulnerability but not the capacity of other components via the influence that mitigation has on loading or load sharing. It is also assumed that any given mitigation does not necessarily produce improved overall performance for all wind speeds. An example already discussed is the influence of the roof sheathing strength on the vulnerability of roof-to-wall connections, caused by the influence of intact strong roof sheathing on the uplift acting on weak roof-to-wall connections. Another example is the influence of opening vulnerability on the performance of many other components, including walls, sheathing, and roof-to-wall connections, as the change in internal pressure resulting from opening failure changes the overall loading on these other components.

In summary, mitigation options may be selected individually or in combination, but the effects of a given mitigation on other components and on overall building vulnerability, should not be and are not isolated in the model.

Form V-1: One Hypothetical Event

A. *Windspeeds for 335 ZIP Codes and sample personal and commercial residential exposure data are provided in the file named "FormV1Input09.xls." 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 damage ratios summarized by windspeed (mph) and construction type.*

The wind speeds provided are one-minute sustained 10-meter wind speeds. The sample personal and commercial residential exposure data provided consist of four structures (one of each construction type: wood frame, masonry, mobile home, and concrete) individually placed at the population centroid of each of the ZIP Codes provided. Each ZIP Code is subjected to a specific wind speed. For completing Part A, Estimated Damage for each individual wind speed range is the sum of Ground Up Loss to all structures in the ZIP Codes subjected to that individual wind speed range, excluding demand surge and storm surge. Subject Exposure is all exposures in the ZIP Codes subjected to that individual wind speed range. For completing Part B, Estimated Damage is the sum of the Ground Up Loss to all structures of a specific type (wood frame, masonry, mobile home, or concrete) in all of the wind speed ranges, excluding demand surge and storm surge. Subject Exposure is all exposures of that specific type in all of the ZIP Codes.

One reference structure for each of the construction types shall be placed at the population center of the ZIP Codes. Do not include contents, appurtenant structures, or time element coverages.

Reference Frame Structure: *One story* *Unbraced gable end roof* *Normal shingles (55mph)* *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 1980*	***Reference Masonry Structure:*** *One story* *Unbraced gable end roof* *Normal shingles (55mph)* *½" plywood deck* *6d nails, deck to roof members* *Toe nail truss to wall anchor* *Masonry exterior walls* *No vertical wall reinforcing* *No shutters* *Standard glass windows* *No door covers* *No skylight covers* *Constructed in 1980*
Reference Mobile Home Structure: *Tie downs* *Single unit* *Manufactured in 1980*	***Reference Concrete Structure:*** *Reinforced concrete moment resisting frame* *Twenty story* *Constructed in 1980*

B. Confirm that the structures used in completing the form are identical to those in the above table. If additional assumptions are necessary to complete this form (for example, regarding structural characteristics, duration or surface roughness), provide the reasons why the assumptions were necessary as well as a detailed description of how they were included.

The modelers do confirm that the structures used in completing the form are identical to those in the table provided in the standard.

C. Provide a plot of the Form V-1, Part A data.

See Figure 47 and Figure 48 in Part C of Form V-1.

Form V-1: One Hypothetical Event

Part A

Wind Speed (mph) 1 min sustained Wind	Estimated Damage/ Subject Exposure
41-50	0.01%
51-60	0.56%
61-70	2.26%
71-80	3.42%
81-90	5.90%
91-100	11.39%
101-110	15.36%
111-120	23.81%
121-130	34.87%
131-140	36.25%
141-150	45.05%
151-160	48.92%
161-170	53.57%

Part B

Construction Type	Estimated Damage/ Subject Exposure
Wood Frame	4.01%
Masonry	3.35%
Mobile Home	10.51%
Concrete	2.89%

The structures used in completing the form are identical to those in the table provided.

Part C

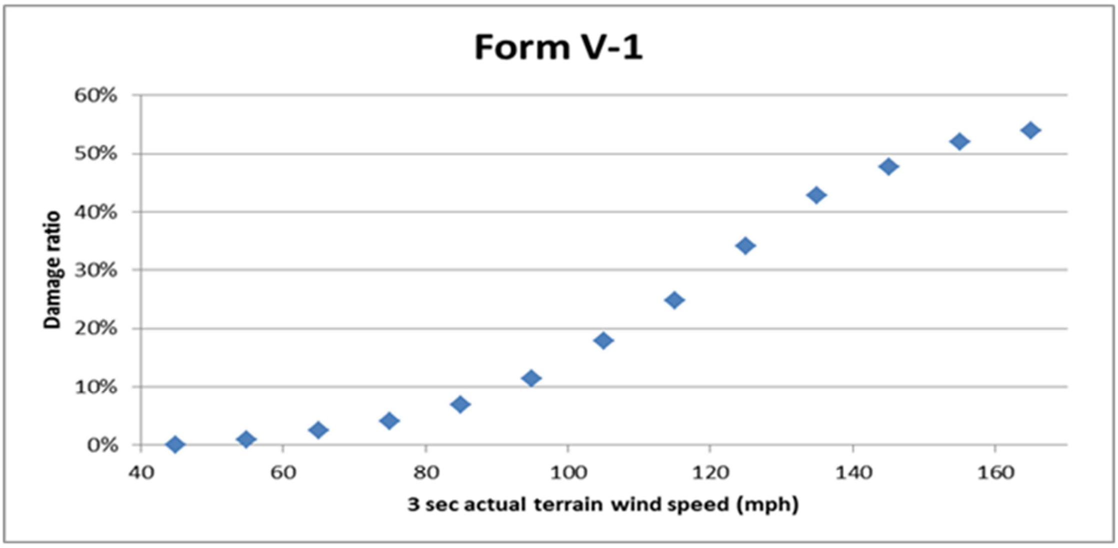


Figure 47. Structure damage vs. 3 sec actual terrain wind speed.

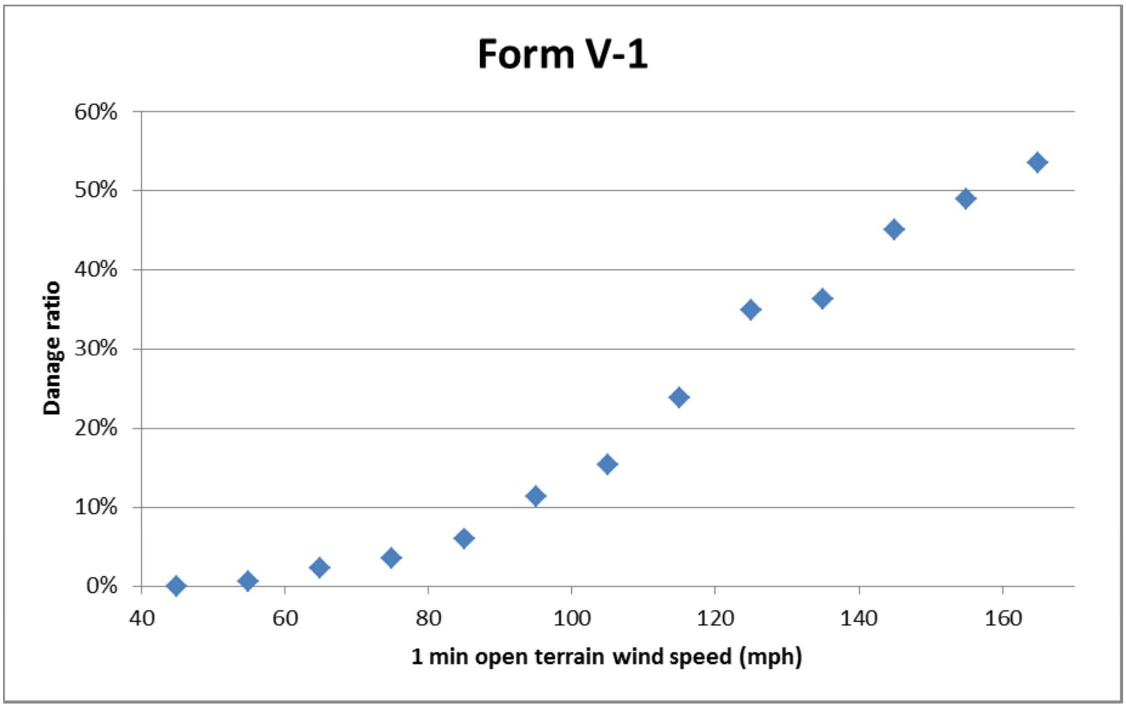


Figure 48. Structure damage vs. 1 minute sustained wind speed.

Form V-2: Mitigation Measures – Range of Changes in Damage

A. Provide the change in the zero deductible personal residential reference structure damage rate (not loss cost) for each individual mitigation measure listed in Form V-2 as well as for the combination of the four mitigation measures provided for the Mitigated Frame Structure and the Mitigated Masonry Structure below.

See Form V-2 below.

B. If additional assumptions are necessary to complete this Form (for example, regarding duration or surface roughness), provide the rationale for the assumptions as well as a detailed description of how they are included.

C. Provide this Form on CD in Excel format without truncation. The file name shall include the abbreviated name of the modeling organization, the standards year, and the form name. A hard copy of Form V-2 shall be included in the submission.

Reference Frame Structure: *One story* *Unbraced gable end roof* *Normal shingles (55mph)* *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 1980*	***Reference Masonry Structure:*** *One story* *Unbraced gable end roof* *Normal shingles (55mph)* *½" plywood deck* *6d nails, deck to roof members* *Toe nail truss to wall anchor* *Masonry exterior walls* *No vertical wall reinforcing* *No shutters* *Standard glass windows* *No door covers* *No skylight covers* *Constructed in 1980*
Mitigated Frame Structure: *Rated shingles (110mph)* *8d nails, deck to roof members* *Truss straps at roof* *Plywood Shutters*	***Mitigated Masonry Structure:*** *Rated shingles (110mph)* *8d nails, deck to roof members* *Truss straps at roof* *Plywood Shutters*

Reference and mitigated structures are $100,000 fully insured structures with a zero deductible policy as indicated under "Owners" Policy Type for Form A-6.

Place the reference structure at the population centroid for ZIP Code 33921 located in Lee County.

Wind speeds used in the Form are one-minute sustained 10-meter wind speeds.

Form V-2: Mitigation Measures – Range of Changes in Damage

INDIVIDUAL MITIGATION MEASURES			PERCENTAGE CHANGES IN DAMAGE (REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE)/(REFERENCE DAMAGE RATE)*100									
			FRAME STRUCTURE WIND SPEED (MPH)					MASONRY STRUCTURE WIND SPEED (MPH)				
			60	85	110	135	160	60	85	110	135	160
	REFERENCE STRUCTURE		-	-	-	-	-	-	-	-	-	-
ROOF STRENGTH	BRACED GABLE ENDS		0%	0%	0%	1%	1%	0%	-1%	0%	0%	1%
	HIP ROOF		1%	11%	14%	16%	8%	2%	8%	3%	12%	15%
ROOF COVERING	METAL ROOF		0%	1%	0%	0%	0%	1%	0%	0%	0%	0%
	RATED SHINGLES (110 MPH)		0%	1%	0%	0%	0%	0%	1%	0%	0%	0%
	MEMBRANE		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	NAILING OF DECK 8d		2%	29%	-1%	-5%	-1%	3%	37%	9%	-8%	-2%
ROOF-WALL STRENGTH	CLIPS		0%	4%	14%	19%	11%	1%	1%	2%	11%	18%
	STRAPS		0%	5%	16%	28%	27%	0%	1%	2%	13%	22%
WALL-FLOOR STRENGTH	TIES OR CLIPS		0%	1%	7%	5%	2%					
	STRAPS		0%	1%	9%	9%	4%					
WALL FOUNDATION STRENGTH	LARGER ANCHORS OR CLOSER SPACING											
	STRAPS											
	VERTICAL REINFORCING							0%	-1%	1%	10%	22%
OPENING PROTECTION	WINDOW SHUTTERS	PLYWOOD	0%	2%	4%	3%	2%	0%	2%	6%	4%	2%
		STEEL	0%	3%	7%	5%	3%	0%	3%	9%	6%	3%
		ENGINEERED	0%	3%	9%	7%	5%	0%	3%	12%	8%	5%
	DOOR AND SKYLIGHT COVERS		0%	1%	0%	1%	0%	1%	0%	0%	1%	0%
WINDOW, DOOR, SKYLIGHT STRENGTH	WINDOWS	LAMINATED	0%	2%	7%	7%	5%	0%	2%	9%	8%	5%
		IMPACT GLASS	0%	2%	8%	9%	8%	1%	3%	11%	11%	8%

MITIGATION MEASURES IN COMBINATION		PERCENTAGE CHANGES IN DAMAGE (REFERENCE DAMAGE RATE - MITIGATED DAMAGE RATE)/(REFERENCE DAMAGE RATE)*100									
		FRAME STRUCTURE WIND SPEED (MPH)					MASONRY STRUCTURE WIND SPEED (MPH)				
		60	85	110	135	160	60	85	110	135	160
STRUCTURE	MITIGATED STRUCTURE	3%	43%	35%	35%	30%	3%	48%	30%	22%	24%

Form V-3: Mitigation Measures – Mean Damage Ratio

A. *Provide the mean damage ratio (prior to any insurance considerations) to the reference structure for each individual mitigation measure listed in Form V-3 as well as the percent damage for the combination of the four mitigation measures provided for the Mitigated Frame Structure and the Mitigated Masonry Structure below.*

See Form V-3 below. Notice that for the 60 mph column all the vulnerabilities coincide at 6%. This is because at these low wind speeds, no significant damage is activated to trigger any significant difference between the different cases.

B. *If additional assumptions are necessary to complete this Form (for example, regarding duration or surface roughness), the modeler shall provide the rationale for the assumptions as well as a detailed description of how they are included.*

C. *Provide a graphical representation of the vulnerability curves for the reference structure and the fully mitigated structure.*

See Figure 49, Figure 50, Figure 51, and Figure 52. Because there are too many vulnerability curves to plot in one figure, for the sake of clarity, the mitigations were divided in four sets for both masonry and frame structures. In each figure, there are two horizontal axes: the upper axis represents the actual terrain three-second gust winds; the lower axis represents the actual terrain one-minute sustained winds. The conversion between three-second gust and one-minute sustained winds depends on the roughness of the terrain. Therefore, on each plot, the value of the roughness parameter for Lee County is indicated. Finally, please note that, as explained in the previous section, mitigating the roof shingles alone, or the metal roof alone, or the membrane alone without mitigating the roof deck (upgrading nail size and or spacing) or the roof-to-wall connections does not improve the overall vulnerability of the structure. Consequently, in Figure 49, Figure 50, Figure 51, and Figure 52, the curves for the base case and the rated shingle, metal roof, and membrane cases are superimposed on each other. This result is dependent on the base case weak sheathing connection and should not be interpreted to imply that reroofing is not an effective mitigation. Reroofing is only ineffective for the case of a very weak roof deck. The combination of re-nailing the decking and reroofing (now required practice) is an effective mitigation.

__Reference Frame Structure__:	*__Reference Masonry Structure__:*
One story *Unbraced gable end roof* *Normal shingles (55mph)* *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 1980*	*One story* *Unbraced gable end roof* *Normal shingles (55mph)* *½" plywood deck* *6d nails, deck to roof members* *Toe nail truss to wall anchor* *Masonry exterior walls* *No vertical wall reinforcing* *No shutters* *Standard glass windows* *No door covers* *No skylight covers* *Constructed in 1980*
__Mitigated Frame Structure__: *Rated shingles (110mph)* *8d nails, deck to roof members* *Truss straps at roof* *Plywood Shutters*	*__Mitigated Masonry Structure__:* *Rated shingles (110mph)* *8d nails, deck to roof members* *Truss straps at roof* *Plywood Shutters*

Reference and mitigated structures are $100,000 fully insured structures with a zero deductible policy as indicated under "Owners" Policy Type for Form A-6.

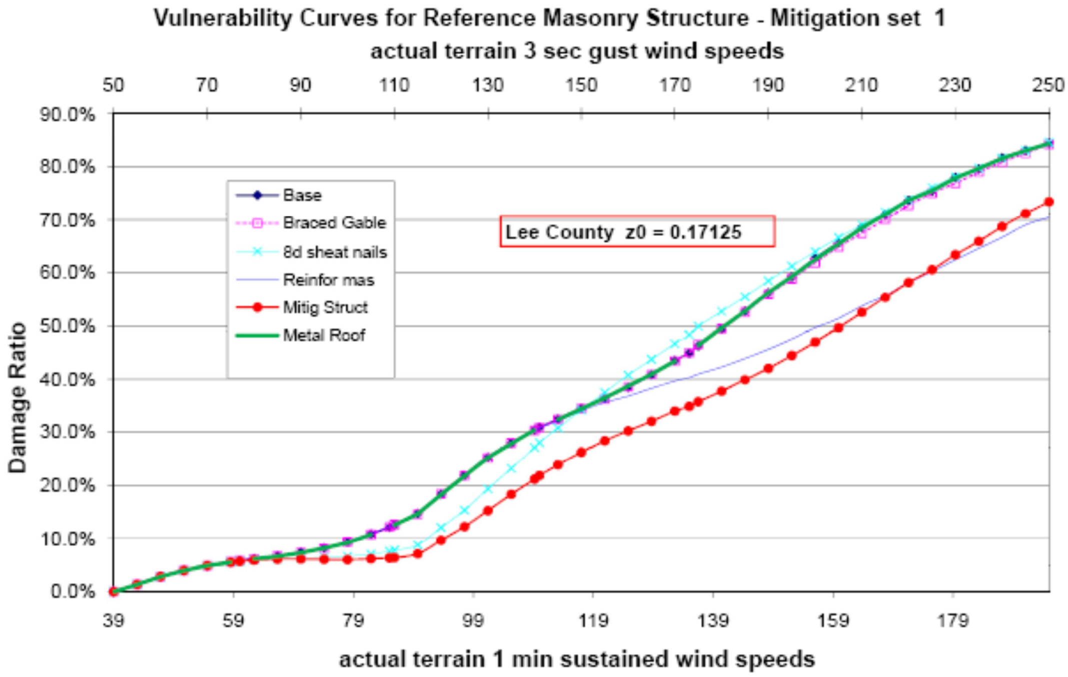
Place the reference structure at the population centroid for ZIP Code 33921 located in Lee County.

Wind speeds used in the Form are one-minute sustained 10-meter wind speeds.

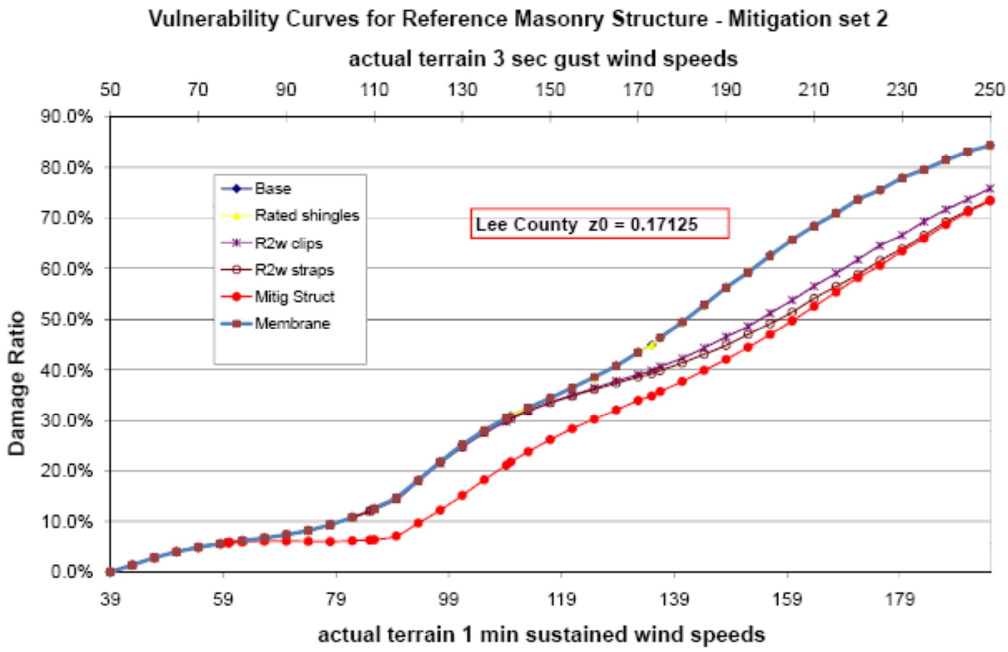
Form V-3: Mitigation Measures – Mean Damage Ratio

INDIVIDUAL MITIGATION MEASURES			MEAN DAMAGE RATIO									
			FRAME STRUCTURE					MASONRY STRUCTURE				
			WIND SPEED (MPH)					WIND SPEED (MPH)				
			60	**85**	**110**	**135**	**160**	**60**	**85**	**110**	**135**	**160**
	REFERENCE STRUCTURE		**6%**	**15%**	**42%**	**61%**	**74%**	**6%**	**12%**	**31%**	**45%**	**66%**
ROOF STRENGTH	**BRACED GABLE ENDS**		6%	15%	42%	60%	73%	6%	12%	31%	45%	65%
	HIP ROOF		6%	13%	36%	51%	67%	6%	11%	30%	40%	56%
ROOF COVERING	**METAL ROOF**		6%	15%	42%	61%	74%	6%	12%	31%	45%	65%
	RATED SHINGLES (110 MPH)		6%	10%	42%	64%	74%	6%	12%	31%	45%	66%
	MEMBRANE		6%	15%	42%	61%	74%	6%	12%	31%	45%	66%
	NAILING OF DECK 8d		6%	10%	42%	64%	74%	6%	8%	28%	48%	67%
ROOF-WALL STRENGTH	**CLIPS**		6%	14%	36%	49%	65%	6%	12%	30%	40%	54%
	STRAPS		6%	14%	35%	44%	54%	6%	12%	30%	39%	51%
WALL-FLOOR STRENGTH	**TIES OR CLIPS**		6%	14%	39%	58%	72%					
	STRAPS		6%	14%	38%	55%	71%					
WALL FOUNDATION STRENGTH	**LARGER ANCHORS OR CLOSER SPACING**											
	STRAPS											
	VERTICAL REINFORCING							6%	12%	31%	40%	51%
OPENING PROTECTION	WINDOW SHUTTERS	PLYWOOD	6%	14%	40%	59%	72%	6%	12%	29%	43%	64%
		STEEL	6%	14%	39%	58%	71%	6%	12%	28%	42%	63%
		ENGINEERED	6%	14%	38%	57%	70%	6%	12%	27%	41%	62%
	DOOR AND SKYLIGHT COVERS		6%	14%	42%	61%	73%	6%	12%	31%	45%	65%
WINDOW, DOOR, SKYLIGHT STRENGTH	WINDOWS	LAMINATED	6%	14%	39%	56%	70%	6%	12%	28%	41%	62%
		IMPACT GLASS	6%	14%	38%	55%	68%	6%	12%	28%	40%	60%

MITIGATION MEASURES IN COMBINATION			MEAN DAMAGE RATIO									
			FRAME STRUCTURE					MASONRY STRUCTURE				
			WIND SPEED (MPH)					WIND SPEED (MPH)				
			60	**85**	**110**	**135**	**160**	**60**	**85**	**110**	**135**	**160**
STRUCTURE	MITIGATED STRUCTURE		6%	8%	27%	39%	51%	6%	6%	22%	35%	50%

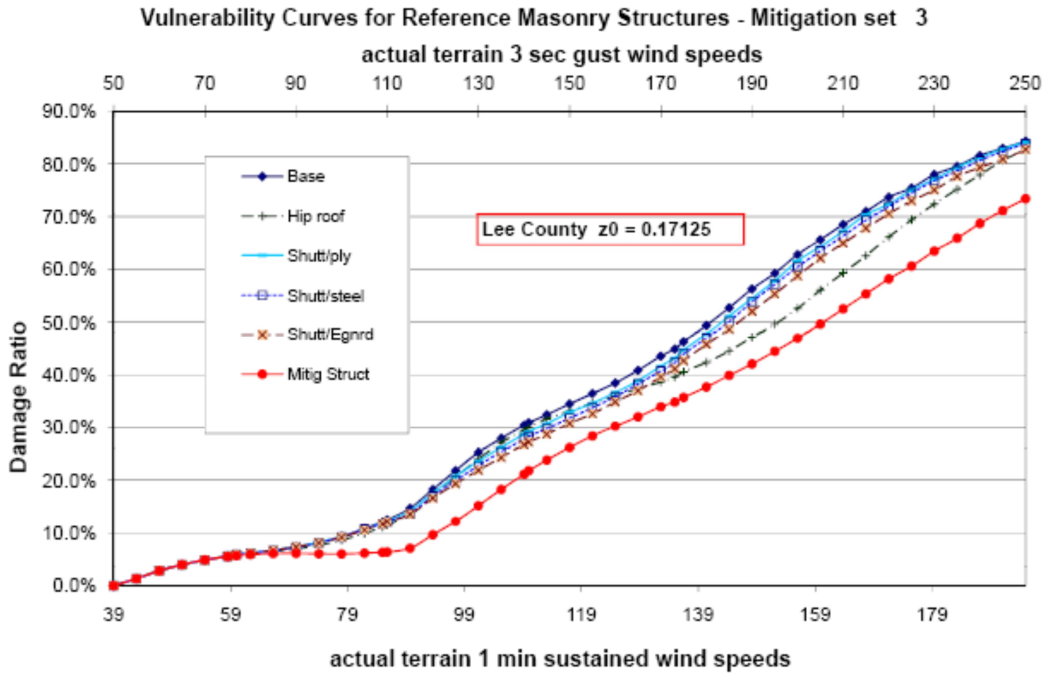


(a)

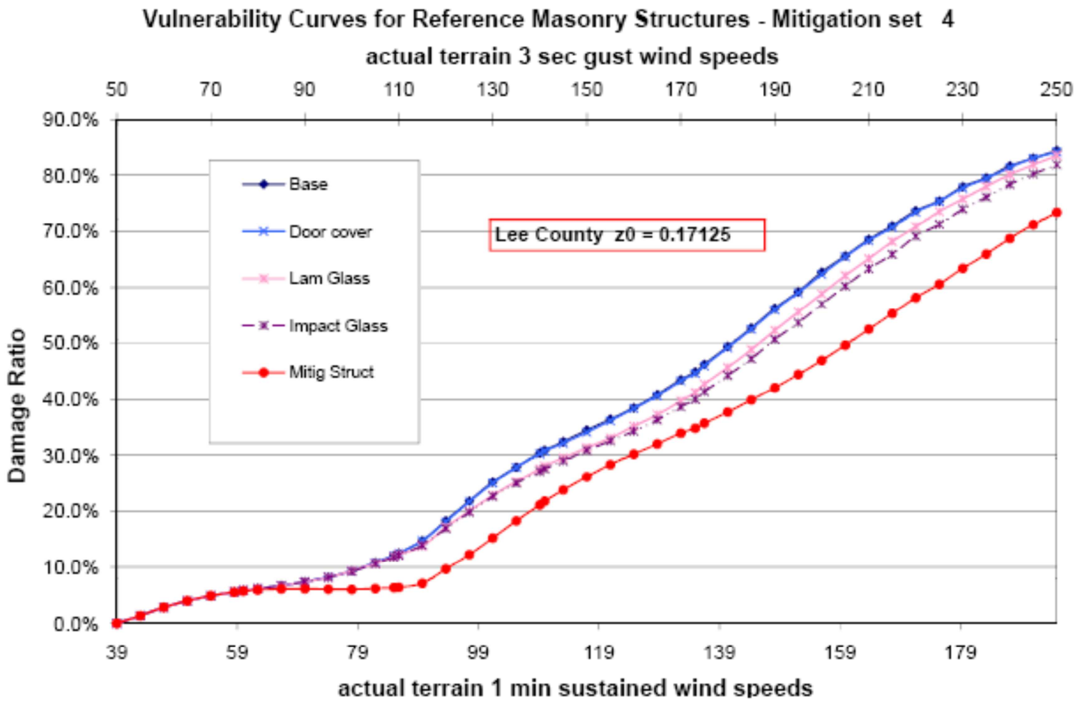


(b)

Figure 49. Mitigation measures for masonry homes.

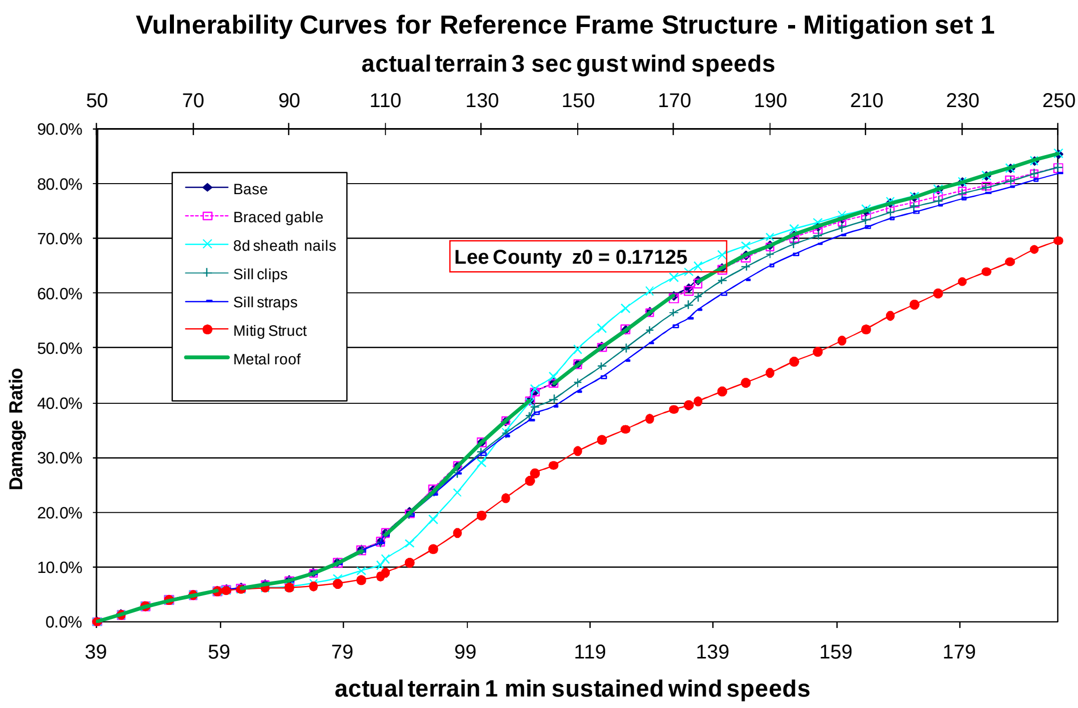


(c)

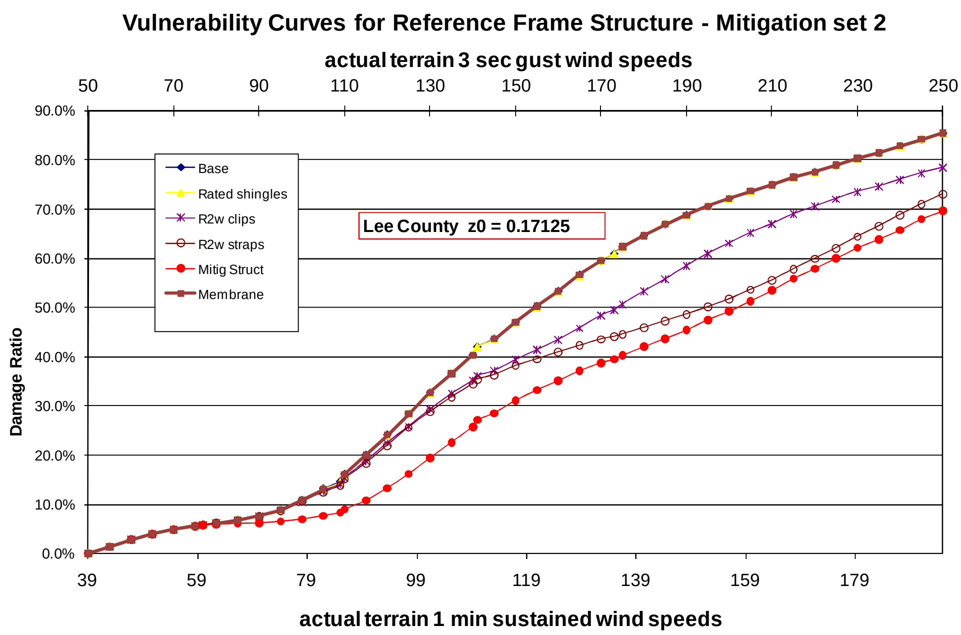


(d)

Figure 50. Mitigation measures for masonry homes.

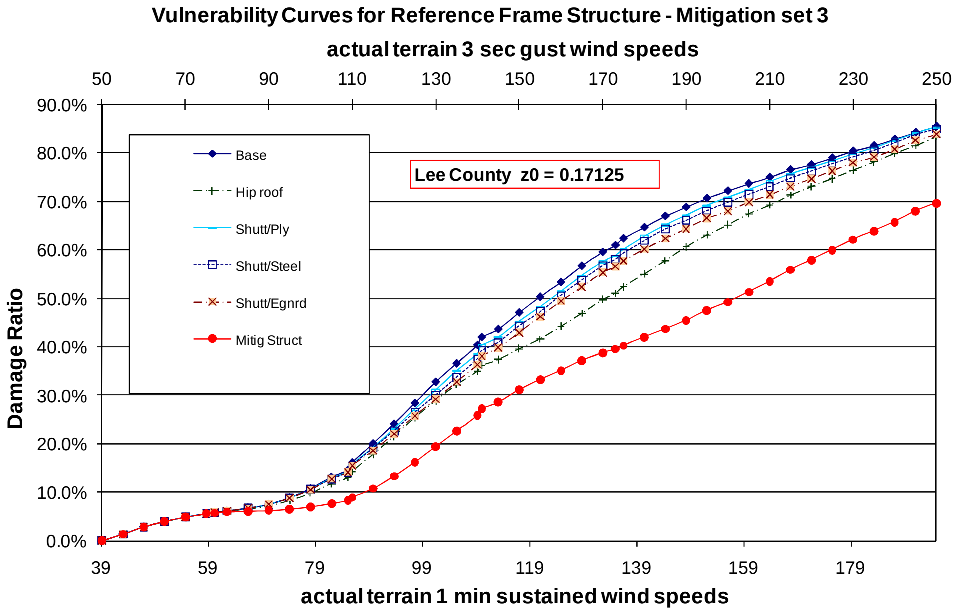


(a)

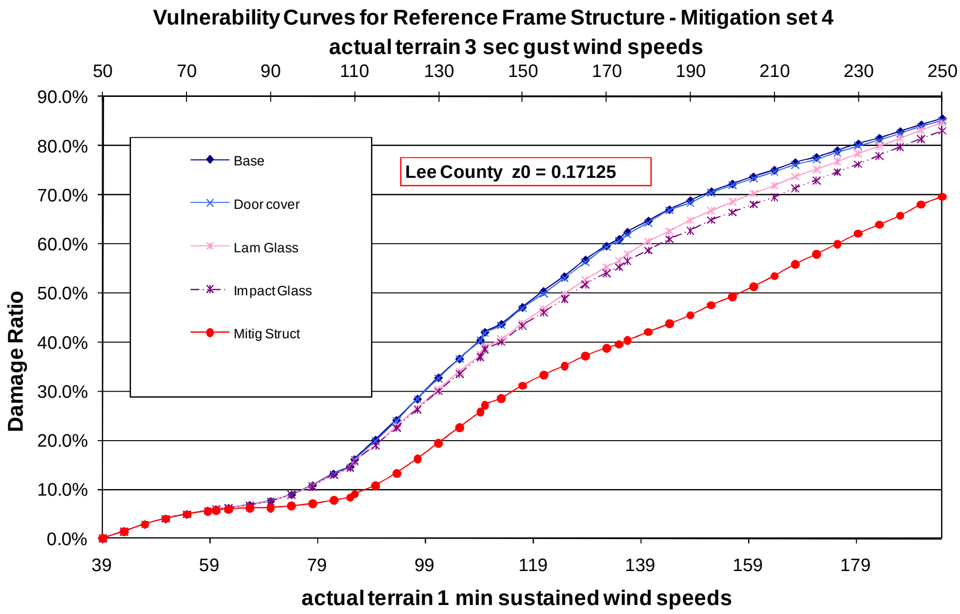


(b)

Figure 51. Mitigation measures for frame homes.



(c)



(d)

Figure 52. Mitigation measures for frame homes.

ACTUARIAL STANDARDS

A-1 Modeled Loss Costs and Probable Maximum Loss Levels

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

Modeled loss costs and probable maximum loss levels are computed for all hurricanes that affect Florida. Damages are computed for affected land areas in which wind speeds exceed a minimum level.

Disclosures

1. ***Describe how damage from model generated storms (land-falling and by-passing) is excluded or included in the calculation of loss costs and probable maximum loss levels for the state of Florida.***

Damages are computed for all Florida land-falling and certain by-passing storms in the stochastic set that attain hurricane level wind speeds. The following by-passing hurricanes are included:

-Non-land-falling hurricanes in regions A, B, C, D, E or F with open terrain winds greater than 30 mph in at least one Florida ZIP Code.

-Land-falling hurricanes in regions E or F with open terrain winds greater than 30 mph in at least one Florida ZIP Code.

2. ***Describe how damage resulting from concurrent or preceding flood or hurricane storm surge is treated in the calculation of loss costs and probable maximum loss levels for the state of Florida.***

Damage from concurrent or preceding flood or storm surge is not considered in the calculation of loss costs and probable maximum loss. The model assumes that wind is the only cause of loss from each hurricane.

A-2 Underwriting Assumptions

A. When used in the modeling process or for verification purposes, adjustments, edits, inclusions, or deletions to insurance company input data used by the modeling organization shall be based upon accepted actuarial, underwriting, and statistical procedures.

Personal Residential

Input data from insurance companies, used for development or validation, were requested and provided in a standardized format. Any adjustments, edits, inclusions or deletions were based upon accepted actuarial, underwriting, and statistical procedures.

Exposure and claim data used in the validation process were collected via a data call issued by the Florida Office of Insurance Regulation. In the case of the 2004 hurricanes, the data call requested policies in force on any of four specific dates in 2004 (i.e., the landfall dates for Hurricanes Frances, Charley, Ivan, and Jeanne), and any associated wind claims occurring on those dates.

All of the data files received were edited for the following:

-duplicate records
-valid entries in each field.

Deletions

A few duplicate records were found and deleted. In the review process, the actuaries located and examined several sets of records in which a duplicate had been purged from the original dataset. These were cases in which the policy number and all policy level characteristics were identical. In the process of reviewing these policies, the actuaries noted that there did appear to be some policies with legitimate multiple dwellings related to the same policy number, i.e., dwellings with different construction years, coverage A amount of insurance, etc. Therefore, it is possible that some or all of the “duplicates” dropped were not actually duplicates, but a second dwelling with the same policy number.

Policies (and any accompanying claims) with invalid Florida ZIP Codes were also deleted. The actuaries examined the invalid ZIP Codes found in the Company D dataset. They sampled among the deleted ZIP Codes, especially those with multiple policies reported, and checked against their own list of valid Florida ZIP Codes to ascertain that they were indeed invalid. Only .05% of Company D records and .8% of Company A records were dropped because of invalid ZIP Codes. The dropped record count for other companies was reportedly similar to that of Companies A and D.

Policies excluding wind were dropped. These were reported by two companies even though the data call requested only policies including wind coverage. Such policies were identified by “ex wind” or similar identifiers in the hurricane deductible field.

Adjustments

The construction categories and deductible categories reported by the individual companies were mapped to those of the model. The engineers determined how company construction categories should be mapped. The actuaries examined the mappings of a sample of policies to verify that they were executed as planned.

Percentage deductibles were converted to dollar amounts by multiplying by the structure amount of insurance. The actuaries examined a sample of these conversions.

Companies B and D did not provide limits for additional living expense (ALE) in their data files. Company B subsequently recommended 30% of structure amount of insurance as a reasonable estimate of the limit. For Company D, a limit of 10% of structure amount of insurance was selected. This selection was later verified as reasonable on the basis of exposure data submitted with a 2006 Company D rate filing. In that filing the average ALE limit reported by the company was 10.5%. The actuaries reviewed the correspondence with Company B and verified the ratio of ALE limit to structure limit from the 2006 Company D rate filing data.

The edits, deletions, and adjustments described above relate to the validation data. The same approach, though, is used with exposures provided by companies in conjunction with rate filings pending with the OIR.

<u>Commercial Residential</u>

The insurance company data used in the development and validation of the Commercial Residential portion of the model were reviewed for duplicate records and missing or invalid values. Some records were dropped.

Deletions

Exposure or claims coded “ex-wind”
Claims with cause of loss other than wind
Invalid ZIP Codes
Exposures missing number of stories or year built and any associated claim records
Exposures with number of stories greater than 45, and any associated claim records

Adjustments

Percentage deductibles were converted to dollar amounts as required by the model. No further adjustments were made to the data.

B. *For loss cost and probable maximum loss level estimates derived from or validated with historical insured hurricane losses, the assumptions in the derivations concerning (1) construction characteristics, (2) policy provisions, (3) claim payment practices, (4) coinsurance, (5) contractual provisions, and (6) relevant underwriting practices underlying those losses, as well as any actuarial modifications, shall be appropriate.*

<u>Personal Residential</u>

The damages calculated by the model, which subsequently flow into the loss costs and probable maximum loss level estimates, depend on the following characteristics of each exposure:

-Region/subregion and latitude-longitude
-Construction type (masonry, frame, mobile home, other)
-Year of construction
-Coverages (e.g., contents only or full package homeowners)
-Deductible
-Limits by coverage

The following assumptions are implicit in the design of the model:

-Each structure can be appropriately categorized as Masonry, Frame, Mobile Home, or Other.
-Within construction types, the relative strength of an exposure can be approximated by the year of construction.
-The values of structures, contents, and appurtenant structures are each equal to their policy limit.
-There is no difference in loss under Actual Cash Value or Replacement Cost coverage.
-Claim practices are stable and do not vary by company.
-A company's underwriting practices relating to any other risk characteristic not considered in the model (i.e., those listed above) will not impact hurricane damages.
-The impact on losses of roof type, shutters, and other risk characteristics not yet widely available from insurance companies can be approximated using weighted damage matrices.

Commercial Residential

The damages calculated by the model, which subsequently flow into the loss costs and probable maximum loss level estimates, depend on the following characteristics of each exposure:

-ZIP Code and latitude-longitude
-Number of stories
-Number of units per building
-Building square footage
-Floor plan layout
-Window type
-Year of construction
-Construction type (for low-rise structures)
-Occupancy (apartment or condominium)
-Coverage (structure, contents, appurtenant structures, time element)
-Limits by coverage
-Deductible

The following assumptions are implicit in the design of the model:

-Within construction types, the relative strength of a low-rise (3 stories or fewer) exposures can be approximated by the year of construction.
-The values of structures, contents, and appurtenant structures are each equal to their policy limit.
-There is no difference in loss under Actual Cash Value or Replacement Cost coverage.
-Claim practices are stable and do not vary by company.

-Condominium association agreements are uniform as to the insurance responsibilities of unit owner and association.
-Contents insured under commercial residential policies are a higher percentage of overall interior unit value for apartments than for condominiums.
-A company's underwriting practices relating to any other risk characteristic not considered in the model (i.e., those listed above) will not impact hurricane damages.
-The impact on losses of risk characteristics not available from insurance companies can be approximated by assuming a weighted mix similar to the overall exposure in that county.

In responding to this standard the actuaries reviewed model flow charts, manual calculations of losses for specific policies, and sample vulnerability matrices and curves.

Disclosures

1. Identify the assumptions used to develop loss costs for unknown residential construction types.

Personal Residential

Loss costs for unknown construction types are estimated using vulnerability matrices specifically developed for unknown construction types. These unknown construction matrices (called "other" construction in model documentation) are the weighted average of the various vulnerability matrices developed for a given region. The weights depend on the prevailing proportions of various construction types in the region. The proportions were estimated from survey data provided by various counties and policy data provided by insurance companies. No weight, however, was given to the Mobile Home vulnerability matrix in determining the weighted average matrix for each region.

Commercial Residential

Loss costs for low-rise commercial residential risks with unknown construction type are determined using weighted vulnerability curves. Construction type is not a variable in determining mid-rise and high-rise commercial residential losses.

2. Identify the assumptions used to develop loss costs for commercial residential construction types.

For low-rise structures of three stories or fewer, the model uses separate vulnerability curves for frame and masonry to determine exterior structure loss and separate curves to determine interior structure loss.

Mid-rise and high-rise structure losses do not consider construction type as a variable. The damage is estimated by aggregating expected damage to each story, taking into consideration the differences in vulnerability between corner units and middle units on each floor.

3. Identify the assumptions used to account for the effects of coinsurance on commercial residential construction loss costs.

The model assumes that coinsurance penalties do not apply.

4. ***Describe the assumptions included in model development and validation concerning insurance company claim payment practices including the effects of contractual obligations on the claim payment process.***

The implicit assumptions are that such practices are stable over time and do not vary by company.

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

For both replacement cost and ACV policies, the value of structures and contents are generally assumed to equal the insured limit. In the rare case where data on property value are available from the insurance company and that value exceeds the limit, the value provided is used to estimate the ground-up damages.

Depreciation is considered in the model, but not explicitly. The damage ratios were calibrated to insured losses that contained a mix of replacement cost and ACV policies but primarily considered replacement cost. Consequently there is an implicit allowance for depreciation (of an unknown degree) built into the modeled losses.

6. ***Identify insurance-to-value assumptions and describe the methods and assumptions used to determine the true property value and associated losses. Provide a sample calculation for determining the property value and guaranteed replacement cost losses.***

The model assumes that the insured value is the true value of the property except in rare cases when the insurance company provides a separate property value that is higher than the insured value.

7. ***Describe how loss adjustment expenses are considered within the loss cost and probable maximum loss level estimates.***

Loss adjustment expenses (LAE) are not included in estimates of loss costs or probable maximum loss levels. The loss data used for validation do not include loss adjustment expenses.

A-3 Loss Cost Projections and Probable Maximum Loss Levels

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

Loss cost and probable maximum loss level estimates do not include expenses, risk loads, investment income, premium reserves, taxes, assessments, or profit margins. The model produces pure losses.

B. Loss cost projections and probable maximum loss levels shall not make a prospective provision for economic inflation.

Loss cost and probable maximum loss level estimates do not consider economic inflation.

C. Loss cost projections and probable maximum loss levels shall not include any provision for direct hurricane storm surge losses.

Loss cost and probable maximum loss level estimates do not consider storm surge loss.

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

Loss costs and probable maximum loss levels can be calculated at a geocode level of resolution whenever the exposures provided as input are available by street address or by latitude-longitude.

Disclosures

1. Describe the method or methods used to estimate annual loss costs and probable maximum loss levels needed for ratemaking. Identify any source documents used and research performed.

To estimate annual loss costs and probable maximum loss levels, losses are estimated for individual policies in the portfolio for each hurricane in a stochastic set of storms. Losses are estimated separately for structure, appurtenant structure, contents, and time element coverage.

The meteorological component of the model generates the stochastic set of hurricanes and derives an expected three-second gust wind speed, by latitude and longitude, for each hurricane in that set of storms.

The engineering component of the model consists of a set of vulnerability matrices for personal residential exposures and a set of vulnerability curves for low-rise commercial residential exposures. The matrices specify the probability of damage of a given magnitude at various wind speeds. The curves specify the expected damage rate by wind speed. For mid-rise and high-rise commercial residential exposures, the model estimates exterior damage by aggregating expected damage per story and interior damage as a function of the volume of water intrusion resulting from breached openings on each story.

The estimated damages are reduced by applicable deductibles and increased to allow for the impact of demand surge on claim costs.

The modeled insured losses can then be summed across all properties in a ZIP Code or across all ZIP Codes in a county to obtain expected aggregate loss. The losses can also be aggregated by policy form, construction type, rating territories, etc.

Finally, modeled losses are divided by the number of years in the simulation and by the total amount of insurance to estimate annual loss costs.

Modeled losses for storms occurring in the same year of the simulation are summed to produce annual storm losses. Probable maximum loss levels are calculated from the ordered set of annual losses as described in Standard A-11.

The following sources were used in the research:

Hogg, R. V., & Klugman, S. (1984). *Loss Distributions*. New York: Wiley.

Klugman, S., Panjer, H., & Willmot, G. (1998). *Loss Models: From Data to Decisions*. New York: Wiley.

Wilkinson, M. E. (1982). Estimating Probable Maximum Loss with Order Statistics. *Casualty Actuarial Society*, *LXIX*, pp. 195-209.

2. Identify the highest level of resolution for which loss costs and probable maximum loss levels can be provided. Identify all possible resolutions available for the reported output ranges.

Losses are calculated at the policy/coverage level for each storm in the stochastic set. When the street address of the exposures is available for input, each policy is associated with a latitude and longitude. In that case loss costs and probable maximum loss levels can be provided by latitude and longitude. Losses can be summarized across any policy characteristic provided in the exposures. Therefore, loss costs and probable maximum loss levels can be aggregated by characteristics such as policy form, coverage, construction, deductible, latitude-longitude, ZIP Code, county, rating territory, roof shape, or whatever is provided for input.

For the reported output ranges, the resolutions available are defined by the policy characteristics provided in the exposures, namely, policy form, ZIP Code, construction and deductible. ZIP Codes can be aggregated to the county, region, or statewide level.

A-4 Demand Surge

A. Demand surge shall be included in the model's calculation of loss costs and probable maximum loss levels using relevant data.

Demand surge is included in the calculation of loss costs and probable maximum loss levels.

B. The methods, data, and assumptions used in the estimation of demand surge shall be actuarially sound.

The methods, data, and assumptions used in the estimation of demand surge are actuarially sound.

Disclosures

1. Describe how the model incorporates demand surge in the calculation of loss costs and probable maximum loss levels.

How Demand Surge is Incorporated in Loss Cost Calculation

Weighted average demand surge factors across the stochastic set of storms are applied to the modeled losses. There are average factors by coverage for each of five regions. The regions are the following:

Northeast/North Central
Northwest
Central
South (except Monroe County)
Monroe County

How Demand Surge is Incorporated in Probable Maximum Loss Levels

Demand surge factors by coverage are calculated for each storm in the stochastic set and are applied to the estimated losses for that storm. For each storm, demand surge is assumed to be a function of coverage, region, and the storm's estimated statewide losses before consideration of demand surge.

General Form of the Demand Surge Functions

The functions applied to determine the demand surge for each storm are of the form

Structure: Surge Factor = c + p1 x ln (statewide storm losses) + p2,

where c is a constant,
p1 is a constant for all regions except Monroe County,
p2 varies by region, and
"statewide storm losses" are the estimated losses, before demand surge, for the storm under consideration.

Appurtenant Structures: Surge Factor = Structure Factor.

Contents: Surge Factor = [(Structure Factor – 1) x 30%] + 1.

Additional Living Expenses: Surge Factor = 1.5 x Structure Factor - .5.

Development of the Demand Surge Function for Structure

To estimate the impact of demand surge on the settlement cost of structural claims following a hurricane we used a quarterly construction cost index produced by Marshall & Swift/Boeckh. We considered the history of the index from first quarter 1992 through second quarter 2007. There is an index for each of 52 ZIP Codes in Florida representing 42 counties. We grouped the indices to produce a set of regional indices, weighting each ZIP Code index with population.

The approach to estimating structural demand surge was to examine the index for specific regions impacted by one or more hurricanes since 1992. From the history of the index, we projected what the index would have been in the period following the storm had no storm occurred. Any gap between the predicted and actual index was assumed to be due to demand surge. In total we examined ten storm–region combinations. From these ten observations of structural demand surge, we generalized to the functional relationship shown above.

Monroe County was treated as an exception. There were no storms of any severity striking Monroe during the period of our observations. We believe, though, that the location of and limited access to the Keys will result in an unusually high surge in reconstruction costs after a storm, particularly since the Overseas Highway could be damaged by storm surge or seriously blocked by debris. We have therefore judgmentally selected demand surge parameters for Monroe in excess of those indicated for the remainder of South Florida.

Development of the Contents Demand Surge Function

The approach to determining the contents demand surge function was to relate any surge in consumer prices in Southeast Florida following hurricanes Katrina and Wilma to the estimated structure demand surge following those storms. We used a subindex of the Miami-Ft. Lauderdale Consumer Price Index for this purpose and compared the projected and actual indices after the storms. Since the surge in consumer prices was roughly 30% of the surge in construction costs, we selected that percentage as the relationship between structure and contents demand surge.

Development of Time Element (TE) Demand Surge Function

To estimate TE demand surge we first examined the relationship between structure losses and TE losses in the validation dataset. This dataset includes losses from three storms (Andrew, Charley, and Frances) and eleven insurance companies. We then compared the predicted increase in TE losses associated with various increases in structure losses. That generalized relationship is the TE demand surge function shown above.

TE demand surge is related to structure demand surge in the following sense: structure surge is caused by an inability of the local construction industry to meet the sudden demand for materials and labor following a storm. A high surge in construction costs suggests a more serious mismatch between the demand for repairs and the supply of materials and labor. This mismatch translates into longer delays in the completion of repairs and rebuilding, which in turn implies a higher surge in TE costs.

Because the model's TE surge is determined as a function of structure surge, Monroe County TE surge factors are higher than those for the remainder of South Florida. We believe this is reasonable because of the unusual delays in repair and rebuilding that are likely to occur following a major storm in the Keys, especially if there is damage to US 1 or to bridges connecting the islands.

Treatment of Demand Surge for Storms Impacting both the Florida Panhandle and Alabama

The Northwest region is segregated from the remainder of the North to allow for demand surge that is a function of combined Florida–Alabama losses from storms impacting both states. The Northwest region consists of all Panhandle counties west of Leon and Wakulla. The definition of this region was selected by considering which counties experienced losses from Hurricanes Ivan, Frederic, and Elena, i.e., from storms that impacted both states. Not all counties in the Northwest region experienced losses from these three specific storms, but losses in neighboring counties suggest that that they are nevertheless at risk for inclusion in a combined Florida–Alabama event.

Demand surge factors for the Northwest region are determined as an upward adjustment to the factors for the Northeast–North Central region. The purpose of this adjustment is to correct for an understatement of the model's demand surge that occurs when only the Florida losses from a combined Florida–Alabama event are used to determine the level of demand surge from a storm.

2. ***Provide citations to published papers, if any, that were used to develop how the model estimates demand surge.***

No published papers were used in the demand surge development.

A-5 User Inputs

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

The insurance companies provide policy data in a standardized format. The input format descriptions are available for audit. If observations on the input variables are missing, the provider is often solicited for the information and a determination is made if the data have zero value or are missing. If the data on many key variables are missing, the record may be dropped from the analysis. Whenever possible, though, appropriate assumptions are made to retain the record. For personal residential risks and low-rise commercial residential risks, a policy missing year built, for example, may be included by using a weighted average damage matrix determined by the policy location and construction type. If number of stories is missing for a commercial residential policy, the height may be randomly assigned on the basis of the height distribution of apartment and condominium buildings in that county.

The insured limit is assumed to be the value of the property except in the rare case when property value data is provided.

If the limit on time element coverage is time based and no exposure is provided then, depending on the policy type, the limit is assumed to be a percentage of either the structure or content coverage.

The number of records deleted and adjustments to the dataset are documented in the output report.

Disclosures

1. ***Describe the methods used to distinguish among policy form types (e.g., homeowners, dwelling property, mobile home, tenants, condo unit owners).***

The client provides the data on exposure by coverage type and identifies construction type, policy form, rating territory, etc. The model can process any combination of policy type, construction type, deductibles, coverage limits, etc. The client is assumed to provide the correct data, though outliers may be investigated. The model output reports include separate loss estimates for structure, content, appurtenant structure, and time element. These losses are also reported by construction type (e.g., masonry, frame, manufactured homes), by county or ZIP Code, by policy form (e.g., HO-3, HO-4 etc.), by rating territory, and combinations thereof.

2. ***Disclose, in a model output report, the specific type of input that is required to use the model or model output in a residential property insurance rate filing. Such input includes, but is not limited to, optional features of the model, type of data to be supplied by the model user and needed to derive loss projections from the model, and any variables that a model user is authorized to set in using the model. Include the model name and version number on the model output report. All items included in the output form submitted to the Commission shall be clearly labeled and defined.***

A model output report follows.

Table 29. Output report for OIR data processing.

Output Report for OIR Data Processing

Florida Public Hurricane Loss Model: Release 4.1

OIR Data Processing Results: <Company Name: OIR Filing Number>

Report Content:
- Original Number of the policies in data set
- Process steps to formalize the data set
- Numbers of policies which are excluded due to certain reason, e.g. invalid ZIP Codes, invalid format, etc.
- Numbers of: Construction Types, Territory Codes, Policy Forms, Program Codes, etc.
- Number of policies to generate the estimated losses
- Number of files in the report

The results are aggregated by different combinations of counties, ZIP Codes, policy forms, program codes, and territory codes as applicable.

In case if there are:
- more than 1 construction type
- more than 1 policy form
- more than 1 program code
- more than 1 territory code

There will be 40 files in the report for personal residential policies with names as below:

<CompanyName>_PERSONAL_Loss_ConstType.xls
<CompanyName>_PERSONAL_Loss_County.xls
<CompanyName>_PERSONAL_Loss_PolicyForm.xls
<CompanyName>_PERSONAL_Loss_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode.xls
<CompanyName>_PERSONAL_Loss_ConstType_PolicyForm.xls
<CompanyName>_PERSONAL_Loss_ConstType_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_ConstType_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType.xls
<CompanyName>_PERSONAL_Loss_County_PolicyForm.xls
<CompanyName>_PERSONAL_Loss_Zipcode_ConstType.xls
<CompanyName>_PERSONAL_Loss_County_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode_PolicyForm.xls
<CompanyName>_PERSONAL_Loss_PolicyForm_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_PolicyForm_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_ConstType_PolicyForm_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_ConstType_PolicyForm_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_ConstType_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_PolicyForm.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_County_PolicyForm_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_PolicyForm_TerritoryCode.xls

<CompanyName>_PERSONAL_Loss_County_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode_ConstType_PolicyForm.xls
<CompanyName>_PERSONAL_Loss_Zipcode_ConstType_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode_PolicyForm_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_ConstType_PolicyForm_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_PolicyForm_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_PolicyForm_TerritoryCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_PolicyForm_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_Zipcode_ConstType_PolicyForm_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_PolicyForm_TerritoryCode_ProgramCode.xls
<CompanyName>_PERSONAL_Loss_County_ConstType_PolicyForm_TerritoryCode_ProgramCode.xls

There will be 9 files in the report for commercial residential policies with names as below:

< CompanyName>_COMMERCIAL_Loss_ConstType.xls
<CompanyName>_COMMERCIAL_Loss_County.xls
<CompanyName>_COMMERCIAL_Loss_TerritoryCode.xls
<CompanyName>_COMMERCIAL_Loss_Zipcode.xls
<CompanyName>_COMMERCIAL_Loss_ConstType_TerritoryCode.xls
<CompanyName>_COMMERCIAL_Loss_County_ConstType.xls
<CompanyName>_COMMERCIAL_Loss_Zipcode_ConstType.xls
<CompanyName>_COMMERCIAL_Loss_County_TerritoryCode.xls
<CompanyName>_COMMERCIAL_Loss_County_ConstType_TerritoryCode.xls

There will be 9 files in the report for combined personal and commercial residential policies with names as below:

< CompanyName>_Loss_ConstType.xls
<CompanyName>_Loss_County.xls
<CompanyName>_Loss_TerritoryCode.xls
<CompanyName>_Loss_Zipcode.xls
<CompanyName>_Loss_ConstType_TerritoryCode.xls
<CompanyName>_Loss_County_ConstType.xls
<CompanyName>_Loss_ZIPcode_ConstType.xls
<CompanyName>_Loss_County_TerritoryCode.xls
<CompanyName>_Loss_County_ConstType_TerritoryCode.xls

The final results are zipped and password protected.

3. Provide a copy of the input form used by a model user to provide input criteria to be used in the model. Describe the process followed by the user to generate the model output produced from the input form. Include the model name and version number on the input form. All items included in the input form submitted to the Commission shall be clearly labeled and defined.

Copies of the input forms for personal residential and commercial residential policies follow.

Table 30. Input form for Florida Public Hurricane Loss Model.

Florida Public Hurricane Loss Model: Version 4.1
Inputs for Personal Residential Policies

Provide input data for the Florida Public Hurricane Loss Model that meets the following specifications:

1. Report data as of the last day of the most recent accident year included on the Rate Indication Form(s). If more current data is appropriate, provide it and explain why it is more appropriate.
2. Report data only for policies that include wind coverage.

Note: Provide a list of all adjustments made by you necessary to conform your data to these specifications. Include any default values that you specified for missing or invalid information. Describe any exposures affected by this filing that are not included in this data. Describe any exposures included in this data that are not part of this filing.

Your response should include a cover letter with any appropriate information relative to 1, 2, or the Note above along with the total number of policies included in the portfolio data and the name, email address, and phone number of a contact person who can answer any questions concerning the data.

Your response should include the following:

a. A listing of each Program Code and the associated Program Name. Program Names must be consistent with those shown on the Rate Collection System (RCS).
b. A summary exhibit on a statewide basis for each Program Code and Form. This exhibit should include the number of policies, the Structure Coverage, the App Coverage, the Contents Coverage, and the ALE Coverage for policies that include wind coverage.

This exhibit should also include the total number of policies in-force (wind and non-wind), the premium in-force at the current rate level for all policies (wind and non-wind) with supporting data, and the premium in-force for policies that include wind coverage at the current rate level with supporting data.

The policy records should be saved in .txt files with the following format:

PolicyID, Zipcode, YearBuilt, ConstructionType, PropertyValue, StructureCoverage, AppCoverage, ContentCoverage, ALECoverage, Deductible, HurricanDeductible, NatureOfCoverage, County, Address, Form, ProgramCode, TerritoryCode, YearRetrofitted, NumberOfStories, RoofShape, RoofCover, RoofMembrane, RoofToWallConnection, StudToWallConnection, NailingOfDeck, GarageDoor, OpeningProtection.

1. Required Attributes:

PolicyID: the unique ID for this policy
Zipcode: 5-digit ZIP Code where this building is located
YearBuilt: 4-digit year number when this building was built
(If not known enter UNKNOWN)
ConstructionType: the construction type for this building, which is with one of the following types: *Frame, Unreinforced Masonry, Reinforced Masonry, Manufactured, Other, or Unknown*
PropertyValue: the dollar amount value for this building
(If not known enter UNKNOWN)
StructureCoverage: the structure coverage amount in dollars
AppCoverage: the appurtenant structure coverage amount in dollars

(Enter 0 if none)

ContentCoverage: the content coverage amount in dollars (enter 0 if none)

ALECoverage: the additional living expense coverage amount in dollars (Enter 0 if none)
Deductible: deductible amount in dollars for perils other than hurricane (Convert percentage deductibles to dollar amount)
HurricaneDeductible: hurricane deductible amount in dollars (Convert percentage deductibles to dollar amount)
NatureOfCoverage: the settlement option on the structure using one letter *R* or *A* to represent Replacement Cost or Actual Cash Value, respectively
County: the name of the county where the building is located
Address: the street address or longitude, latitude of the building in that order
Form: Policy Form (HO-1,HO-2,HO-3,HO-5,HO-8,HO-4,HO-6 etc.)
ProgramCode: use one letter (A, B, C, etc) to represent each company program
TerritoryCode: use the territory codes reflected in your rate manual
Year retrofitted: 4 digit year when the property was retrofitted (brought up to code) if applicable.
If not retrofitted enter 0000,
If not known enter UNKNOWN
Number of stories: 1,2, UNKNOWN
Roof Shape: unbraced gable=1, braced gable=2, gable (bracing unknown)=3, hip =4, other=5, unknown=6
Roof Cover: unrated shingles=1, rated shingles(current FBC)=2, shingles(ratings unknown)=3, tiles=4, other=5, unknown=6
Roof Membrane: regular underlayment=1, secondary water resistance=2, unknown=3
Roof to wall connection: toe nails=1, clips=2, straps=3, other=4, unknown=5
Stud to wall connection: toe nails=1, clips=2, straps=3, other=4, unknown=5 (only for frame)
Nailing of deck: planks=1, 6d@6/12"=2, 8d@6/12"=3, 8d@6/6"=4, unknown=5
Garage door: unbraced=1, braced=2, unknown=3
Opening protection plywood=1, metal=2, impact resistant glass=3, no protection=4, unknown=5

2. Examples

1,33143,1977,Masonry,162000,162000,16200,124000,0,0,250,R,Miami-Dade,1000SW1000Street,HO-3,A,30,1998,2,2,3,2,3,3,3,3,2

1,33143,1977,Masonry,162000,162000,16200,124000,0,0,250,R,Miami-Dade,-80.362900, 25.661051,HO-3,A,52,1998,2,2,3,2,3,3,3,3,2

Note the attributes should be separated by comma only

Florida Public Hurricane Loss Model: Version 4.1
Inputs for Commercial Residential Policies

Provide input data for the Florida Public Hurricane Loss Model that meets the following specifications:

1. Report data as of the last day of the most recent accident year included on the Rate Indication Form(s). If more current data is appropriate, provide it and explain why it is more appropriate.
2. Report data only for policies that include wind coverage.

Note: Provide a list of all adjustments made by you necessary to conform your data to these specifications. Include any default values that you specified for missing or invalid information. Describe any exposures affected by this filing that are not included in this data. Describe any exposures included in this data that are not part of this filing.

Your response should include a cover letter with any appropriate information relative to 1, 2, or the Note above along with the total number of policies included in the portfolio data and the name, email address, and phone number of a contact person who can answer any questions concerning the data.

Your response should include the following:

a. A listing of each ProgramCode and the associated Program Name. Program Names must be consistent with those shown on the Rate Collection System (RCS).
b. A summary exhibit on a statewide basis for each ProgramCode and Form. This exhibit should include the number of policies, the StructureCoverage, the AppCoverage, the ContentsCoverage, and the TimeElementCoverage for policies that include wind coverage.
c. If structure coverage is not at actual shown coinsurance percent but a base, document what base is used.

This exhibit should also include the total number of policies in-force (wind and non-wind), the premium in-force at the current rate level for all policies (wind and non-wind) with supporting data, and the premium in-force for policies that include wind coverage at the current rate level with supporting data.

The policy records should be saved in .txt files with the following format:

PolicyID,Location ID,Building ID, Zipcode, YearBuilt, ConstructionType, Number of Stories, Number of Units, Property Value, StructureCoverage, AppCoverage, ContentCoverage, TimeElementCoverage, Deductible, HurricaneDeductible, Coinsurance, NatureOfCoverage, County, Address, Form, ProgramCode, TerritoryCode, YearRetrofitted, Roof shape, Roof cover, Roof membrane, Roof to wall connection, Stud to wall connection, Nailing of deck, Appurtenant structure, Opening protection, Building layout, Coinsurance enforcement ,Frequency of limit update

1. Required Attributes:

PolicyID:	the unique ID for this policy.
Location ID	the unique location id for building location.
Building ID:	the unique ID for this building.
Zipcode:	5-digit ZIP Code where this building is located.
YearBuilt:	4-digit year number when this building was built. (If not known, enter UNKNOWN.)
ConstructionType:	the construction type for this building, which is with one of the following types: *Frame, Unreinforced Masonry, Reinforced Masonry, Concrete, Steel, Other, or Unknown.*
Number of Stories:	**t**he number of floors in the building.

(If not known, enter UNKNOWN.)

Number of Units: the number of units in the building.

(If not known, enter UNKNOWN.)

PropertyValue: the dollar amount value for this building.
(If not known, enter UNKNOWN.)

StructureCoverage: the structure coverage amount in dollars.

AppCoverage: the appurtenant structure coverage amount in dollars.
(Enter 0 if none.)

ContentCoverage: the content coverage amount in dollars.
(Enter 0 if none.)

TimeElementCoverage: the business income and extra expense coverage amount in dollars.
(Enter 0 if none.)

Deductible: deductible amount in dollars for perils other than hurricane.
(Convert percentage deductibles to dollar amount.)

HurricaneDeductible: hurricane deductible amount in dollars.
(Convert percentage deductibles to dollar amount.)

Coinsurance: coinsurance percentage (e.g. for 80% enter 80)

NatureOfCoverage: the settlement option on the structure using one letter *R* or *A* to represent Replacement Cost or Actual Cash Value, respectively

County: the name of the county where the building is located

Address: the street address or longitude, latitude of the building in that order

Form: Policy Form
(If company offers different base forms of coverage, enter company code, otherwise enter 0.)

ProgramCode: use one letter (A, B, C, etc.) to represent each company program

TerritoryCode: use the territory codes reflected in your rate manual

Year retrofitted: 4 digit year when the property was retrofitted (brought up to code) if applicable.
(If not retrofitted enter 0000, if not known enter UNKNOWN)

Roof shape: unbraced gable=1, braced gable=2, gable (bracing unknown) =3, hip =4, other=5, unknown=6

Roof cover: unrated shingles=1, rated shingles(current FBC)=2, shingles(ratings unknown)=3, tiles=4, other=5, unknown=6

Roof membrane: regular underlayment=1, secondary water resistance=2, unknown=3

Roof to wall connection: toe nails=1, clips=2, straps=3, other=4, unknown=5

Stud to wall connection: toe nails=1, clips=2, straps=3, other=4, unknown=5 (only for frame)

Nailing of deck: planks=1, 6d@6/12”=2, 8d@6/12”=3, 8d@6/6”=4, other=5,unknown=6

Appurtenant structure: none=1,pool=2,detached garage=3,club house=4,administration building=5, other=6, unknown=7

Opening protection plywood=1, metal=2, impact resistant glass=3, no protection=4, unknown=5

Building Layout: open (access to units through external balcony)=1,close (access through the interior)=2, unknown=3

Coinsurance Enforcement: Company enforces coinsurance clause at time of claim=1, does not enforce coinsurance at time of claim=2

Frequency of Limit Update: Company updates policy limits at each renewal=1, at every other renewal=2,less frequently or no routine update of limits at renewal=3

2. Example

1,1,1,33143,1977,ReinforcedMasonry,10,50,5000000,4000000,400000,2000000,1000000,5000,120000,80,R, Miami-Dade,1000SW1000Street,A,A,1,1985,1,3,5,2,5,3,4,3,3,1,1

Note the attributes should be separated by comma only.

The model is not run by insurance company staff or other external users. The process to run the model consists of the following steps:

1) Perform pre-processing. Run automated data validation programs (see checklist below), and resolve any data issues.
2) Run the model.
3) Review output for reasonableness.

4. Describe actions performed to ensure the validity of insurer data used for model inputs or validation/verification.

We developed a set of programs to check and validate the data. These programs include the Validation Automation Program and MATLAB Plotting Program. Sometimes the computer test results are compared with manually processed results. The following checklist is also implemented:

Table 31. Checklist for the Pre-processing.

Note: LMs is coverage limit for building structure, LMapp is coverage limit for appurtenant structure, LMc is coverage limit for contents, and LMale is coverage limit for time element.

PolicyID	* There are no null values. * All duplicates (if any) have valid policy information.	
Zipcode	* There are no null values. * All values belong to the set of 5-digit zipcodes in Florida.	
YearBuilt	* There are no null values (Note: policies with no YearBuilt should have for value 0). * All values are 4-digit numbers. * There are no values exceeding the current year. * There are no non-zero values less than 1700.	
ConstType	* There are no null values. * All values are either *masonry*, *frame*, *manufactured*, or *other*.	
PropValue	* There are no null values. * There are no negative values. * If all values are equal to 0, then they are updated to equal LMs. * The actural Property Values will be updated to the larger numeric value between Property Value and Structure Limit	
LMs	* There are no null or non-numeric values. * There are no negative values.	
LMapp	* There are no null or non-numeric values. * There are no negative values. * If all values are equal to 0 (because it's missing but the company covers Lmapp), then they are updated to 10% of LMs. (double check with Dr. Hamid)	
LMc	* There are no null or non-numeric values. * There are no negative values.	
LMale	* There are no null or non-numeric values. * There are no negative values. * If all values are equal to 0, then the ALE limits will be updated in the program as follows: (1) 20% of LMs or (2) 40% of LMc if LMs is zero but LMc > 0 or (3) 40% of LMapp if both LMs and LMc are zero	
Deduc	* There are no null or non-numeric values. * There are no negative values. * All percentages are converted to numeric values. (Sometimes the percentages are represented as 2, 5, 10, 02, 05, 000002, 000005, 000010 instead of 2%, 5%, 10%)	
HurrDeduc	* There are no null or non-numeric values. * There are no negative values. * All percentages are converted to numeric values. (Sometimes the percentages are represented as 2, 5, 10, 02, 05, 000002, 000005, 000010 instead of 2%, 5%, 10%) * Normally Hurricane Deductible should be no less than 500.	
Coverage	* There are no null values. * The format is correct (i.e. value is equal to *A* or *R*).	
County	* There are no null values. * All county names are spelled only one way (i.e. all caps & no spelling errors, etc.). * All names are counties in Florida. * For counties as Miami-Dade (Miami Dade, Dade), St. Johns (Saint Johns, St Johns), St. Lucie (Saint Lucie, St Lucie), make sure only one type of spelling is used.	
PolicyForm	* If the field is present, values cannot be null. * The format is correct (i.e. value is equal to *DP-3*, *HO-6*, etc.).	
ProgramCode	* If the field is present, values cannot be null. * The format is correct (i.e. value is equal to *A*, *B*, etc.).	
TerritoryCode	* If the field is present, values cannot be null. * The format is correct (i.e. value is equal to *36*, *11*, etc.).	

A-6 Logical Relationship to Risk

A. Loss costs shall not exhibit an illogical relation to risk, nor shall loss costs exhibit a significant change when the underlying risk does not change significantly.

The loss costs produced by the model do not show illogical relations to risk nor do they change significantly when the underlying risk does not change.

B. Loss costs produced by the model shall be positive and non-zero for all valid Florida ZIP Codes.

The model produces positive and non-zero loss costs for all valid ZIP Codes in the geo-coded set.

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

Loss costs decrease as the quality of construction increases.

D. Loss costs cannot increase as the presence of fixtures or construction techniques designed for hazard mitigation increases, all other factors held constant.

Loss costs decrease when loss mitigation measures are implemented in combinations reflective of common practice.

E. Loss costs cannot increase as the quality of building codes and enforcement increases, all other factors held constant.

Loss costs decrease as the quality of building codes and enforcement increases.

F. Loss costs shall decrease as deductibles increase, all other factors held constant.

Loss costs decrease as deductible increases, all other factors held constant. See Form A-6.

G. The relationship of loss costs for individual coverages, (e.g., structures and appurtenant structures, contents, and time element shall be consistent with the coverages provided.

The relationship of loss costs for structure, appurtenants, contents, and time element are consistent with the coverages provided.

Disclosures

1. Demonstrate that loss cost relationships by type of coverage (structures, appurtenant structures, contents, time element) are consistent with actual insurance data.

The structure loss consists of external and internal losses. Contents and additional living expense losses are a function of the interior structure loss. Appurtenant structure losses are derived independently. All the losses are based on a combination of engineering principles, empirical equations, and engineering judgment. They were validated against claim data from Hurricanes Andrew, Charley, and Frances. The results are shown in the graphs below. Each dot represents an insurance portfolio.

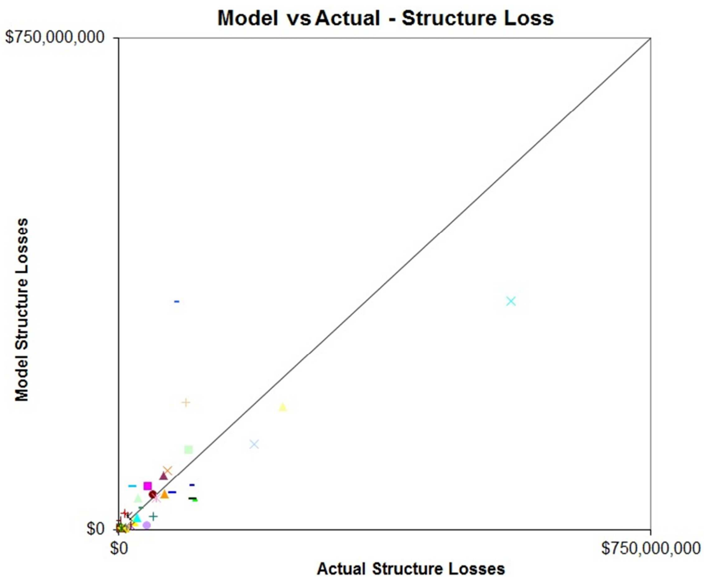


Figure 53. Model vs. Actual—Structure Loss.

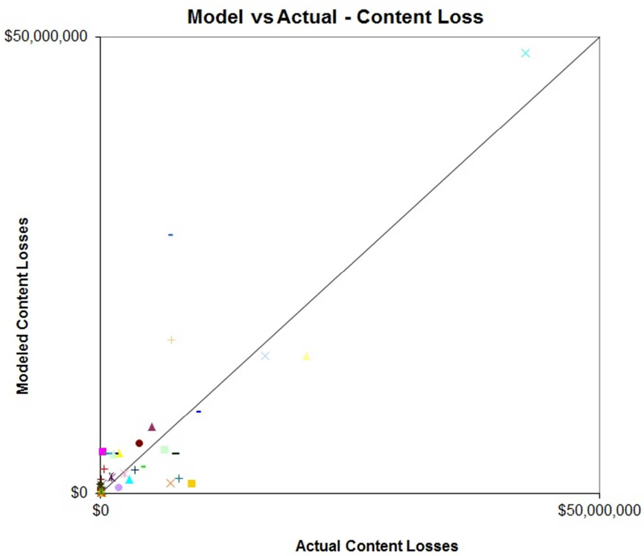


Figure 54. Model vs. Actual—Content Loss.

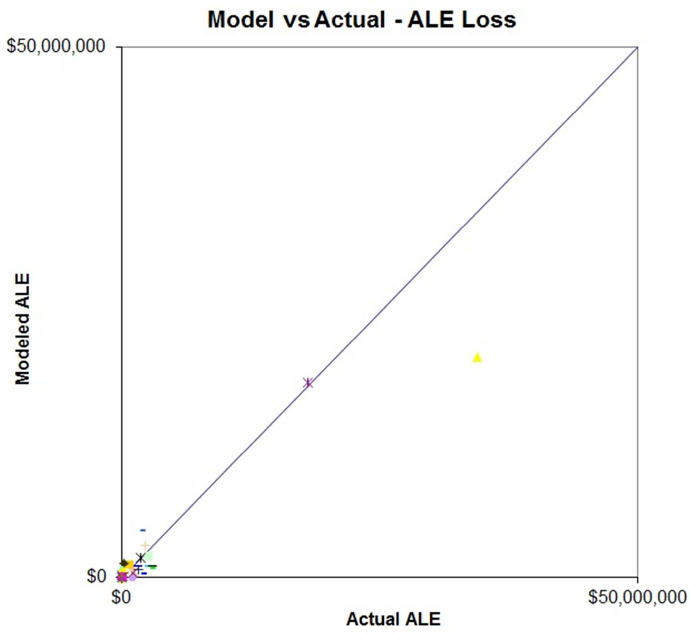


Figure 55. Model vs. Actual—ALE Loss.

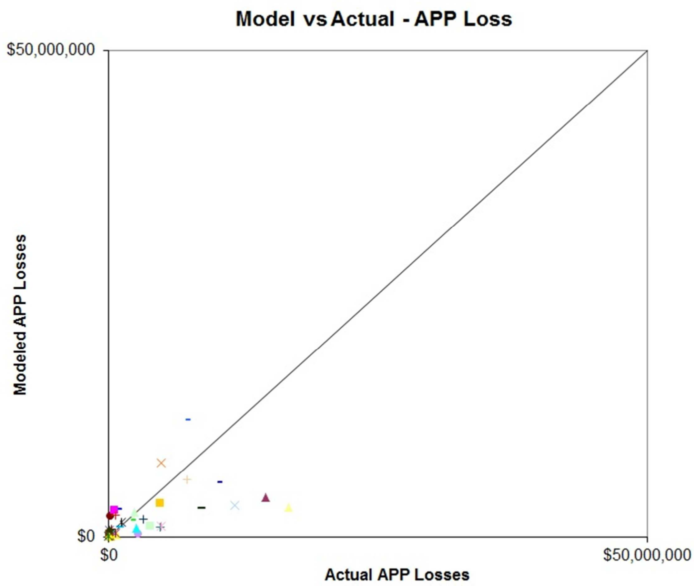


Figure 56. Model vs. Actual—APP Loss.

2. ***Demonstrate that loss cost relationships by construction type are consistent with actual insurance data.***

The validation studies described above were performed for a mix of masonry and frame structures for each portfolio. In addition, portfolios of manufactured homes were validated separately. In general, loss costs for masonry are lower than for frame, which are lower than for mobile homes. A comparison of modeled versus historical loss follows.

Table 32. Modeled vs. Historical Loss by Construction Type.

Hurricane Charley – Company A

	Actual			Modeled			
Construction	Exposure	Loss	Loss/ Exposure	Exposure	Loss	Loss/ Exposure	Difference
Frame	$ 1,363,062,575.00	$ 17,902,054.00	0.01313	$ 1,363,062,575.00	$ 23,949,551.50	0.01757	0.00444
Masonry	$ 6,062,668,168.00	$ 92,569,308.00	0.01527	$ 6,062,668,168.00	$ 105,769,888.28	0.01745	0.00218

Hurricane Charley – Company E

	Actual			Modeled			
Construction	Exposure	Loss	Loss/ Exposure	Exposure	Loss	Loss/ Exposure	Difference
Frame	$ 374,276,311.00	$ 8,587,915.00	0.02295	$ 374,276,311.00	$ 7,734,933.45	0.02067	-0.00228
Masonry	$ 2,201,170,400.00	$ 53,498,341.00	0.02430	$ 2,201,170,400.00	$ 44,569,418.80	0.02025	-0.00406

Also see Standard S-5 and Form S-4.

3. Demonstrate that loss cost relationships among coverages, territories, and regions are consistent and reasonable.

Loss costs in regions that have relatively high historical frequency of hurricanes are higher. Similarly, the loss costs for inland counties are generally lower than coastal counties. Loss costs for the northern region are lower than the central and southern regions. This is shown in Form A-2 maps for each construction type.

4. Explain any anomalies or special circumstances that might preclude any of the above conditions from occurring.

For some inland ZIP Codes the loss costs may be higher than neighboring ZIP Codes that are closer to the coast because of lower terrain roughness. Similarly, a frame structure may have lower lost cost than masonry if the frame is newer and built under a stronger building code.

5. Provide a completed Form A-1, Personal Residential Loss Costs.

See Form A-1.

6. Provide a completed Form A-2, Zero Deductible Personal Residential Loss Costs by ZIP Code.

See Form A-2.

7. Provide a completed Form A-3, Base Hurricane Storm Set Statewide Loss Costs.

See Form A-3.

8. Provide a completed Form A-4, Hurricane Andrew (1992) Percent of Losses.

See Form A-4.

9. Provide a completed Form A-5, Cumulative Losses from the 2004 Hurricane Season.

See Form A-5.

A-7 Deductibles, Policy Limits, and Coinsurance

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

In practice the insurance companies often allocate deductibles to structure, content, AP, and ALE on a pro-rata loss basis. Thus, if for example, structure and content damages before deductible are $20,000 and $6,000 respectively, and the deductible is $3,000, then (20,000/26,000)(3,000) = $2,308 is allocated to structure and (6,000/26,000)(3,000) = $692 is allocated to contents. This means that the various damages have to be considered and deductibles applied simultaneously. The deductibles must be allocated among the different losses and the truncation applied to each loss separately on a pro-rata basis.

For the pro-rata deductible method to work optimally, the functional relationships between structure damage and others should be estimated, and for each interval or class of structural damage, the corresponding mean and variance of the C, AP, and ALE damages should be specified. The conditional probabilities for C, AP, and ALE will then be the same as those for structural damage. An independent content matrix is somewhat problematic and may create biases in estimates of net of deductible losses. For structures we are likely to have damage ratio ranges or intervals of 0 to 2%, 2% to 4%, 4% to 6%, etc. For each interval (and its midpoint), ideally we may want to use the mean and variance of the corresponding damage ratios for contents, AP, and ALE. In practice, since the damage matrix for different types of losses are not directly related, we need to use the mean of the content, or AP, or ALE damage vector conditional on windspeeds since the windspeed is the only common frame of reference to the various types of damages.

Expected Structure Loss = $E(L_s) = \sum_{D_S}^{L+D_S} (DM_i - D_s)\, p_S(x_i w) + \sum LM_S\, p_S(x_i w)$

Expected Content Loss = $E(L_C) = \sum_{C_S}^{L+C_S} (f(X_i) - D_c)\, p_C(x_i w) + \sum LM_C\, p_C(x_i w)$

Expected Appurtenant Loss = $E(L_{AP}) = \sum (g(X_i) - D_{AP})\, p_S(x_i w) + \sum LM_{AP}\, p_S(x_i w)$

Expected ALE Loss = $E(L_{ALE}) = \sum (h(X_i) - D_{ALE})\, p_S(x_i w) + \sum LM_{ALE}\, p_S(x_i w)$

Expected Loss = $E(L) = E(L_S) + E(L_C) + E(L_{AP}) + E(L_{ALE})$

where each of the losses net of deductible is ≥ 0 and where the deductibles D_S, D_C, D_{AP}, D_{ALE} are applied on a pro-rata basis to the respective damages as follows:

$D_S = [DM_S / (DM_S + C + AP + ALE)] * D$
$D_C = [C / (DM_S + C + AP + ALE)] * D$
$D_{AP} = [AP / (DM_S + C + AP + ALE)] * D$
$D_{ALE} = [ALE / (DM_S + C + AP + ALE)] * D$

For this method to work, ideally, the joint probabilities of the losses must be estimated and used. In practice such joint probabilities are hard to estimate and validate. Thus, the engineering component should ideally provide for each structural damage interval, and given a wind speed, the mean and variance of damage ratio for content, AP, and ALE. The model uses the mean C, AP, and ALE for the given wind speed to determine the allocation of deductible to the various coverages.

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

The relationship among the modeled deductible loss costs is reasonable.

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

The deductible loss costs are calculated in accordance with s. 627.701(5)(a), F.S.

D. The effects of coinsurance on commercial residential loss costs produced by the model shall be actuarially sound

The effects of coinsurance on commercial residential loss costs are incorporated in an actuarially sound manner.

Disclosures

1. ***Describe the methods used in the model to treat deductibles (both flat and percentage), policy limits, replacement costs, and insurance-to-value when projecting loss costs.***

<u>Personal Residential</u>

In the damage matrices, each wind speed interval is associated with a distribution of possible damage ratios. Each damage ratio is multiplied by insured value to determine dollar damages, the deductible is deducted, and net of deductible loss is estimated, subject to the constraints that net loss is ≥ 0 and ≤ limit – deductible.

<u>Commercial Residential</u>

The deductible is deducted from expected loss for each building.

<u>Personal and Commercial Residential</u>

The deductible is allocated to coverage by first calculating expected losses for each coverage, assuming zero deductible, and then allocating the deductible to coverage based on those losses.

Percentage deductibles are converted into dollar amounts.

Both the replacement cost and property value are assumed to equal the coverage limit unless the property value is provided as an input

2. ***Provide an example of how insurer loss (loss net of deductibles) is calculated. Discuss data or documentation used to confirm or validate the method used by the model.***

Example:

(A)		(B)	(C)	(D)=(A)*(C)	(E)=(D)-(B)
Structure Value	Policy Limit	Deductible	Damage Ratio	Zero Deductible Loss	Loss Net of Deductible
100,000	90,000	500	2%	2,000	1,500

<u>Personal Residential</u>

For each damage ratio:
Loss net of deductible = (Damage Ratio x Bldg Value) – Deductible, but not less than zero or greater than limit – deductible.

Example
Bldg value = \$200,000. Limit = \$180,000. Deductible = \$3,000. J^{th} Damage ratio = 5%.
Loss net of deductible = .05 x 200,000 - 3,000 = \$7,000. If the J^{th} Damage ratio = 1%, then loss net of deductible = 0. If the damage ratio is 95%, then the loss net of deductible = \$180,000 - \$3,000 = \$177,000.

The deductible method used by model is based on Hogg and Klugman (1984). Modeled losses net of deductible were validated against insurance company losses for Hurricanes Andrew, Charley, and Frances.

<u>Commercial Residential</u>

The deductible is deducted from the expected damage for each building.

Example
Building Limit = \$1,000,000. Deductible = 3 % or \$30,000. Expected Damage Ratio = 10%.
Expected Damage = \$1,000,000 x 10% = \$100,000.
Loss net of deductible = \$100,000 - \$30,000 = \$70,000.

3. ***Describe how the model calculates annual deductibles.***

If there are multiple Hurricanes in a year in the stochastic set, the wind deductibles are applied to the first hurricane, and any remaining amount is then applied to the second hurricane. If none of the wind deductible remains, then the general peril deductible is applied. This is the case for both personal and commercial residential policies.

4. ***Describe the methods used in the model to account for coinsurance.***

The model assumes no coinsurance penalties apply.

A-8 Contents

A. The methods used in the development of contents loss costs shall be actuarially sound.

The methods used in the development of contents loss costs are actuarially sound.

B. The relationship between the modeled structure and contents loss costs shall be reasonable, based on the relationship between historical structure and contents losses.

The relationship between the modeled structure and contents loss costs is reasonable, on the basis of the relationship between historical structure and contents losses.

Disclosures

1. Describe the methods used in the model to calculate loss costs for contents coverage associated with personal and commercial residential structures.

Personal Residential

Contents losses are a function of the internal damage. These empirical functions are based on engineering judgment and were validated against claim data for Hurricanes Andrew, Charley, and Frances. Figure 57 shows claims data from Hurricane Andrew, the cubic polynomial trend fit, and the model curve for the High Velocity Hurricane Zone (HVHZ), which consists of Miami-Dade and Broward counties. Notice that in this case the fit between model and data is very good where the density of data is higher.

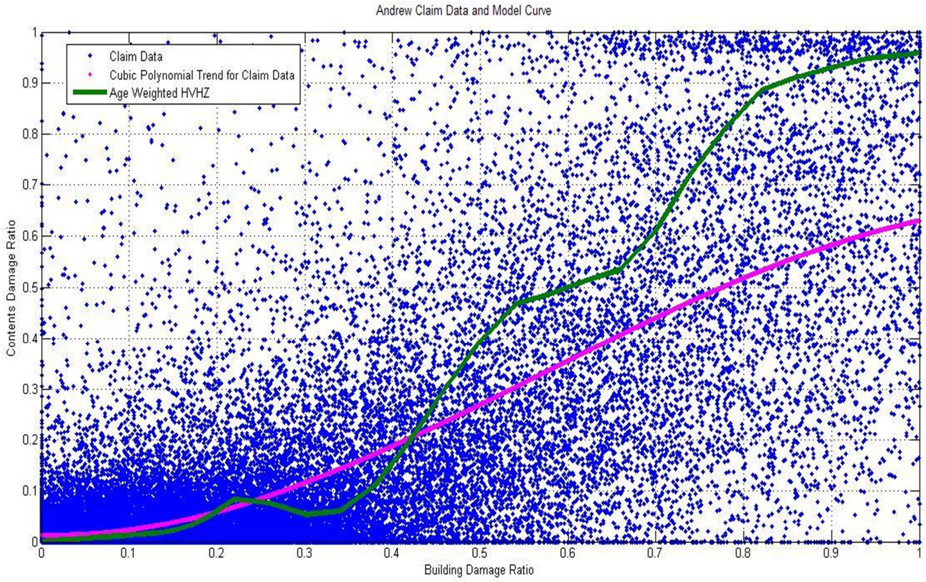


Figure 57. Modeled vs. actual relationship between structure and content damage ratios for Hurricane Andrew.

<u>Commercial Residential</u>

Contents damage in low-rise buildings (three stories or fewer) is modeled as a proportion of interior damage. The interior damage is determined by vulnerability functions that vary by subregion and number of stories.

Contents damage in mid-rise and high-rise buildings (over three stories) is also estimated as a proportion of total estimated interior damage to the building. The interior damage is estimated by determining the expected number of openings (windows, doors, sliding-glass doors) per story to be breached, and the resulting volume of water intrusion in each story.

The assumptions underlying contents damage development are based on engineering judgment.

A-9 Time Element Coverage

A. The methods used in the development of time element coverage loss costs shall be actuarially sound.

The methods used in the development of time element coverage loss costs are actuarially sound.

B. Time element loss cost derivations shall consider the estimated time required to repair or replace the property.

Time element loss cost derivations consider the estimated time required to repair or replace the property.

C. The relationship between the modeled structure and time element loss costs shall be reasonable, based on the relationship between historical structure and time element losses.

For Personal Residential risks the model uses time element vulnerability functions derived from the relationship between structural damage and additional living expense. The vulnerability functions have been calibrated using historical claim data on structure and additional living expense.

For Commercial Residential risks the relationship between modeled structure and time element loss costs is reasonable, but judgmental, since no historical loss data were available for calibration.

D. Time element loss costs produced by the model shall appropriately consider time element claims arising from indirect loss.

The time element loss costs produced by the model consider time element claims arising from damage to the infrastructure. The model does not distinguish explicitly between direct and indirect loss. For Personal Residential risks the time element vulnerability functions were calibrated against claim data that include both types of losses. For Commercial Residential risks the recognition of claims due to indirect loss is judgmental since no historical loss data were available for calibration.

Disclosures

1. ***Describe the methods used to develop loss costs for time element coverage. State whether the model considers both direct and indirect loss to the insured property. For example, direct loss could be for expenses paid to house policyholders in an apartment while their home is being repaired. Indirect loss could be for expenses incurred for loss of power (e.g., food spoilage).***

<u>Personal Residential</u>

The additional living expense losses are based on an empirical function relating those losses to the interior damage to the structure. The model does not distinguish explicitly between direct and indirect loss to the structure, but the function is calibrated against claim data that include both types of losses.

Commercial Residential

The time element losses in low-rise buildings (three stories or fewer) are modeled using vulnerability functions that relate those losses to interior damage to the building. Time element losses in mid-rise and high-rise buildings (over three stories) are not modeled.

2. State the minimum threshold at which time element loss is calculated (e.g., loss is estimated for structure damage greater than 20% or only for category 3, 4, 5 events). Provide documentation of validation test results to verify the approach used.

Time element losses for Personal Residential and low-rise Commercial Residential buildings are calculated as a function of interior damage. There is no minimum threshold at which time element loss is calculated since it is believed that even with minimum interior damage, some time element losses might exist, e.g., when residents are subject to a mandatory evacuation.

3. Describe how modeled time element loss costs take into consideration the damage (including damage due to storm surge, flood, and wind) to local and regional infrastructure.

Time element losses for Personal Residential and low-rise Commercial Residential buildings are calculated as function of interior damage to the structure. They do not explicitly consider the degree of flood or storm surge damage to the infrastructure. For Personal Residential losses there is potentially some influence of such damages injected through the validation process. For low-rise Commercial Residential losses, however, there were no historical time element losses available for validation.

A-10 Output Ranges

A. Output ranges shall be logical and any deviations supported.

Output ranges generated by the model are logical. Deviations are explained.

B. All other factors held constant, output ranges produced by the model shall reflect lower loss costs for:

1. masonry construction versus frame construction,

Output ranges produced by the model reflect lower loss costs for masonry versus frame construction. Deviations are explained.

2. personal residential risk exposure versus mobile home risk exposure,

Output ranges produced by the model reflect lower loss costs for residential versus mobile home risk exposure.

3. in general, inland counties versus coastal counties, and

In general output ranges produced by the model reflect lower loss costs for inland counties versus coastal counties.

4. in general, northern counties versus southern counties.

In general output ranges produced by the model reflect lower loss costs for northern counties versus southern counties.

Disclosures

1. Provide an explanation for all anomalies in the loss costs that are not consistent with the requirements of this standard.

Loss costs for masonry are lower than frame for every ZIP Code, but the county weighted average loss cost for masonry sometimes exceeds frame because the masonry weights are greater in ZIP Codes with high loss costs.

2. Provide an explanation of the differences in the personal residential output ranges using the 2007 Florida Hurricane Catastrophe Fund aggregate personal residential exposure data between the previously accepted submission and the current submission.

There were major revisions to both the meteorology and vulnerability components of the model, and those revisions produced an array of changes to the loss costs.

Impact of Meteorology Changes on Loss Costs

In general the meteorology changes resulted in increased winds and higher loss costs along the immediate coast and lower winds and loss costs inland. Most counties received overall loss cost reductions because of meteorology, with impacts at $0 deductible ranging in size from -3% in Gulf to -34% in Madison. However, some coastal counties with more exposure near the coast than inland, such as Monroe, show overall increases in loss costs. The largest impacts were in Franklin, Walton, Nassau, and Monroe with increases of +77%, +46%, +32%, and +26%, respectively.

Impact of Vulnerability Changes on Loss Costs

Revisions to the vulnerability component increased loss costs in most counties with changes at $0 deductible ranging from +1% to +10%. Larger increases, occurred in some central and northern counties, most notably Orange and Union at +19%.

Combined Impact of Meteorology and Vulnerability Changes

Loss costs for most counties decreased overall as the effect of the lower inland winds more than offset the smaller increases from vulnerability revisions. The few counties where the winds caused loss costs to increase were increased further when combined with the engineering changes. The largest increase occurred in Franklin at +103%.

3. ***Provide a completed Form A-6, Personal Residential Output Ranges using the 2007 Florida Hurricane Catastrophe Fund aggregate personal residential exposure data.***

See Form A-6.

4. ***Provide a completed Form A-7, Percentage Change in Personal Residential Output Ranges using the 2007 Florida Hurricane Catastrophe Fund aggregate personal residential exposure data.***

See Form A-7.

5. ***Provide a completed Form A-8, Percentage Change in Personal Residential Output Ranges by County using the 2007 Florida Hurricane Catastrophe Fund aggregate personal residential exposure data.***

See Form A-8.

6. ***Provide a sample output range report produced by the model for commercial residential loss costs.***

Please see the sample output range report in Standard A-5, Disclosure 2. Both personal residential and commercial residential model output is included in that report.

A-11 Probable Maximum Loss

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

The methods, data, and assumptions used to estimate probable maximum loss levels are actuarially sound.

Disclosures

1. ***Describe how the model produces probable maximum loss levels.***

Probable maximum loss is produced nonparametrically using order statistics of simulated annual losses.

The model produces N simulated annual losses, represented by $X_1, X_2, \ldots, X_N$. The data are ordered so that $X_{(1)} \leq X_{(2)} \leq . . . \leq X_{(N)}$.

For a return period of Y years, let p = 1-1/Y. The corresponding PML for the return period Y is the pth quantile of the ordered losses.

Let k = (N)*p. If k is an integer, then the estimate of the PML is the kth order statistic, $X_{(k)}$, of the simulated losses. If k is not an integer, then let k* = the smallest integer greater than k, and the estimate of the pth quantile is given by $X_{(k*)}$.

2. ***Provide citations to published papers, if any, that were used to estimate probable maximum loss levels.***

Wilkinson, M. E. (1982). Estimating Probable Maximum Loss with Order Statistics. *Casualty Actuarial Society*, *LXIX*, pp. 195-209.

3. ***Provide a completed Form A-9, Probable Maximum Loss for Florida.***

See Form A-9.

4. ***Describe how the probable maximum loss levels produced by the model include the effects of personal and commercial residential insurance coverage.***

The model can produce probable maximum loss levels separately for personal and commercial residential exposures or on a combined basis. To produce the probable maximum loss on a combined basis, modeled losses for both personal and commercial exposures are aggregated for each year in the simulation before the years are ordered.

5. ***Explain any differences between the values provided on Form A-9 and those provided on Form S-2.***

They are the same.

Form A-1: Loss Costs

A. *Provide the expected annual personal residential loss costs by construction type and coverage for each ZIP Code in the sample data set named* ***"FormA1Input09.xls."*** *Refer to assumption information for* ***"FormA1Input09.xls"*** *provided under* ***Submission Data****. Loss costs shall be rounded to six decimal places. There are 1,479 ZIP Codes and three construction types; therefore, the completed file should have 4,437 records in total. The following is a description of the requested file layout. Follow the instructions on Form A-1 below and in the* ***Submission Data*** *description. Note that fields 2-9 are the exposure fields from the sample data set. Fields 10-13 are for the loss costs (net of deductibles).*

B. *If there are ZIP Codes in the sample data set that the model does not recognize as "valid," provide a list in the submission document of such ZIP Code and provide either a) the new ZIP Code to which the original one was mapped, or b) an indication that the insured values from this ZIP Code were not modeled.*

   Loss cost data shall be provided for all ZIP Codes given in the sample data set. That is, if no losses were modeled, the record should still be included in the completed file with loss cost of zero, and if a ZIP Code was mapped to a new one, the resulting loss costs should be reported with the original ZIP Code.

C. *Provide the results on CD in Excel and PDF format using the following file layout. The file name shall include the abbreviated name of the modeling organization, the standards year, and the form name. The first row of the file shall contain the field names below.*

No.	Field Name	Description
1	*Analysis Date*	*Date of Analysis – YYYY/MM/DD*
Exposure Fields from Sample Data Set		
2	*County Code*	*FIPS County Code*
3	*ZIP Code*	*5-digit ZIP Code*
4	*Construction Type*	*1 = Wood Frame, 2 = Masonry, 3 = Mobile Home*
5	*Annual Deductible*	*2% (of the Structure Value) policy deductible for each record (i.e., 0.02*$100,000)*
6	*Structure Value*	*$100,000 for each record*
7	*Appurtenant Structures Value*	*$10,000 for each record*
8	*Contents Value*	*$50,000 for each record*
9	*Additional Living Expense Value*	*$20,000 for each record*
Loss Costs (net of deductibles)		
10	*Structure Loss Cost*	*Projected expected annual loss cost for structure divided by the structure value modeled for each record ($100,000)*
11	*Appurtenant Structures Loss Cost*	*Projected expected annual loss cost for appurtenant structures divided by the appurtenant structures value modeled for each record ($10,000)*
12	*Contents Loss Cost*	*Projected expected annual loss cost for contents divided by the contents value modeled for each record ($50,000)*
13	*Additional Living Expense Loss Cost*	*Projected expected annual loss cost for additional living expense divided by the additional living expense value modeled for each record ($20,000)*

All deductibles are a percentage of the Structure Value and are policy-level deductibles; however, for reporting purposes, the policy deductible shall be pro-rated to the individual coverage losses in proportion to the loss. The default all-other perils deductible is $500.

Invalid ZIP Code Listing

The ZIP Codes in the sample data set not recognized as valid are listed below. The insured values from these ZIP Codes were not modeled.

32151
32230
32276
32335
32573
32574
32575
32576
32581
32582
32589
32590
32592
32593

32594
32595
32596
32597
32598
32613
33044
33188
33192
33651
33697
33728

Form A-2: Zero Deductible Personal Residential Loss Costs by ZIP Code

Provide a map color-coded by ZIP Code (with a minimum of 6 value ranges) displaying zero deductible personal residential loss costs for frame, masonry, and mobile home.

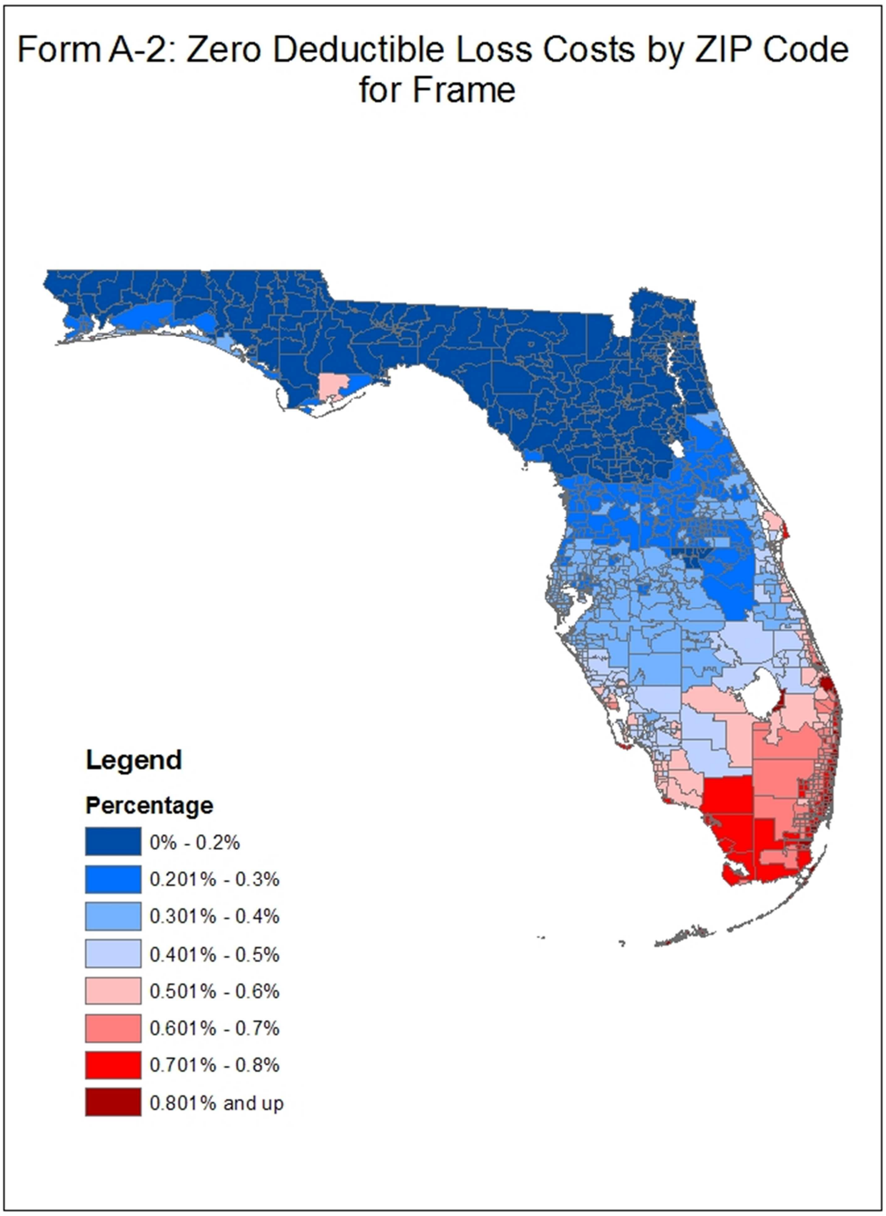


Figure 58. Zero Deductible Loss Cost by ZIP Code for Owners Frame.

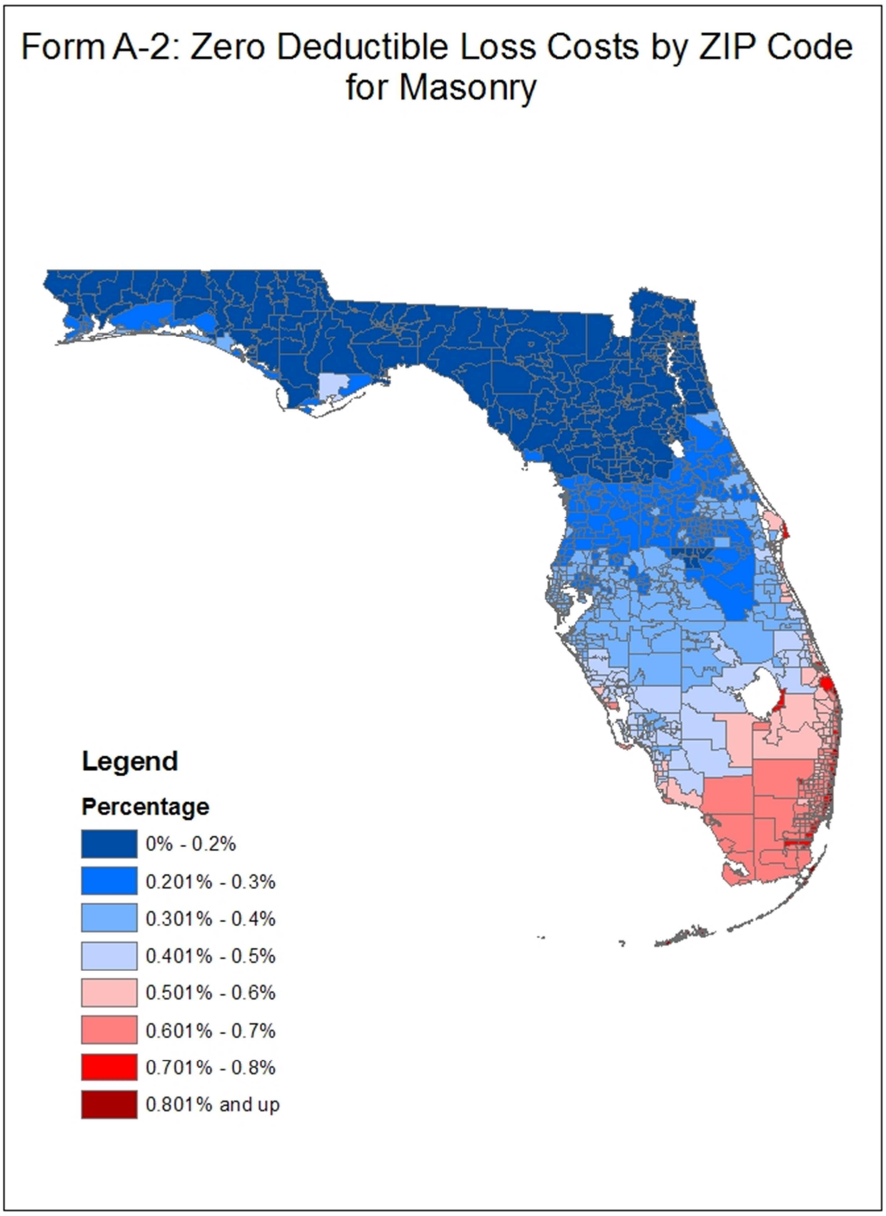


Figure 59. A Zero Deductible Costs by ZIP Code for Owners Masonry.

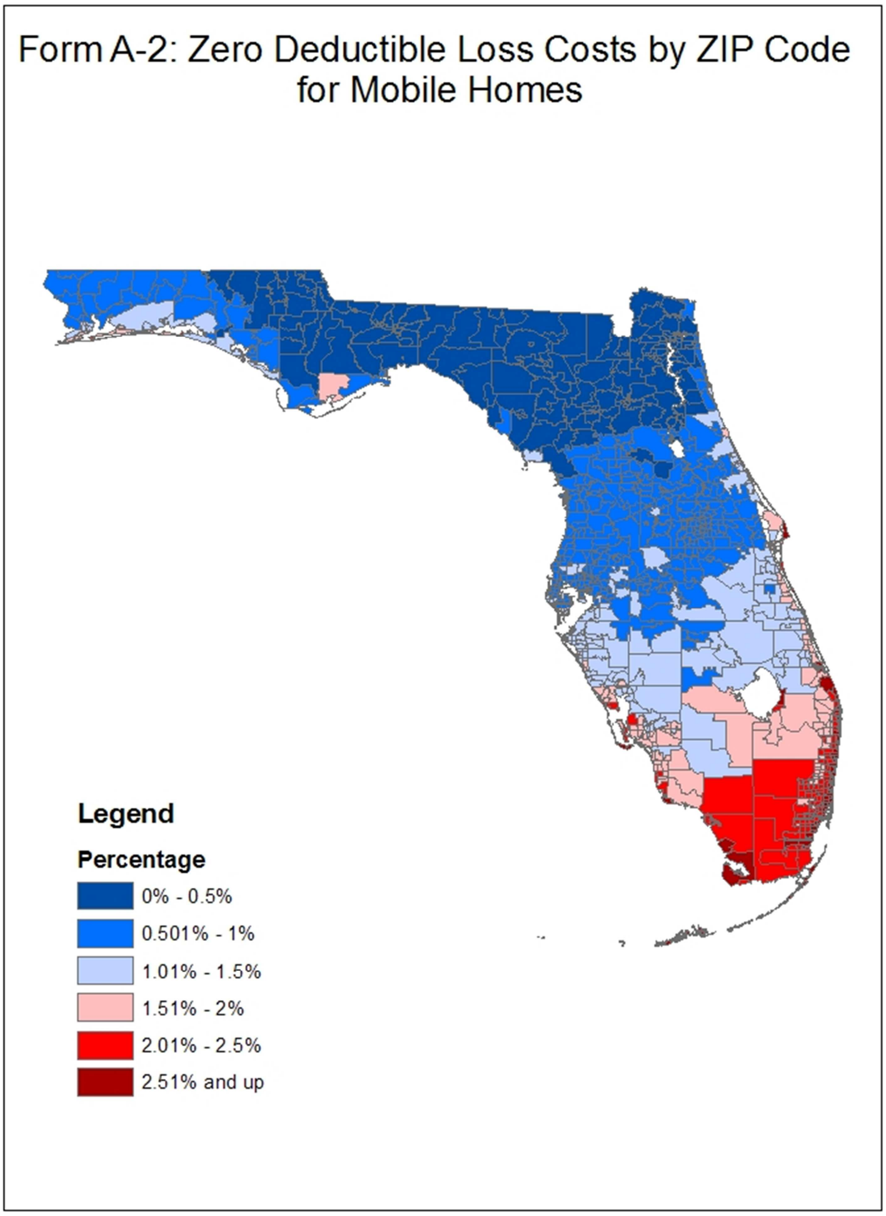


Figure 60. Zero Deductible Loss Costs by ZIP Code for Mobile Home.

Form A-3: Base Hurricane Storm Set Statewide Loss Costs

A. *Provide the total insured loss and the dollar contribution to the average annual loss assuming personal residential zero deductible policies from each specific hurricane in the Base Hurricane Storm Set as defined in Standard M-1, for the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named* ***"hlpm2007.exe."***

B. *Provide the total insured loss and the dollar contribution to the average annual loss assuming commercial residential zero deductible policies from each specific hurricane in the Base Hurricane Storm Set, as defined in Standard M-1, for the 2007 Florida Hurricane Catastrophe Fund's aggregate personal and commercial residential exposure data, type of business 1, found in the file named* ***"hlpm2007c.exe."***

The table below contains the minimum number of hurricanes from HURDAT to be included in the Base Hurricane Storm Set. Each hurricane has been assigned an ID number. Additional hurricanes included in the model's Base Hurricane Storm Set shall be added to the table below and assigned an ID number as the hurricane falls within the given ID numbers.

C. *Provide this Form on CD in Excel format. The file name shall include the abbreviated name of the modeling organization, the standards year, and the form name. A hard copy of Form A-3 shall be included in the submission.*

ID	Landfall/Closest Approach Date	Year	Name	Total Personal Residential Insured Losses ($)	Dollar Contribution	Total Commercial Residential Insured Losses	Dollar Contribution
005	9/11/1903	1903	NoName3-1903	9,131,706,927	83,015,518	1,056,567,323	9,605,157
010	10/16/1904	1904	NoName3-1904	3,190,929,908	29,008,454	465,812,887	4,234,663
015	6/16/1906	1906	NoName2-1906	2,372,939,229	21,572,175	392,083,482	3,564,395
020	10/8/1906	1906	NoName8-1906	11,089,892,483	100,817,204	2,489,719,083	22,633,810
025	10/11/1909	1909	NoName10-1909	1,044,615,816	9,496,507	452,896,388	4,117,240
030	10/17/1910	1910	NoName5-1910	12,779,965,679	116,181,506	2,557,298,045	23,248,164
035	7/31/1915	1915	NoName1-1915	1,050,627,332	9,551,158	75,500,308	686,366
040	9/3/1915	1915	NoName4-1915	488,720,857	4,442,917	18,243,119	165,847
045	10/17/1916	1916	NoName14-1916	1,165,178,411	10,592,531	199,102,100	1,810,019
050	9/26/1917	1917	NoName4-1917	2,170,523,490	19,732,032	1,089,953,185	9,908,665
055	9/9/1919	1919	NoName2-1919	197,021,576	1,791,105	65,556,831	595,971
060	10/24/1921	1921	NoName6-1921	20,139,185,686	183,083,506	2,494,848,376	22,680,440
065	9/13/1924	1924	NoName5-1924	166,039,591	1,509,451	4,165,299	37,866
070	10/20/1924	1924	NoName10-1924	6,636,406,957	60,330,972	873,733,154	7,943,029
075	11/30/1925	1925	NoName4-1925	3,971,256,244	36,102,329	281,535,944	2,559,418
080	7/27/1926	1926	NoName1-1926	8,854,442,423	80,494,931	1,538,925,079	13,990,228
085	9/18/1926	1926	NoName6-1926	32,434,109,375	294,855,540	20,622,559,520	187,477,814
090	8/7/1928	1928	NoName1-1928	5,888,543,942	53,532,218	404,145,420	3,674,049
095	9/16/1928	1928	NoName4-1928	36,356,015,951	330,509,236	7,261,037,691	66,009,434
100	9/27/1929	1929	NoName2-1929	16,834,749,861	153,043,181	3,424,522,830	31,132,026
105	7/29/1933	1933	NoName5-1933	1,037,392,655	9,430,842	100,316,767	911,971

ID	Landfall/Closest Approach Date	Year	Name	Total Personal Residential Insured Losses ($)	Dollar Contribution	Total Commercial Residential Insured Losses	Dollar Contribution
110	9/3/1933	1933	NoName12-1933	11,544,203,233	104,947,302	2,892,191,577	26,292,651
115	9/2/1935	1935	NoName2-1935	10,030,191,998	91,183,564	1,917,401,865	17,430,926
120	11/4/1935	1935	NoName6-1935	6,925,210,089	62,956,455	1,353,904,335	12,308,221
125	7/27/1936	1936	NoName5-1936	705,422,679	6,412,933	68,801,667	625,470
130	8/11/1939	1939	NoName2-1939	3,399,933,545	30,908,487	195,757,397	1,779,613
135	10/5/1941	1941	NoName5-1941	22,820,912,954	207,462,845	10,647,954,799	96,799,589
140	10/18/1944	1944	NoName11-1944	22,425,860,658	203,871,461	1,507,645,442	13,705,868
145	6/22/1945	1945	NoName1-1945	9,618,740,915	87,443,099	261,613,970	2,378,309
150	9/15/1945	1945	NoName9-1945	18,447,435,906	167,703,963	4,963,805,114	45,125,501
155	10/7/1946	1946	NoName5-1946	6,124,010,270	55,672,821	283,691,252	2,579,011
160	9/17/1947	1947	NoName4-1947	20,298,093,530	184,528,123	5,487,811,159	49,889,192
165	10/11/1947	1947	NoName8-1947	7,150,364,782	65,003,316	1,058,432,379	9,622,113
170	9/21/1948	1948	NoName7-1948	4,830,909,262	43,917,357	1,032,906,459	9,390,059
175	10/5/1948	1948	NoName8-1948	1,834,141,158	16,674,011	479,863,295	4,362,394
180	8/26/1949	1949	NoName2-1949	21,944,473,255	199,495,211	4,110,934,162	37,372,129
185	9/3/1950	1950	EASY-1950	13,912,587,469	126,478,068	1,232,193,167	11,201,756
190	10/17/1950	1950	KING-1950	4,740,824,628	43,098,406	1,970,545,840	17,914,053
195	9/25/1953	1953	FLORENCE-1953	255,735,147	2,324,865	36,552,017	332,291
200	9/24/1956	1956	FLOSSY-1956	626,031,538	5,691,196	104,055,890	945,963
205	9/9/1960	1960	DONNA-1960	20,709,934,265	188,272,130	2,853,631,961	25,942,109
210	8/26/1964	1964	CLEO-1964	13,616,663,875	123,787,853	7,519,061,241	68,355,102
215	9/9/1964	1964	DORA-1964	4,131,009,213	37,554,629	263,734,680	2,397,588
220	10/14/1964	1964	ISBELL-1964	8,009,643,062	72,814,937	1,857,081,854	16,882,562
225	9/7/1965	1965	BETSY-1965	6,143,160,662	55,846,915	960,629,748	8,732,998
230	6/8/1966	1966	ALMA-1966	11,649,700,769	105,906,371	1,119,621,442	10,178,377
235	9/21/1966	1966	INEZ-1966	320,535,617	2,913,960	35,973,136	327,029
240	10/16/1968	1968	GLADYS-1968	5,251,149,298	47,737,721	398,406,945	3,621,881
245	6/18/1972	1972	AGNES-1972	127,593,335	1,159,939	1,860,070	16,910
250	9/22/1975	1975	ELOISE-1975	970,482,685	8,822,570	539,767,759	4,906,980
255	9/3/1979	1979	DAVID-1979	8,111,344,681	73,739,497	1,445,853,609	13,144,124
260	9/12/1979	1979	FREDERIC-1979	1,075,987,218	9,781,702	225,853,362	2,053,212
265	8/29/1985	1985	ELENA-1985	161,093,694	1,464,488	8,223,957	74,763
270	11/20/1985	1985	KATE-1985	425,441,990	3,867,654	9,759,541	88,723
275	10/12/1987	1987	FLOYD-1987	136,893,828	1,244,489	12,694,035	115,400
280	8/24/1992	1992	ANDREW-1992	17,435,551,498	158,505,014	10,544,804,370	95,861,858
285	8/1/1995	1995	ERIN-1995	4,666,456,426	42,422,331	220,853,668	2,007,761
290	10/3/1995	1995	OPAL-1995	3,198,224,765	29,074,771	1,816,362,624	16,512,387
295	9/1/1998	1998	EARL-1998	11,913,484	108,304	178,251	1,620
300	9/25/1998	1998	GEORGES-1998	393,327,688	3,575,706	172,469,863	1,567,908
305	10/15/1999	1999	IRENE-1999	4,087,575,104	37,159,774	618,293,314	5,620,848

ID	Landfall/Closest Approach Date	Year	Name	Total Personal Residential Insured Losses ($)	Dollar Contribution	Total Commercial Residential Insured Losses	Dollar Contribution
310	8/13/2004	2004	CHARLEY-2004	7,663,297,947	69,666,345	448,116,488	4,073,786
315	9/4/2004	2004	FRANCES-2004	10,435,844,529	94,871,314	957,140,018	8,701,273
320	9/14/2004	2004	IVAN-2004	619,399,032	5,630,900	89,632,475	814,841
325	9/25/2004	2004	JEANNE-2004	13,099,111,848	119,082,835	1,255,062,227	11,409,657
330	7/7/2005	2005	DENNIS-2005	870,770,466	7,916,095	132,514,857	1,204,681
335	8/24/2005	2005	KATRINA-2005	3,523,331,357	32,030,285	714,237,904	6,493,072
340	9/18/2005	2005	RITA-2005	120,269,657	1,093,361	10,811,502	98,286
345	10/20/2005	2005	WILMA-2005	15,626,556,601	142,059,605	2,088,726,714	18,988,425
Other hurricanes included:							
	8/10/1901	1901	NoName4-1901	328,911,001	2,990,100	22,454,684	204,133
	9/25/1906	1906	NoName6-1906	743,802,204	6,761,838	74,013,934	672,854
	8/8/1911	1911	NoName2-1911	244,992,582	2,227,205	9,836,958	89,427
	8/23/1911	1911	NoName3-1911	0	0	0	0
	9/10/1912	1912	NoName4-1912	32,092,862	291,753	3,960,275	36,002
	7/4/1916	1916	NoName2-1916	447,064,255	4,064,221	33,021,683	300,197
	10/20/1926	1926	NoName10-1926	191,977,220	1,745,247	54,749,285	497,721
	8/29/1932	1932	NoName3-1932	1,181,220,555	10,738,369	279,384,192	2,539,856
	8/5/1940	1940	NoName3-1940	0	0	0	0
	8/29/1950	1950	BAKER-1950	470,735,762	4,279,416	39,153,376	355,940
	9/14/1960	1960	ETHEL-1960	0	0	70	1
	8/16/1969	1969	CAMILLE-1969	0	0	0	0
	7/16/1997	1997	DANNY-1997	61,597,446	559,977	6,356,900	57,790
	9/20/2004	2004	IVAN-2004	0	0	0	0
	8/30/2008	2008	GUSTAV-2008	0	0	0	0
	9/9/2008	2008	IKE-2008	0	0	1,202	11
			Total	530,930,005,885		122,318,874,789	

Note: Total dollar contributions should agree with the total average annual zero deductible statewide loss costs provided in Form S-5 for current year.

Form A-4: Hurricane Andrew (1992) Percent of Losses

A. Provide the percentage of personal residential zero deductible losses, rounded to four decimal places, from Hurricane Andrew (1992) for each affected ZIP Code. Include all ZIP Codes where losses are equal to or greater than $500,000.

B. Provide the percentage of commercial residential zero deductible losses, rounded to four decimal places, from Hurricane Andrew (1992) for each affected ZIP Code. Include all ZIP Codes where losses are equal to or greater than $500,000.

C. Provide a map color-coded by ZIP Code depicting the percentage of total personal residential losses from Hurricane Andrew(1992) below latitude 27°N using the following interval coding:

Red	*Over 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 0.1%*

D. Provide a map color-coded by ZIP Code depicting the percentage of total commercial residential losses from Hurricane Andrew (1992) below latitude 27°N using the following interval coding:

Red	*Over 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	*0.1%*

E. Provide this Form on CD in Excel format. The file name shall include the abbreviated name of the modeling organization, the standards year, and the form name. A hard copy of Form A-4 shall be included in the submission.

Rather than using a directly published windfield for Hurricane Andrew, the winds underlying the loss cost calculations must be produced by the model being evaluated and should be the same hurricane parameters as used in completing Form A-3. Use the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named ***"hlpm2007.exe"*** *for personal residential losses and the 2007 Florida Hurricane Catastrophe Fund's aggregate personal and commercial residential exposure data, type of business 1, found in the file named* ***"hlpm2007c.exe"*** *for commercial residential losses.*

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33012	$89,564,117	0.51%	$34,160,882	0.32%
33143	$477,649,331	2.74%	$154,905,600	1.47%
33013	$71,521,886	0.41%	$3,773,630	0.04%
33144	$94,064,350	0.54%	$7,753,919	0.07%
33931	$19,637,521	0.11%	$5,462,355	0.05%
33014	$77,116,613	0.44%	$21,686,164	0.21%
33145	$176,702,423	1.01%	$18,658,902	0.18%
33015	$83,260,848	0.48%	$8,699,243	0.08%
33146	$254,142,635	1.46%	$35,380,181	0.34%
33016	$43,463,592	0.25%	$18,665,378	0.18%
33147	$75,932,759	0.44%	$2,143,809	0.02%
33018	$59,475,614	0.34%	$1,543,312	0.01%
33149	$550,038,268	3.15%	$854,434,542	8.10%
33477	$18,484,675	0.11%	$4,312,246	0.04%
33019	$80,088,280	0.46%	$183,250,359	1.74%
33150	$33,435,781	0.19%	$3,103,860	0.03%
33020	$66,425,921	0.38%	$31,020,650	0.29%
34134	$53,712,284	0.31%	$5,645,590	0.05%
33021	$108,626,752	0.62%	$8,738,570	0.08%
34135	$63,725,927	0.37%	$4,027,505	0.04%
33480	$124,541,099	0.71%	$13,405,014	0.13%
33023	$119,770,217	0.69%	$1,330,886	0.01%
33154	$161,931,279	0.93%	$530,402,155	5.03%
33351	$36,692,592	0.21%	$2,135,483	0.02%
33024	$121,838,793	0.70%	$2,700,591	0.03%
33155	$234,308,399	1.34%	$23,760,480	0.23%
33483	$41,806,246	0.24%	$9,481,133	0.09%
34138	$1,473,624	0.01%	$715,245	0.01%
33025	$67,441,884	0.39%	$7,837,165	0.07%
33156	$1,218,081,293	6.99%	$192,727,305	1.83%
33484	$18,399,043	0.11%	$4,154,551	0.04%
34139	$3,354,569	0.02%	$860,226	0.01%
33026	$85,434,442	0.49%	$4,894,990	0.05%
33157	$560,737,845	3.22%	$99,145,511	0.94%
33027	$94,398,691	0.54%	$1,199,327	0.01%
33158	$147,516,247	0.85%	$39,297,563	0.37%
33486	$47,591,973	0.27%	$1,849,678	0.02%
33487	$45,261,390	0.26%	$9,608,880	0.09%
33160	$108,725,122	0.62%	$723,760,191	6.86%
33030	$92,665,921	0.53%	$20,265,254	0.19%
33161	$96,803,509	0.56%	$56,149,373	0.53%
33162	$54,460,927	0.31%	$5,679,428	0.05%
34145	$140,213,907	0.80%	$116,930,321	1.11%
33032	$106,565,770	0.61%	$11,364,654	0.11%
33426	$21,196,844	0.12%	$1,007,215	0.01%
33033	$110,279,281	0.63%	$5,367,964	0.05%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33034	$43,801,826	0.25%	$14,441,646	0.14%
33165	$345,958,085	1.98%	$26,479,486	0.25%
33428	$29,255,780	0.17%	$2,530,105	0.02%
33035	$27,816,239	0.16%	$14,530,572	0.14%
33166	$59,114,549	0.34%	$14,736,261	0.14%
33167	$33,147,508	0.19%	$1,707,367	0.02%
33037	$49,455,358	0.28%	$2,625,788	0.02%
33496	$44,965,995	0.26%	$2,237,898	0.02%
33431	$36,996,127	0.21%	$5,715,791	0.05%
33169	$55,525,684	0.32%	$2,981,103	0.03%
33432	$52,780,568	0.30%	$13,212,742	0.13%
33170	$59,882,173	0.34%	$5,463,264	0.05%
33301	$53,693,631	0.31%	$7,746,318	0.07%
33957	$37,262,912	0.21%	$4,185,531	0.04%
33433	$62,125,608	0.36%	$6,592,189	0.06%
33172	$26,809,069	0.15%	$162,965,661	1.55%
33434	$22,033,180	0.13%	$4,802,593	0.05%
33173	$295,909,944	1.70%	$112,440,424	1.07%
33304	$34,764,975	0.20%	$17,225,703	0.16%
33435	$33,219,693	0.19%	$6,181,351	0.06%
33174	$91,378,164	0.52%	$43,200,387	0.41%
33305	$34,758,079	0.20%	$4,296,975	0.04%
33436	$29,868,432	0.17%	$3,242,380	0.03%
33109	$101,587,828	0.58%	$313,491,646	2.97%
33175	$327,177,855	1.88%	$63,026,940	0.60%
33306	$12,716,822	0.07%	$2,730,092	0.03%
33437	$846,435	0.00%	$3,145,015	0.03%
33176	$713,970,330	4.09%	$131,930,344	1.25%
33177	$227,203,531	1.30%	$6,129,362	0.06%
33308	$92,804,550	0.53%	$51,845,120	0.49%
33178	$63,067,153	0.36%	$42,024,380	0.40%
33309	$38,900,088	0.22%	$2,584,211	0.02%
33179	$58,720,554	0.34%	$16,270,555	0.15%
33441	$31,142,647	0.18%	$4,984,643	0.05%
33180	$70,081,256	0.40%	$277,316,715	2.63%
33311	$45,524,003	0.26%	$2,827,153	0.03%
33442	$32,887,436	0.19%	$8,476,493	0.08%
33181	$55,534,077	0.32%	$106,592,804	1.01%
33312	$78,511,642	0.45%	$1,568,216	0.01%
33182	$53,032,288	0.30%	$2,447,697	0.02%
33313	$37,120,098	0.21%	$6,752,840	0.06%
33444	$22,277,825	0.13%	$1,739,745	0.02%
33183	$217,985,434	1.25%	$106,199,677	1.01%
33445	$37,692,486	0.22%	$5,653,715	0.05%
33314	$26,044,355	0.15%	$2,234,682	0.02%
33904	$576,906	0.00%	$1,840,165	0.02%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33184	$89,256,268	0.51%	$8,793,733	0.08%
33446	$32,947,096	0.19%	$5,435,910	0.05%
33315	$25,900,122	0.15%	$2,589,779	0.02%
33185	$101,506,975	0.58%	$1,148,609	0.01%
33054	$35,311,196	0.20%	$1,284,541	0.01%
34102	$94,749,967	0.54%	$5,363,442	0.05%
33316	$44,700,863	0.26%	$24,727,418	0.23%
33186	$662,318,877	3.80%	$123,329,523	1.17%
34103	$50,374,358	0.29%	$15,484,461	0.15%
33317	$81,897,247	0.47%	$2,391,371	0.02%
33056	$56,287,069	0.32%	$1,302,558	0.01%
34104	$53,511,943	0.31%	$5,615,177	0.05%
33908	$38,315,520	0.22%	$5,838,861	0.06%
34105	$52,878,725	0.30%	$3,891,955	0.04%
33319	$47,925,821	0.27%	$7,717,658	0.07%
33189	$103,468,624	0.59%	$27,123,599	0.26%
33321	$42,005,829	0.24%	$6,019,549	0.06%
33190	$28,646,762	0.16%	$2,253,837	0.02%
33125	$149,504,424	0.86%	$105,077,693	1.00%
33322	$62,069,182	0.36%	$6,253,783	0.06%
33060	$43,777,107	0.25%	$5,677,125	0.05%
34108	$77,547,743	0.44%	$10,236,191	0.10%
33126	$83,503,711	0.48%	$126,889,260	1.20%
33912	$34,488,753	0.20%	$1,832,286	0.02%
34109	$67,116,854	0.38%	$4,298,867	0.04%
33127	$77,686,692	0.45%	$42,273,590	0.40%
33913	$20,045,164	0.12%	$1,451,985	0.01%
34110	$61,724,276	0.35%	$5,781,483	0.05%
33324	$63,060,107	0.36%	$7,720,515	0.07%
33193	$180,370,374	1.03%	$120,195,162	1.14%
33062	$66,204,793	0.38%	$85,164,682	0.81%
33128	$6,088,724	0.03%	$9,093,459	0.09%
33914	$45,075,242	0.26%	$776,948	0.01%
33063	$43,364,285	0.25%	$5,166,095	0.05%
33129	$38,113,120	0.22%	$151,191,654	1.43%
33064	$80,837,896	0.46%	$5,600,485	0.05%
34112	$66,144,393	0.38%	$8,147,295	0.08%
33326	$64,281,488	0.37%	$3,319,993	0.03%
33130	$26,048,857	0.15%	$77,428,307	0.73%
34113	$52,964,396	0.30%	$5,960,437	0.06%
33196	$217,132,929	1.25%	$65,056,320	0.62%
33065	$43,944,069	0.25%	$4,309,717	0.04%
33131	$23,551,261	0.14%	$348,517,094	3.31%
34114	$39,999,194	0.23%	$5,628,213	0.05%
33328	$72,745,911	0.42%	$1,716,184	0.02%
33066	$11,941,828	0.07%	$6,717,439	0.06%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33132	$4,567,024	0.03%	$89,283,751	0.85%
33460	$20,276,939	0.12%	$1,406,647	0.01%
33067	$47,454,972	0.27%	$678,585	0.01%
33133	$495,373,977	2.84%	$232,485,479	2.20%
34116	$44,045,656	0.25%	$1,020,807	0.01%
33068	$35,660,651	0.20%	$1,315,359	0.01%
33134	$232,422,937	1.33%	$50,327,347	0.48%
33462	$20,715,548	0.12%	$2,208,188	0.02%
33069	$15,710,556	0.09%	$11,930,533	0.11%
33135	$91,112,531	0.52%	$64,105,981	0.61%
33004	$29,166,718	0.17%	$13,759,873	0.13%
33921	$9,947,867	0.06%	$516,128	0.00%
33070	$7,318,168	0.04%	$640,144	0.01%
33136	$10,631,170	0.06%	$62,701,788	0.59%
34119	$78,489,227	0.45%	$2,970,078	0.03%
33071	$53,831,645	0.31%	$1,724,917	0.02%
33137	$97,824,377	0.56%	$180,119,351	1.71%
33334	$48,390,722	0.28%	$4,130,310	0.04%
34120	$46,360,272	0.27%	$602,869	0.01%
33138	$148,024,857	0.85%	$141,679,979	1.34%
33073	$23,088,454	0.13%	$662,273	0.01%
33139	$306,814,918	1.76%	$1,369,731,213	12.99%
33401	$7,598,866	0.04%	$4,481,053	0.04%
33140	$494,302,531	2.84%	$960,760,796	9.11%
33009	$68,844,958	0.39%	$194,757,603	1.85%
33141	$168,090,049	0.96%	$680,369,921	6.45%
33010	$56,839,844	0.33%	$12,268,104	0.12%
33142	$67,606,205	0.39%	$3,802,680	0.04%
33928	$26,200,868	0.15%	$2,465,687	0.02%
33407	$0	0.00%	$1,386,483	0.01%
33408	$0	0.00%	$4,155,721	0.04%
33409	$0	0.00%	$1,876,153	0.02%
33153	$0	0.00%	$9,237,128	0.09%
33163	$0	0.00%	$782,265	0.01%
34146	$0	0.00%	$601,217	0.01%
33036	$0	0.00%	$668,061	0.01%
33116	$0	0.00%	$1,353,195	0.01%
33907	$0	0.00%	$2,328,437	0.02%
33122	$0	0.00%	$4,181,063	0.04%
33124	$0	0.00%	$2,116,357	0.02%
33919	$0	0.00%	$3,581,625	0.03%
33461	$0	0.00%	$1,912,170	0.02%
33403	$0	0.00%	$788,609	0.01%
33404	$0	0.00%	$3,468,339	0.03%
33028	$42,190,434	0.24%	$0	0.00%
33029	$108,975,920	0.63%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33031	$85,978,524	0.49%	$0	0.00%
33055	$72,744,591	0.42%	$0	0.00%
33076	$35,196,188	0.20%	$0	0.00%
33168	$47,742,640	0.27%	$0	0.00%
33187	$161,528,404	0.93%	$0	0.00%
33194	$15,694,354	0.09%	$0	0.00%
33323	$35,360,036	0.20%	$0	0.00%
33325	$55,043,018	0.32%	$0	0.00%
33327	$40,514,721	0.23%	$0	0.00%
33330	$50,209,510	0.29%	$0	0.00%
33331	$65,511,867	0.38%	$0	0.00%
33332	$31,684,037	0.18%	$0	0.00%
33405	$11,029,101	0.06%	$0	0.00%
33427	$725,395	0.00%	$0	0.00%
33498	$21,607,805	0.12%	$0	0.00%
33924	$12,753,988	0.07%	$0	0.00%
33956	$4,123,280	0.02%	$0	0.00%
33967	$8,241,615	0.05%	$0	0.00%
34117	$31,039,079	0.18%	$0	0.00%
34140	$2,099,275	0.01%	$0	0.00%
34142	$2,490,360	0.01%	$0	0.00%

Form A-4: Hurricane Andrew Percent of Losses (Map)

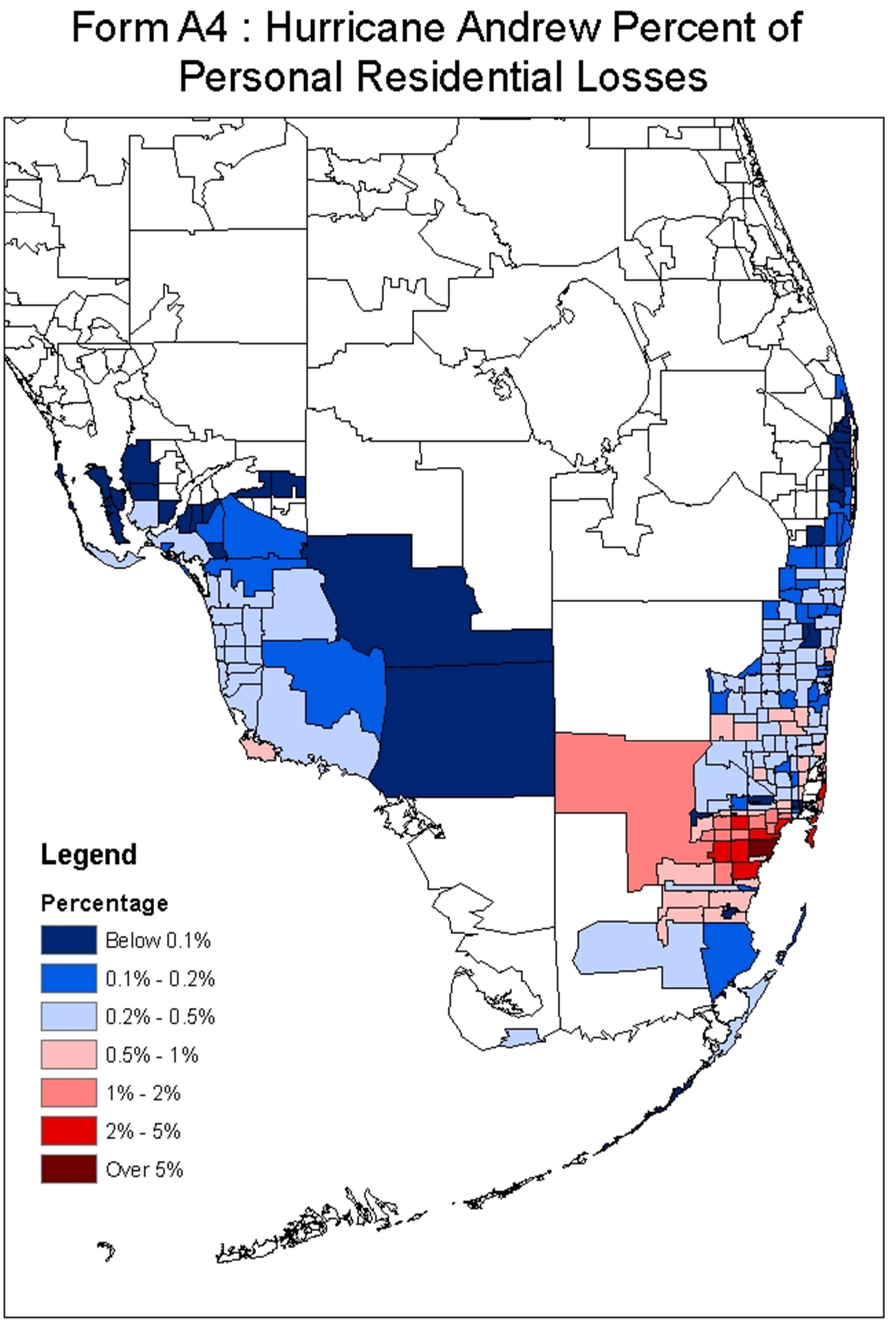


Figure 61. Hurricane Andrew Personal Residential Loss Distribution.

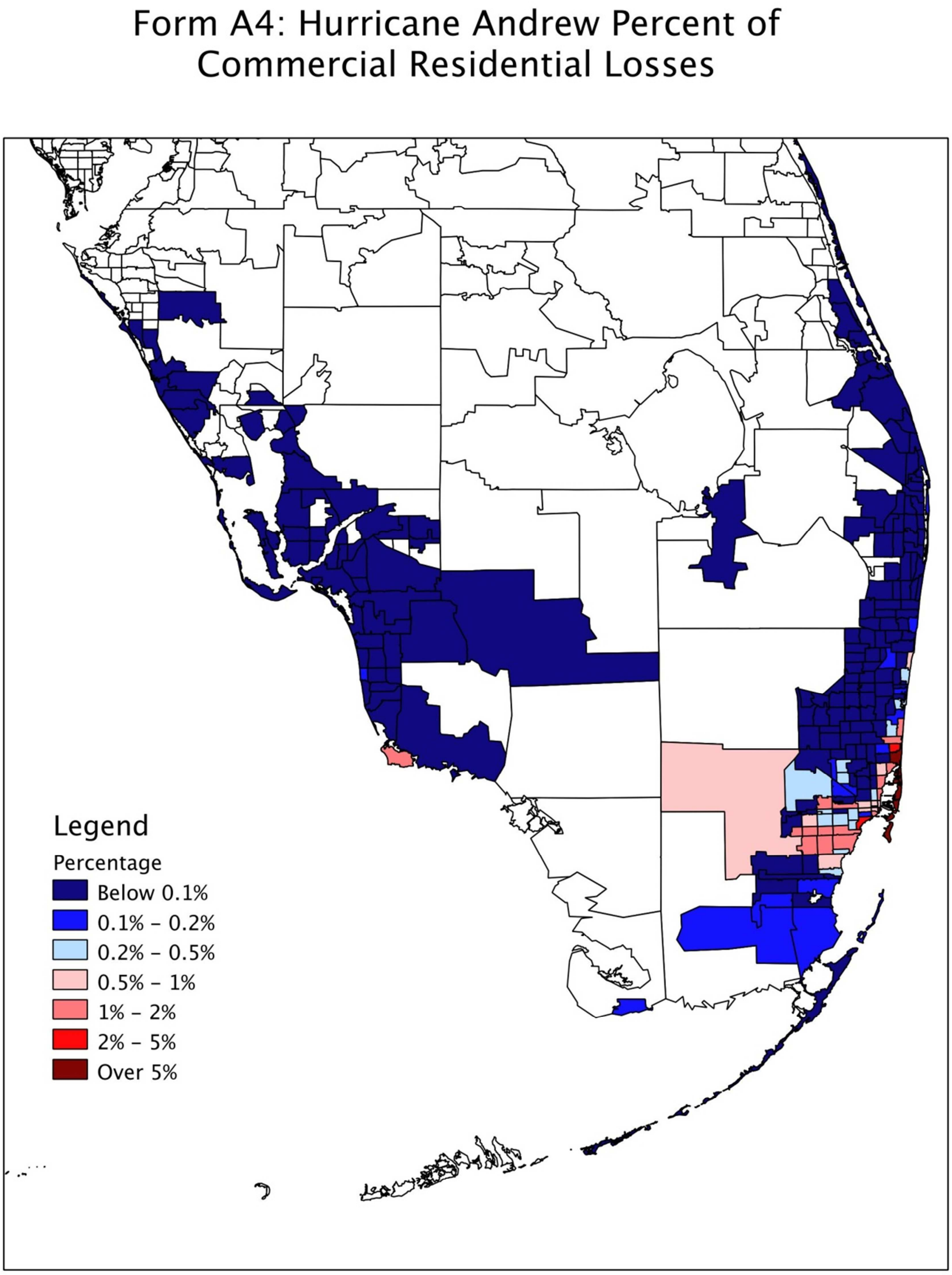


Figure 62. Hurricane Andrew Commercial Residential Loss Distribution.

Form A-5: Cumulative Losses from the 2004 Hurricane Season

A. Provide the percentage of personal residential zero deductible cumulative losses, rounded to four decimal places, from Hurricane Charley (2004), Hurricane Frances (2004), Hurricane Ivan (2004), and Hurricane Jeanne (2004) for each affected ZIP Code. Include all ZIP Codes where losses are equal to or greater than $500,000.

B. Provide the percentage of commercial residential zero deductible cumulative losses, rounded to four decimal places, from Hurricane Charley (2004), Hurricane Frances (2004), Hurricane Ivan (2004), and Hurricane Jeanne (2004) for each affected ZIP Code. Include all ZIP Codes where losses are equal to or greater than $500,000.

C. Provide maps color coded by ZIP Code depicting the percentage of total personal residential losses from each hurricane, Hurricane Charley (2004), Hurricane Frances (2004), Hurricane Ivan (2004), and Hurricane Jeanne (2004) and for the cumulative losses using the following interval coding:

Red	*Over 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 0.1%*

D. Provide maps color-coded by ZIP Code depicting the percentage of total commercial residential losses from each hurricane, Hurricane Charley (2004), Hurricane Frances (2004), Hurricane Ivan (2004), and Hurricane Jeanne (2004) and for the cumulative losses using the following interval coding:

Red	*Over 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	*0.1%*

E. Provide this form on CD in Excel format. The file name shall include the abbreviated name of the modeling organization, the standards year, and the form name. A hard copy of Form A-5 shall be included in the submission.

Rather than using directly a specific published windfield, the winds underlying the loss cost calculations must be produced by the model being evaluated and should be the same hurricane parameters as used in completing Form A-3. Use the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named ***"hlpm2007.exe"*** *for personal residential losses and the 2007 Florida Hurricane Catastrophe Fund's aggregate personal and commercial residential exposure data, type of business 1, found in the file named "hlpm2007c.exe" for commercial residential losses.*

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
34950	$38,843,140	0.12%	$3,332,960	0.12%
34667	$95,188,493	0.30%	$1,611,686	0.06%
32828	$228,733,073	0.72%	$624,020	0.02%
34102	$33,225,038	0.10%	$2,474,760	0.09%
34951	$102,612,942	0.32%	$1,104,774	0.04%
34668	$71,532,518	0.22%	$1,693,503	0.06%
32829	$66,138,976	0.21%	$1,242,071	0.05%
34103	$17,987,385	0.06%	$16,096,517	0.59%
34952	$191,783,216	0.60%	$5,138,866	0.19%
32547	$18,155,748	0.06%	$643,459	0.02%
32548	$14,864,183	0.05%	$3,099,379	0.11%
32832	$63,686,248	0.20%	$925,391	0.03%
32550	$14,241,895	0.04%	$3,589,601	0.13%
33966	$7,146,908	0.02%	$743,489	0.03%
34108	$666,803	0.00%	$5,900,173	0.21%
34957	$105,721,779	0.33%	$6,301,307	0.23%
32127	$211,037,668	0.66%	$6,846,359	0.25%
33825	$94,470,512	0.30%	$815,510	0.03%
33401	$43,618,686	0.14%	$16,405,566	0.60%
32835	$140,219,822	0.44%	$4,892,290	0.18%
32128	$97,463,454	0.31%	$581,779	0.02%
32836	$131,149,624	0.41%	$814,113	0.03%
34110	$598,269	0.00%	$3,333,082	0.12%
33403	$28,268,429	0.09%	$7,043,065	0.26%
32837	$222,754,475	0.70%	$1,416,718	0.05%
32413	$17,060,353	0.05%	$2,182,488	0.08%
34677	$18,035,992	0.06%	$2,146,624	0.08%
33404	$76,205,494	0.24%	$32,335,434	1.18%
32839	$65,186,584	0.20%	$2,128,129	0.08%
33405	$58,598,539	0.18%	$1,872,900	0.07%
33406	$58,992,803	0.19%	$1,741,164	0.06%
33407	$53,879,912	0.17%	$6,391,560	0.23%
33408	$141,552,258	0.44%	$48,802,190	1.77%
32701	$53,264,398	0.17%	$4,091,538	0.15%
33409	$49,070,044	0.15%	$8,745,860	0.32%
32136	$59,301,043	0.19%	$2,701,647	0.10%
34683	$61,055,592	0.19%	$1,994,399	0.07%
32561	$44,982,372	0.14%	$21,397,291	0.78%
33410	$218,443,818	0.69%	$13,772,575	0.50%
32137	$115,930,612	0.36%	$4,954,185	0.18%
34684	$17,979,507	0.06%	$2,909,233	0.11%
33411	$205,947,262	0.65%	$7,063,916	0.26%
34685	$19,214,726	0.06%	$962,123	0.04%
33980	$43,795,068	0.14%	$5,750,931	0.21%
33414	$226,132,791	0.71%	$2,864,773	0.10%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
34688	$25,606,257	0.08%	$1,174,671	0.04%
32707	$158,294,328	0.50%	$2,839,555	0.10%
32566	$33,566,213	0.11%	$1,193,862	0.04%
33415	$57,207,476	0.18%	$9,107,240	0.33%
34689	$67,152,383	0.21%	$2,752,675	0.10%
32708	$265,756,366	0.84%	$1,633,358	0.06%
33982	$59,811,574	0.19%	$971,586	0.04%
33558	$54,970,098	0.17%	$1,540,978	0.06%
33983	$65,282,388	0.21%	$7,189,243	0.26%
33417	$45,894,373	0.14%	$13,856,148	0.50%
34691	$29,133,020	0.09%	$731,292	0.03%
33701	$6,083,965	0.02%	$1,889,277	0.07%
33418	$311,750,175	0.98%	$10,350,073	0.38%
33702	$15,615,619	0.05%	$1,044,580	0.04%
33844	$126,786,439	0.40%	$727,818	0.03%
32712	$59,887,510	0.19%	$532,713	0.02%
33703	$19,267,708	0.06%	$1,075,675	0.04%
34269	$17,089,647	0.05%	$1,359,703	0.05%
32714	$73,394,827	0.23%	$2,758,566	0.10%
33706	$35,833,121	0.11%	$8,922,442	0.32%
33990	$89,472,254	0.28%	$1,055,011	0.04%
33707	$30,576,575	0.10%	$4,227,980	0.15%
34698	$51,661,590	0.16%	$5,731,053	0.21%
33991	$50,275,019	0.16%	$636,027	0.02%
33708	$37,242,261	0.12%	$11,069,192	0.40%
34982	$105,519,011	0.33%	$5,753,980	0.21%
33709	$11,369,835	0.04%	$912,901	0.03%
33426	$41,225,710	0.13%	$2,061,872	0.08%
34134	$32,565,562	0.10%	$4,646,677	0.17%
33710	$22,916,404	0.07%	$734,518	0.03%
33852	$118,564,862	0.37%	$520,723	0.02%
32720	$21,876,399	0.07%	$3,084,351	0.11%
33569	$51,641,994	0.16%	$1,028,430	0.04%
34135	$673,103	0.00%	$2,773,973	0.10%
33711	$8,995,544	0.03%	$1,422,679	0.05%
33428	$28,986,816	0.09%	$2,529,671	0.09%
33004	$5,352,936	0.02%	$1,304,459	0.05%
33853	$67,799,317	0.21%	$1,111,852	0.04%
34986	$124,460,846	0.39%	$1,339,925	0.05%
33714	$6,676,697	0.02%	$553,855	0.02%
33431	$15,018,052	0.05%	$3,850,322	0.14%
32724	$45,793,577	0.14%	$1,939,246	0.07%
33573	$17,269,265	0.05%	$2,413,430	0.09%
33715	$13,999,198	0.04%	$8,047,603	0.29%
33432	$19,993,364	0.06%	$6,885,382	0.25%
33716	$1,444,867	0.00%	$1,336,283	0.05%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33433	$34,022,552	0.11%	$5,402,763	0.20%
32301	$11,381,040	0.04%	$506,717	0.02%
34990	$230,901,824	0.73%	$6,712,581	0.24%
33434	$21,832,154	0.07%	$4,787,124	0.17%
33435	$46,710,978	0.15%	$10,340,312	0.38%
33436	$79,905,958	0.25%	$7,212,012	0.26%
32304	$6,300,667	0.02%	$873,264	0.03%
33437	$158,043,571	0.50%	$8,432,163	0.31%
34711	$153,544,555	0.48%	$555,097	0.02%
34145	$32,945,674	0.10%	$8,706,238	0.32%
34994	$58,255,505	0.18%	$12,664,458	0.46%
34996	$103,627,386	0.33%	$20,572,254	0.75%
34714	$13,520,065	0.04%	$1,205,146	0.04%
34997	$219,870,044	0.69%	$9,342,168	0.34%
33441	$10,089,739	0.03%	$2,597,385	0.09%
32168	$152,512,050	0.48%	$947,388	0.03%
33442	$13,170,368	0.04%	$5,609,029	0.20%
32169	$134,280,000	0.42%	$29,415,740	1.07%
33019	$24,369,883	0.08%	$7,556,819	0.27%
33444	$16,047,792	0.05%	$2,392,808	0.09%
34293	$33,485,454	0.11%	$1,691,759	0.06%
33020	$12,292,168	0.04%	$2,933,244	0.11%
33445	$37,667,269	0.12%	$9,543,722	0.35%
33870	$80,988,102	0.25%	$2,283,621	0.08%
33446	$47,486,643	0.15%	$11,168,991	0.41%
32174	$279,212,395	0.88%	$1,283,899	0.05%
33872	$100,954,330	0.32%	$1,292,224	0.05%
32034	$578,872	0.00%	$1,651,864	0.06%
32176	$181,846,808	0.57%	$13,802,810	0.50%
32601	$5,111,148	0.02%	$919,664	0.03%
33876	$24,423,220	0.08%	$521,352	0.02%
32746	$185,482,869	0.58%	$989,755	0.04%
32606	$14,269,152	0.04%	$1,450,020	0.05%
33455	$193,102,859	0.61%	$4,770,169	0.17%
33880	$74,789,726	0.24%	$1,296,217	0.05%
32607	$12,969,236	0.04%	$1,712,000	0.06%
33881	$104,427,850	0.33%	$1,778,206	0.06%
32608	$18,853,296	0.06%	$1,586,739	0.06%
33458	$264,439,943	0.83%	$10,878,225	0.40%
32751	$147,455,864	0.46%	$3,620,014	0.13%
33884	$174,812,646	0.55%	$1,849,633	0.07%
33460	$54,456,341	0.17%	$3,581,763	0.13%
33602	$11,344,934	0.04%	$2,706,548	0.10%
33461	$40,936,508	0.13%	$5,722,931	0.21%
33462	$69,360,274	0.22%	$5,516,341	0.20%
33604	$16,720,429	0.05%	$564,855	0.02%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33463	$88,875,851	0.28%	$5,895,365	0.21%
32757	$48,820,396	0.15%	$618,869	0.02%
33606	$16,353,410	0.05%	$911,297	0.03%
33467	$241,363,237	0.76%	$6,067,910	0.22%
32901	$73,570,243	0.23%	$3,248,581	0.12%
34741	$90,587,639	0.28%	$7,800,110	0.28%
33609	$620,940	0.00%	$884,953	0.03%
33610	$12,519,537	0.04%	$549,552	0.02%
33469	$129,273,065	0.41%	$10,910,487	0.40%
32903	$111,681,887	0.35%	$18,442,607	0.67%
34743	$164,368,685	0.52%	$1,044,683	0.04%
33611	$22,716,771	0.07%	$2,436,701	0.09%
32904	$100,602,029	0.32%	$2,053,723	0.07%
34744	$213,652,497	0.67%	$1,608,320	0.06%
33612	$15,451,238	0.05%	$1,466,139	0.05%
32905	$91,175,854	0.29%	$6,250,747	0.23%
33896	$20,825,385	0.07%	$708,446	0.03%
33613	$28,107,392	0.09%	$2,334,431	0.08%
33755	$12,946,824	0.04%	$852,965	0.03%
34746	$192,698,526	0.61%	$4,921,395	0.18%
32765	$315,394,915	0.99%	$1,076,678	0.04%
33614	$15,350,253	0.05%	$2,420,657	0.09%
33756	$20,777,838	0.07%	$3,855,468	0.14%
33898	$77,901,609	0.24%	$752,394	0.03%
34747	$127,201,522	0.40%	$7,069,701	0.26%
33615	$23,266,982	0.07%	$1,282,572	0.05%
33617	$39,156,182	0.12%	$4,034,905	0.15%
33901	$32,820,211	0.10%	$2,990,774	0.11%
33618	$41,752,691	0.13%	$1,690,663	0.06%
33760	$5,030,327	0.02%	$1,235,857	0.04%
33477	$120,585,285	0.38%	$25,979,818	0.94%
33761	$13,493,467	0.04%	$4,004,324	0.15%
33903	$73,462,776	0.23%	$3,115,681	0.11%
32771	$172,107,065	0.54%	$1,394,717	0.05%
33762	$4,741,370	0.01%	$1,031,959	0.04%
33904	$133,535,217	0.42%	$7,026,656	0.26%
34470	$21,759,703	0.07%	$803,999	0.03%
33480	$309,248,505	0.97%	$42,587,137	1.55%
33905	$41,661,249	0.13%	$949,207	0.03%
32773	$70,541,808	0.22%	$842,281	0.03%
34471	$59,469,780	0.19%	$669,316	0.02%
33764	$15,646,806	0.05%	$1,345,005	0.05%
33765	$6,032,757	0.02%	$626,502	0.02%
33907	$23,306,060	0.07%	$4,213,996	0.15%
33483	$25,674,564	0.08%	$10,305,669	0.37%
33908	$91,022,195	0.29%	$10,426,799	0.38%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
34474	$34,951,127	0.11%	$1,103,945	0.04%
33767	$25,851,399	0.08%	$15,937,804	0.58%
33484	$31,371,868	0.10%	$8,529,894	0.31%
33909	$45,938,365	0.14%	$772,133	0.03%
34758	$137,085,071	0.43%	$597,237	0.02%
32920	$37,377,338	0.12%	$20,349,906	0.74%
33486	$18,367,281	0.06%	$1,226,636	0.04%
33062	$14,835,835	0.05%	$12,622,254	0.46%
32779	$203,794,397	0.64%	$3,399,252	0.12%
33770	$15,354,175	0.05%	$704,349	0.03%
33487	$33,139,240	0.10%	$13,287,971	0.48%
33912	$72,689,109	0.23%	$2,705,000	0.10%
34761	$84,321,164	0.27%	$607,761	0.02%
32780	$158,531,987	0.50%	$3,974,050	0.14%
33629	$1,116,396	0.00%	$2,274,189	0.08%
32922	$39,240,900	0.12%	$1,747,807	0.06%
33771	$10,626,153	0.03%	$1,246,455	0.05%
33064	$521,160	0.00%	$2,564,553	0.09%
33913	$25,192,589	0.08%	$1,762,046	0.06%
33772	$28,627,503	0.09%	$1,125,530	0.04%
33914	$141,657,684	0.45%	$3,177,499	0.12%
33774	$44,146,814	0.14%	$3,430,409	0.12%
33916	$14,318,512	0.05%	$1,171,557	0.04%
32501	$11,745,664	0.04%	$1,254,697	0.05%
33917	$70,392,690	0.22%	$1,169,197	0.04%
32927	$102,352,127	0.32%	$584,958	0.02%
32503	$38,252,716	0.12%	$2,270,112	0.08%
33777	$22,244,185	0.07%	$1,434,055	0.05%
33919	$64,925,764	0.20%	$6,534,650	0.24%
32504	$29,224,748	0.09%	$1,173,425	0.04%
34202	$575,538	0.00%	$778,014	0.03%
32080	$52,393,697	0.16%	$9,000,090	0.33%
33778	$15,929,692	0.05%	$509,307	0.02%
34769	$124,931,882	0.39%	$1,629,753	0.06%
33637	$11,165,648	0.04%	$508,836	0.02%
32505	$18,975,923	0.06%	$666,406	0.02%
33496	$45,323,783	0.14%	$4,104,856	0.15%
33921	$91,466,991	0.29%	$12,146,382	0.44%
32789	$240,736,612	0.76%	$3,747,122	0.14%
32506	$36,081,018	0.11%	$1,339,592	0.05%
32082	$53,649,081	0.17%	$3,457,204	0.13%
32931	$98,428,602	0.31%	$78,419,149	2.85%
33922	$27,711,701	0.09%	$8,109,175	0.29%
32507	$64,195,584	0.20%	$37,859,812	1.38%
32084	$33,601,362	0.11%	$1,565,476	0.06%
33782	$12,576,917	0.04%	$667,107	0.02%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33924	$110,976,071	0.35%	$21,839,245	0.79%
32792	$183,411,553	0.58%	$5,532,593	0.20%
32086	$18,482,328	0.06%	$1,212,541	0.04%
32935	$163,355,497	0.51%	$5,455,641	0.20%
33785	$21,786,426	0.07%	$8,421,892	0.31%
34210	$8,379,877	0.03%	$5,580,770	0.20%
32937	$184,665,939	0.58%	$17,538,190	0.64%
33786	$12,673,409	0.04%	$617,957	0.02%
33928	$25,804,585	0.08%	$2,466,185	0.09%
32796	$81,329,694	0.26%	$1,238,814	0.05%
32514	$38,086,227	0.12%	$1,372,529	0.05%
33647	$117,115,445	0.37%	$1,406,166	0.05%
32940	$229,463,145	0.72%	$7,784,624	0.28%
32233	$14,946,373	0.05%	$1,958,101	0.07%
33931	$33,058,879	0.10%	$12,109,070	0.44%
32801	$29,781,568	0.09%	$4,655,878	0.17%
34217	$20,908,792	0.07%	$3,509,244	0.13%
32095	$8,072,517	0.03%	$730,856	0.03%
32803	$120,814,905	0.38%	$2,834,627	0.10%
33511	$32,679,207	0.10%	$657,728	0.02%
32804	$122,743,038	0.39%	$1,561,792	0.06%
32806	$171,692,024	0.54%	$3,194,445	0.12%
34221	$748,626	0.00%	$1,104,574	0.04%
34787	$63,303,707	0.20%	$914,841	0.03%
32807	$104,779,264	0.33%	$2,962,230	0.11%
32808	$106,449,524	0.33%	$1,685,745	0.06%
34223	$47,170,720	0.15%	$2,981,357	0.11%
32809	$94,066,382	0.30%	$2,333,409	0.08%
32526	$40,379,234	0.13%	$1,086,135	0.04%
34224	$35,340,611	0.11%	$1,692,149	0.06%
32951	$175,426,220	0.55%	$62,221,930	2.26%
32810	$96,814,700	0.30%	$1,109,559	0.04%
32952	$169,777,319	0.53%	$3,267,557	0.12%
33801	$34,746,817	0.11%	$2,711,472	0.10%
32811	$35,297,924	0.11%	$4,369,941	0.16%
32953	$124,274,456	0.39%	$2,349,996	0.09%
32812	$154,889,807	0.49%	$2,301,340	0.08%
33803	$48,724,768	0.15%	$1,413,989	0.05%
34652	$54,636,212	0.17%	$2,765,112	0.10%
34228	$32,798,806	0.10%	$20,119,610	0.73%
32955	$185,208,709	0.58%	$4,078,233	0.15%
34653	$33,527,513	0.11%	$1,247,964	0.05%
34229	$14,412,107	0.05%	$705,841	0.03%
33946	$22,687,967	0.07%	$1,149,156	0.04%
34654	$39,998,762	0.13%	$561,466	0.02%
33947	$29,361,807	0.09%	$687,201	0.03%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
34655	$74,431,426	0.23%	$1,842,237	0.07%
33948	$62,138,363	0.20%	$1,128,949	0.04%
32250	$38,921,899	0.12%	$4,437,402	0.16%
32958	$179,180,594	0.56%	$12,558,961	0.46%
32817	$149,508,465	0.47%	$594,400	0.02%
32818	$102,707,260	0.32%	$1,246,639	0.05%
33950	$173,493,497	0.55%	$41,899,548	1.52%
33809	$62,250,629	0.20%	$849,487	0.03%
32960	$118,147,688	0.37%	$34,724,697	1.26%
32819	$183,564,187	0.58%	$3,879,954	0.14%
32961	$786,406	0.00%	$546,734	0.02%
33952	$118,315,183	0.37%	$2,127,165	0.08%
32962	$120,292,692	0.38%	$22,227,414	0.81%
34236	$11,892,541	0.04%	$4,877,330	0.18%
32821	$63,348,738	0.20%	$841,037	0.03%
32114	$74,460,997	0.23%	$4,832,127	0.18%
32963	$573,121,581	1.80%	$478,941,073	17.42%
32822	$122,374,515	0.38%	$6,183,990	0.22%
33955	$51,793,508	0.16%	$16,072,227	0.58%
32824	$135,611,997	0.43%	$1,695,560	0.06%
33956	$44,682,314	0.14%	$860,529	0.03%
32541	$25,591,270	0.08%	$5,017,247	0.18%
32966	$91,201,462	0.29%	$5,924,511	0.22%
32117	$92,750,121	0.29%	$2,054,549	0.07%
34947	$34,107,813	0.11%	$27,404,638	1.00%
32825	$232,250,464	0.73%	$1,113,396	0.04%
33957	$130,881,766	0.41%	$111,471,843	4.05%
32967	$88,410,599	0.28%	$8,710,522	0.32%
32118	$146,776,020	0.46%	$71,455,962	2.60%
32826	$71,547,544	0.22%	$1,038,281	0.04%
32119	$150,434,679	0.47%	$4,315,489	0.16%
34949	$99,778,143	0.31%	$349,220,577	12.70%
34242	$46,781,146	0.15%	$15,950,070	0.58%
32407	$0	0.00%	$1,636,773	0.06%
34105	$0	0.00%	$1,840,974	0.07%
32408	$0	0.00%	$2,283,855	0.08%
34109	$0	0.00%	$2,083,210	0.08%
34112	$0	0.00%	$3,123,800	0.11%
33424	$0	0.00%	$546,172	0.02%
34991	$0	0.00%	$875,259	0.03%
34285	$0	0.00%	$4,286,139	0.16%
33304	$0	0.00%	$3,329,540	0.12%
33306	$0	0.00%	$504,583	0.02%
33308	$0	0.00%	$9,484,692	0.34%
33316	$0	0.00%	$3,892,055	0.14%
33759	$0	0.00%	$567,505	0.02%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33763	$0	0.00%	$864,627	0.03%
33060	$0	0.00%	$1,957,849	0.07%
33063	$0	0.00%	$3,533,603	0.13%
33065	$0	0.00%	$2,965,659	0.11%
33069	$0	0.00%	$5,399,843	0.20%
34205	$0	0.00%	$1,053,873	0.04%
32932	$0	0.00%	$947,922	0.03%
34207	$0	0.00%	$1,057,635	0.04%
34209	$0	0.00%	$2,147,083	0.08%
33802	$0	0.00%	$619,459	0.02%
34231	$0	0.00%	$2,527,583	0.09%
34238	$0	0.00%	$1,474,631	0.05%
33109	$0	0.00%	$1,773,243	0.06%
32025	$7,512,040	0.02%	$0	0.00%
32052	$1,689,565	0.01%	$0	0.00%
32053	$956,939	0.00%	$0	0.00%
32054	$2,867,249	0.01%	$0	0.00%
32055	$6,215,435	0.02%	$0	0.00%
32059	$889,831	0.00%	$0	0.00%
32060	$7,441,118	0.02%	$0	0.00%
32062	$891,166	0.00%	$0	0.00%
32066	$1,504,889	0.00%	$0	0.00%
32102	$1,790,417	0.01%	$0	0.00%
32112	$2,341,123	0.01%	$0	0.00%
32113	$6,547,618	0.02%	$0	0.00%
32124	$10,655,238	0.03%	$0	0.00%
32129	$83,633,549	0.26%	$0	0.00%
32130	$3,217,534	0.01%	$0	0.00%
32132	$48,993,985	0.15%	$0	0.00%
32134	$3,484,672	0.01%	$0	0.00%
32135	$1,057,755	0.00%	$0	0.00%
32141	$111,122,980	0.35%	$0	0.00%
32148	$3,137,505	0.01%	$0	0.00%
32159	$84,067,288	0.26%	$0	0.00%
32162	$109,169,305	0.34%	$0	0.00%
32164	$72,607,330	0.23%	$0	0.00%
32179	$11,471,862	0.04%	$0	0.00%
32180	$1,586,425	0.01%	$0	0.00%
32192	$836,211	0.00%	$0	0.00%
32195	$5,808,019	0.02%	$0	0.00%
32266	$13,534,015	0.04%	$0	0.00%
32302	$2,105,206	0.01%	$0	0.00%
32303	$25,076,360	0.08%	$0	0.00%
32305	$4,497,733	0.01%	$0	0.00%
32308	$19,189,724	0.06%	$0	0.00%
32309	$22,382,573	0.07%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
32310	$5,312,022	0.02%	$0	0.00%
32311	$14,225,037	0.04%	$0	0.00%
32312	$35,171,024	0.11%	$0	0.00%
32317	$10,488,787	0.03%	$0	0.00%
32322	$2,150,320	0.01%	$0	0.00%
32327	$11,012,259	0.03%	$0	0.00%
32331	$1,557,166	0.00%	$0	0.00%
32340	$3,984,214	0.01%	$0	0.00%
32344	$6,070,779	0.02%	$0	0.00%
32346	$2,260,658	0.01%	$0	0.00%
32347	$4,407,098	0.01%	$0	0.00%
32348	$3,580,600	0.01%	$0	0.00%
32358	$1,074,523	0.00%	$0	0.00%
32359	$1,864,222	0.01%	$0	0.00%
32502	$1,091,755	0.00%	$0	0.00%
32531	$2,600,583	0.01%	$0	0.00%
32533	$30,637,337	0.10%	$0	0.00%
32534	$11,546,505	0.04%	$0	0.00%
32535	$2,438,708	0.01%	$0	0.00%
32563	$31,119,209	0.10%	$0	0.00%
32564	$970,576	0.00%	$0	0.00%
32565	$3,603,675	0.01%	$0	0.00%
32568	$2,414,718	0.01%	$0	0.00%
32569	$9,942,145	0.03%	$0	0.00%
32570	$18,196,448	0.06%	$0	0.00%
32571	$25,698,135	0.08%	$0	0.00%
32577	$5,190,259	0.02%	$0	0.00%
32579	$9,576,244	0.03%	$0	0.00%
32580	$2,550,642	0.01%	$0	0.00%
32583	$14,335,140	0.05%	$0	0.00%
32603	$1,190,844	0.00%	$0	0.00%
32605	$17,728,806	0.06%	$0	0.00%
32609	$5,087,314	0.02%	$0	0.00%
32615	$8,929,706	0.03%	$0	0.00%
32617	$5,497,238	0.02%	$0	0.00%
32618	$5,856,911	0.02%	$0	0.00%
32619	$1,562,802	0.00%	$0	0.00%
32621	$3,018,285	0.01%	$0	0.00%
32622	$550,728	0.00%	$0	0.00%
32625	$3,450,868	0.01%	$0	0.00%
32626	$3,926,097	0.01%	$0	0.00%
32628	$1,376,530	0.00%	$0	0.00%
32631	$533,383	0.00%	$0	0.00%
32640	$4,379,442	0.01%	$0	0.00%
32641	$3,553,975	0.01%	$0	0.00%
32643	$5,632,140	0.02%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
32648	$501,361	0.00%	$0	0.00%
32653	$10,342,789	0.03%	$0	0.00%
32656	$6,877,796	0.02%	$0	0.00%
32664	$1,205,786	0.00%	$0	0.00%
32666	$3,789,318	0.01%	$0	0.00%
32667	$4,683,922	0.01%	$0	0.00%
32668	$6,281,452	0.02%	$0	0.00%
32669	$14,084,753	0.04%	$0	0.00%
32680	$2,920,749	0.01%	$0	0.00%
32681	$555,103	0.00%	$0	0.00%
32686	$7,061,422	0.02%	$0	0.00%
32692	$757,512	0.00%	$0	0.00%
32693	$3,476,443	0.01%	$0	0.00%
32694	$662,074	0.00%	$0	0.00%
32696	$9,758,306	0.03%	$0	0.00%
32702	$1,273,196	0.00%	$0	0.00%
32703	$72,245,729	0.23%	$0	0.00%
32706	$674,339	0.00%	$0	0.00%
32709	$7,871,441	0.02%	$0	0.00%
32713	$68,066,045	0.21%	$0	0.00%
32718	$739,296	0.00%	$0	0.00%
32725	$132,912,122	0.42%	$0	0.00%
32726	$39,985,106	0.13%	$0	0.00%
32730	$14,785,326	0.05%	$0	0.00%
32732	$32,392,771	0.10%	$0	0.00%
32735	$8,131,269	0.03%	$0	0.00%
32736	$12,162,763	0.04%	$0	0.00%
32738	$166,652,097	0.52%	$0	0.00%
32744	$9,436,540	0.03%	$0	0.00%
32750	$137,117,810	0.43%	$0	0.00%
32754	$48,343,595	0.15%	$0	0.00%
32759	$10,824,862	0.03%	$0	0.00%
32763	$25,272,620	0.08%	$0	0.00%
32764	$14,137,847	0.04%	$0	0.00%
32766	$83,440,361	0.26%	$0	0.00%
32767	$1,127,469	0.00%	$0	0.00%
32775	$1,759,479	0.01%	$0	0.00%
32776	$22,192,028	0.07%	$0	0.00%
32777	$1,068,277	0.00%	$0	0.00%
32778	$38,701,847	0.12%	$0	0.00%
32784	$17,509,215	0.06%	$0	0.00%
32790	$519,930	0.00%	$0	0.00%
32794	$706,912	0.00%	$0	0.00%
32798	$4,289,532	0.01%	$0	0.00%
32802	$747,533	0.00%	$0	0.00%
32805	$51,046,966	0.16%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
32814	$21,927,427	0.07%	$0	0.00%
32820	$27,734,458	0.09%	$0	0.00%
32827	$39,218,567	0.12%	$0	0.00%
32833	$37,984,447	0.12%	$0	0.00%
32907	$177,292,586	0.56%	$0	0.00%
32908	$29,844,517	0.09%	$0	0.00%
32909	$107,385,394	0.34%	$0	0.00%
32926	$82,382,392	0.26%	$0	0.00%
32934	$90,474,598	0.28%	$0	0.00%
32948	$11,851,483	0.04%	$0	0.00%
32949	$15,884,346	0.05%	$0	0.00%
32950	$31,910,941	0.10%	$0	0.00%
32957	$1,439,413	0.00%	$0	0.00%
32964	$1,328,044	0.00%	$0	0.00%
32968	$75,907,924	0.24%	$0	0.00%
32970	$749,468	0.00%	$0	0.00%
32976	$124,885,253	0.39%	$0	0.00%
33412	$100,785,373	0.32%	$0	0.00%
33413	$37,025,008	0.12%	$0	0.00%
33430	$12,026,581	0.04%	$0	0.00%
33438	$1,624,182	0.01%	$0	0.00%
33440	$20,572,829	0.06%	$0	0.00%
33468	$521,758	0.00%	$0	0.00%
33470	$102,217,234	0.32%	$0	0.00%
33471	$10,143,985	0.03%	$0	0.00%
33475	$1,506,167	0.00%	$0	0.00%
33476	$8,789,299	0.03%	$0	0.00%
33478	$93,055,844	0.29%	$0	0.00%
33493	$2,948,690	0.01%	$0	0.00%
33498	$21,722,932	0.07%	$0	0.00%
33510	$17,364,196	0.05%	$0	0.00%
33513	$16,068,604	0.05%	$0	0.00%
33514	$2,442,638	0.01%	$0	0.00%
33521	$1,356,208	0.00%	$0	0.00%
33523	$27,769,850	0.09%	$0	0.00%
33525	$37,658,477	0.12%	$0	0.00%
33527	$18,579,743	0.06%	$0	0.00%
33534	$5,565,981	0.02%	$0	0.00%
33538	$11,880,246	0.04%	$0	0.00%
33540	$12,383,072	0.04%	$0	0.00%
33541	$27,296,206	0.09%	$0	0.00%
33542	$24,292,065	0.08%	$0	0.00%
33543	$60,832,236	0.19%	$0	0.00%
33544	$43,332,365	0.14%	$0	0.00%
33547	$22,829,988	0.07%	$0	0.00%
33548	$16,897,951	0.05%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33549	$35,020,298	0.11%	$0	0.00%
33556	$72,358,626	0.23%	$0	0.00%
33559	$17,055,057	0.05%	$0	0.00%
33563	$13,874,163	0.04%	$0	0.00%
33565	$30,490,528	0.10%	$0	0.00%
33566	$33,064,576	0.10%	$0	0.00%
33567	$16,377,041	0.05%	$0	0.00%
33570	$9,047,112	0.03%	$0	0.00%
33572	$18,388,621	0.06%	$0	0.00%
33576	$10,968,095	0.03%	$0	0.00%
33584	$15,845,879	0.05%	$0	0.00%
33585	$2,363,239	0.01%	$0	0.00%
33592	$11,778,313	0.04%	$0	0.00%
33594	$57,541,776	0.18%	$0	0.00%
33597	$11,676,673	0.04%	$0	0.00%
33598	$3,596,011	0.01%	$0	0.00%
33605	$5,261,550	0.02%	$0	0.00%
33616	$5,573,698	0.02%	$0	0.00%
33619	$11,164,757	0.04%	$0	0.00%
33624	$60,326,540	0.19%	$0	0.00%
33625	$32,043,370	0.10%	$0	0.00%
33626	$27,146,048	0.09%	$0	0.00%
33634	$10,481,771	0.03%	$0	0.00%
33635	$8,406,951	0.03%	$0	0.00%
33704	$16,628,752	0.05%	$0	0.00%
33705	$13,325,005	0.04%	$0	0.00%
33712	$10,470,693	0.03%	$0	0.00%
33713	$16,510,369	0.05%	$0	0.00%
33773	$10,426,710	0.03%	$0	0.00%
33776	$32,334,760	0.10%	$0	0.00%
33781	$10,839,364	0.03%	$0	0.00%
33805	$18,407,597	0.06%	$0	0.00%
33810	$77,578,246	0.24%	$0	0.00%
33811	$23,068,050	0.07%	$0	0.00%
33812	$9,507,482	0.03%	$0	0.00%
33813	$87,077,716	0.27%	$0	0.00%
33815	$6,594,934	0.02%	$0	0.00%
33820	$1,006,506	0.00%	$0	0.00%
33823	$54,012,083	0.17%	$0	0.00%
33827	$20,636,406	0.06%	$0	0.00%
33830	$52,315,250	0.16%	$0	0.00%
33834	$6,400,661	0.02%	$0	0.00%
33836	$582,659	0.00%	$0	0.00%
33837	$94,935,298	0.30%	$0	0.00%
33838	$13,790,256	0.04%	$0	0.00%
33839	$8,656,748	0.03%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
33841	$18,757,480	0.06%	$0	0.00%
33843	$43,550,916	0.14%	$0	0.00%
33846	$517,875	0.00%	$0	0.00%
33847	$870,018	0.00%	$0	0.00%
33848	$2,355,804	0.01%	$0	0.00%
33849	$1,085,233	0.00%	$0	0.00%
33850	$19,995,887	0.06%	$0	0.00%
33851	$4,630,978	0.01%	$0	0.00%
33855	$8,377,813	0.03%	$0	0.00%
33857	$8,178,349	0.03%	$0	0.00%
33858	$824,221	0.00%	$0	0.00%
33859	$40,293,606	0.13%	$0	0.00%
33860	$21,412,451	0.07%	$0	0.00%
33865	$1,943,379	0.01%	$0	0.00%
33867	$1,043,228	0.00%	$0	0.00%
33868	$15,362,197	0.05%	$0	0.00%
33873	$34,157,589	0.11%	$0	0.00%
33875	$48,553,881	0.15%	$0	0.00%
33877	$1,500,434	0.00%	$0	0.00%
33890	$14,757,921	0.05%	$0	0.00%
33897	$48,626,914	0.15%	$0	0.00%
33920	$5,336,415	0.02%	$0	0.00%
33935	$14,919,904	0.05%	$0	0.00%
33936	$21,675,074	0.07%	$0	0.00%
33945	$937,183	0.00%	$0	0.00%
33953	$15,735,183	0.05%	$0	0.00%
33954	$36,497,469	0.11%	$0	0.00%
33960	$1,748,331	0.01%	$0	0.00%
33967	$13,050,760	0.04%	$0	0.00%
33971	$32,347,543	0.10%	$0	0.00%
33972	$22,155,169	0.07%	$0	0.00%
33981	$32,363,373	0.10%	$0	0.00%
33993	$47,546,703	0.15%	$0	0.00%
34215	$2,281,549	0.01%	$0	0.00%
34216	$6,641,533	0.02%	$0	0.00%
34251	$4,955,210	0.02%	$0	0.00%
34265	$519,824	0.00%	$0	0.00%
34266	$105,497,237	0.33%	$0	0.00%
34268	$571,821	0.00%	$0	0.00%
34286	$38,533,548	0.12%	$0	0.00%
34287	$35,659,295	0.11%	$0	0.00%
34288	$18,065,800	0.06%	$0	0.00%
34289	$2,097,612	0.01%	$0	0.00%
34420	$24,121,412	0.08%	$0	0.00%
34428	$18,887,039	0.06%	$0	0.00%
34429	$29,332,913	0.09%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
34430	$630,750	0.00%	$0	0.00%
34431	$27,525,571	0.09%	$0	0.00%
34432	$33,262,860	0.10%	$0	0.00%
34433	$15,371,536	0.05%	$0	0.00%
34434	$24,542,429	0.08%	$0	0.00%
34436	$17,181,000	0.05%	$0	0.00%
34442	$52,182,495	0.16%	$0	0.00%
34446	$52,456,403	0.16%	$0	0.00%
34448	$28,577,483	0.09%	$0	0.00%
34449	$3,353,760	0.01%	$0	0.00%
34450	$33,158,434	0.10%	$0	0.00%
34452	$30,854,297	0.10%	$0	0.00%
34453	$27,382,537	0.09%	$0	0.00%
34461	$30,644,313	0.10%	$0	0.00%
34465	$46,181,392	0.15%	$0	0.00%
34472	$47,094,295	0.15%	$0	0.00%
34473	$35,265,697	0.11%	$0	0.00%
34475	$10,089,402	0.03%	$0	0.00%
34476	$62,734,664	0.20%	$0	0.00%
34479	$22,825,789	0.07%	$0	0.00%
34480	$30,983,650	0.10%	$0	0.00%
34481	$39,919,041	0.13%	$0	0.00%
34482	$43,021,443	0.14%	$0	0.00%
34484	$6,449,623	0.02%	$0	0.00%
34488	$4,405,108	0.01%	$0	0.00%
34491	$70,000,057	0.22%	$0	0.00%
34498	$1,309,169	0.00%	$0	0.00%
34601	$23,777,565	0.07%	$0	0.00%
34602	$17,595,513	0.06%	$0	0.00%
34604	$16,251,485	0.05%	$0	0.00%
34606	$65,120,630	0.20%	$0	0.00%
34607	$23,885,496	0.08%	$0	0.00%
34608	$72,122,039	0.23%	$0	0.00%
34609	$86,819,736	0.27%	$0	0.00%
34610	$20,696,521	0.07%	$0	0.00%
34613	$48,583,354	0.15%	$0	0.00%
34614	$10,675,474	0.03%	$0	0.00%
34637	$10,638,746	0.03%	$0	0.00%
34638	$30,225,127	0.10%	$0	0.00%
34639	$59,466,648	0.19%	$0	0.00%
34660	$555,806	0.00%	$0	0.00%
34669	$22,018,758	0.07%	$0	0.00%
34681	$2,593,033	0.01%	$0	0.00%
34690	$23,181,341	0.07%	$0	0.00%
34695	$15,981,142	0.05%	$0	0.00%
34705	$4,389,983	0.01%	$0	0.00%

ZIP Code	Personal Residential Monetary Contribution($)	Percent of Losses (%)	Commercial Residential Monetary Contribution($)	Percent of Losses (%)
34715	$22,510,948	0.07%	$0	0.00%
34731	$32,532,860	0.10%	$0	0.00%
34734	$16,673,408	0.05%	$0	0.00%
34736	$27,264,957	0.09%	$0	0.00%
34737	$13,282,128	0.04%	$0	0.00%
34739	$4,488,839	0.01%	$0	0.00%
34748	$94,707,190	0.30%	$0	0.00%
34753	$7,116,867	0.02%	$0	0.00%
34755	$1,327,020	0.00%	$0	0.00%
34756	$11,288,132	0.04%	$0	0.00%
34759	$131,552,664	0.41%	$0	0.00%
34760	$1,737,317	0.01%	$0	0.00%
34762	$1,393,270	0.00%	$0	0.00%
34771	$85,414,496	0.27%	$0	0.00%
34772	$96,156,391	0.30%	$0	0.00%
34773	$7,027,707	0.02%	$0	0.00%
34785	$22,201,266	0.07%	$0	0.00%
34786	$250,768,733	0.79%	$0	0.00%
34788	$33,855,936	0.11%	$0	0.00%
34797	$5,581,841	0.02%	$0	0.00%
34945	$20,680,455	0.07%	$0	0.00%
34946	$26,007,054	0.08%	$0	0.00%
34953	$223,564,820	0.70%	$0	0.00%
34956	$13,579,542	0.04%	$0	0.00%
34972	$40,859,975	0.13%	$0	0.00%
34973	$589,905	0.00%	$0	0.00%
34974	$87,245,851	0.27%	$0	0.00%
34981	$16,235,619	0.05%	$0	0.00%
34983	$177,043,199	0.56%	$0	0.00%
34984	$72,100,988	0.23%	$0	0.00%
34987	$20,604,568	0.06%	$0	0.00%
34992	$608,911	0.00%	$0	0.00%

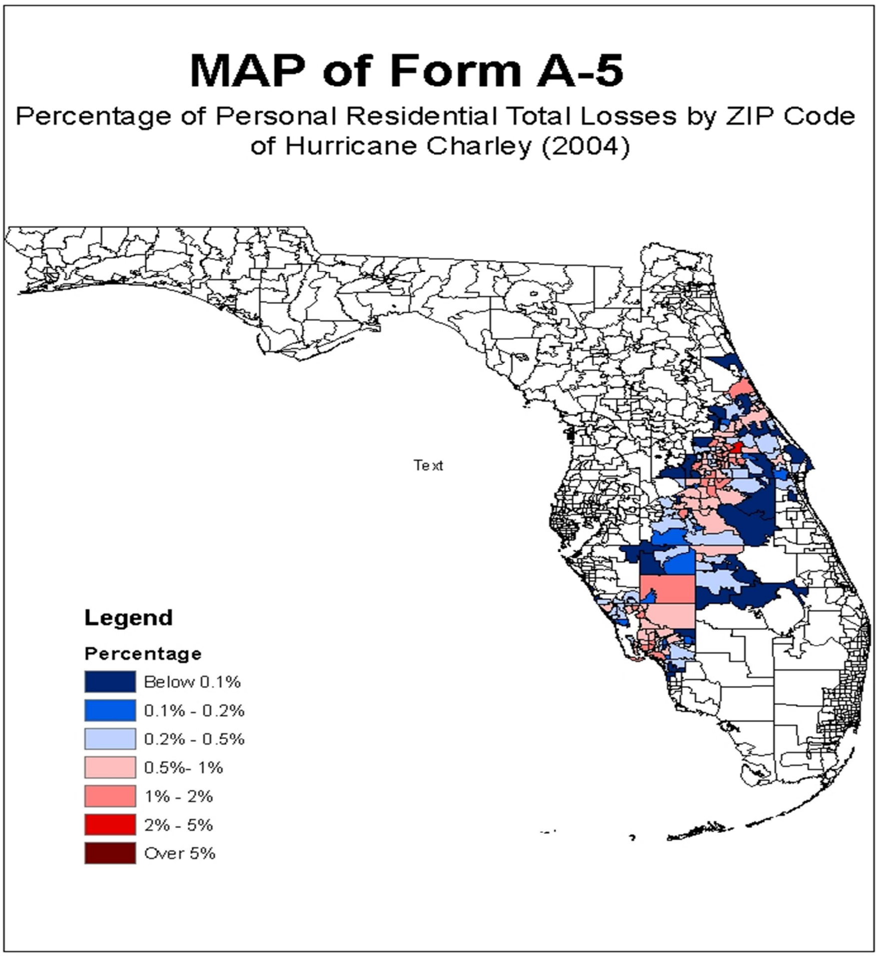


Figure 63. Percentage of total Personal Residential losses for Charley.

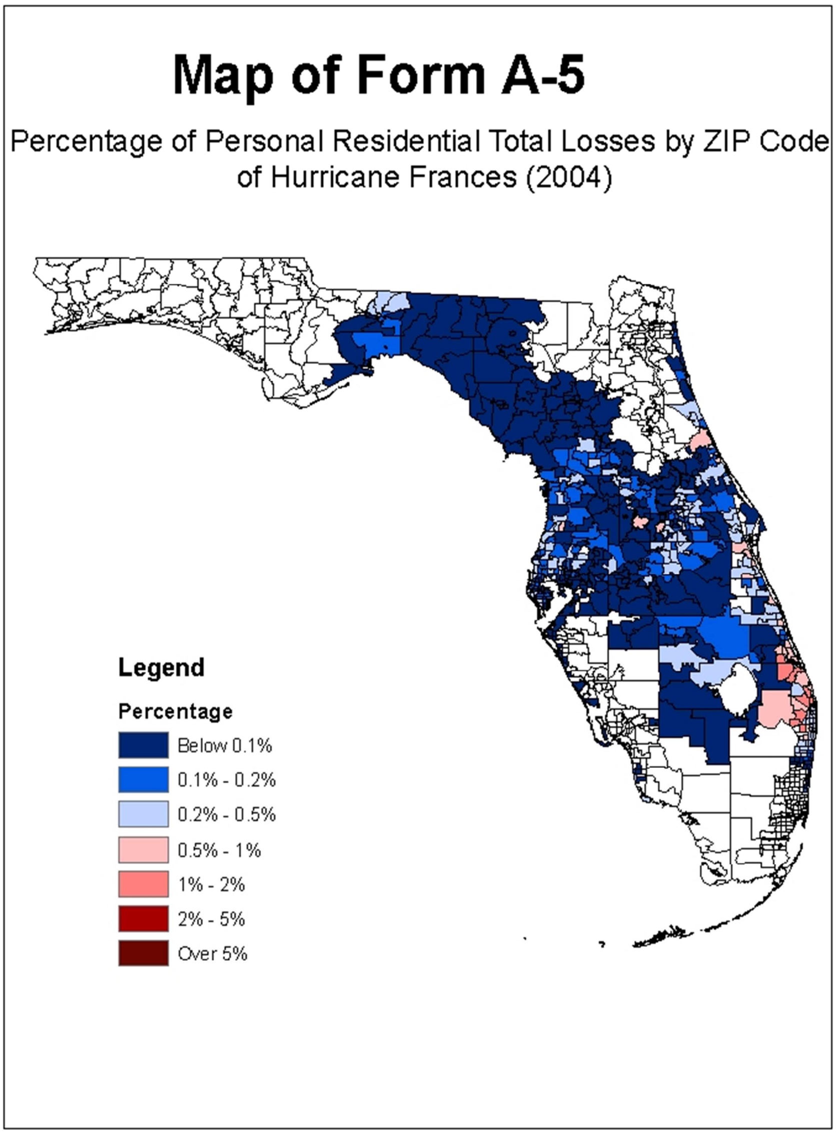


Figure 64. Percentage of total Personal Residential losses for Frances.

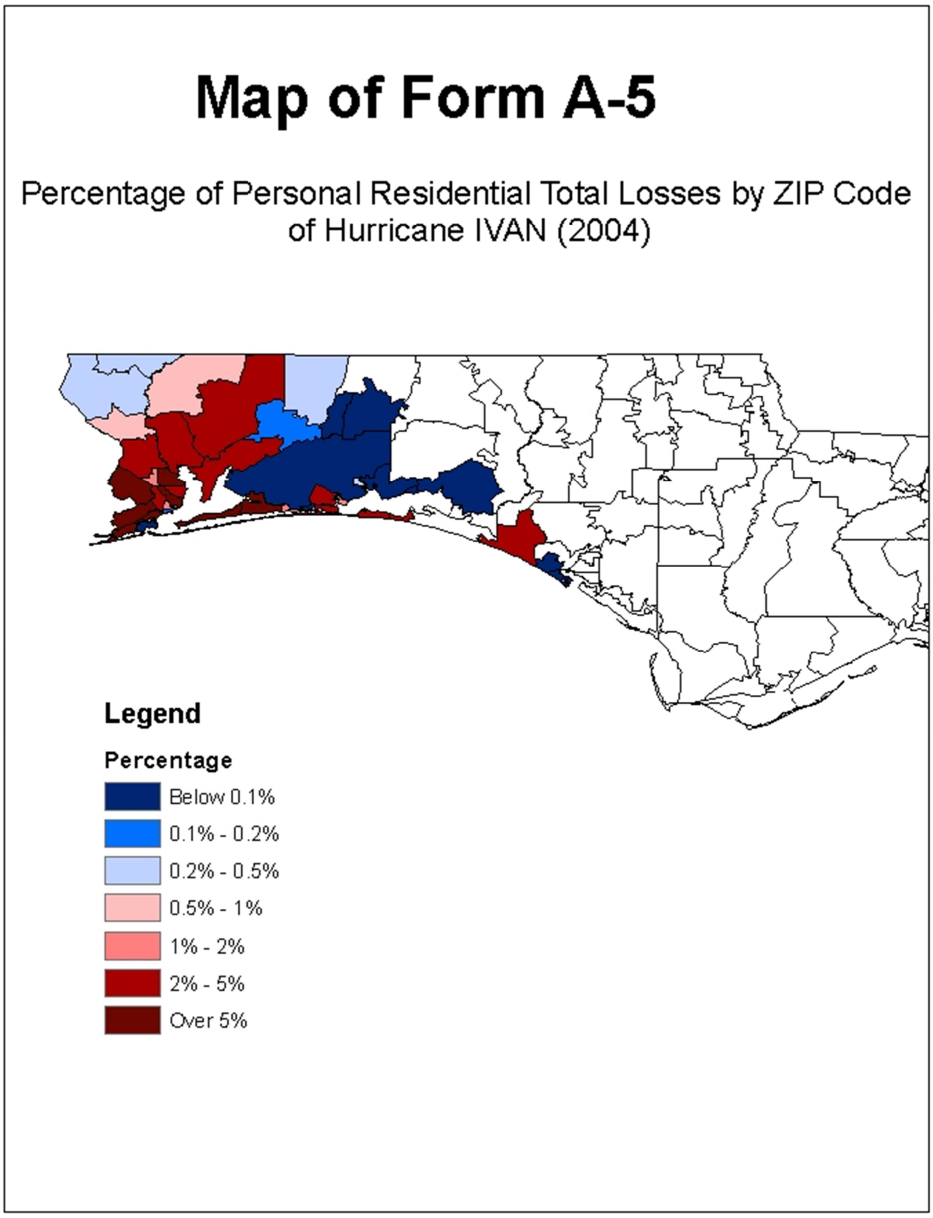


Figure 65. Percentage of total Personal Residential losses for Ivan.

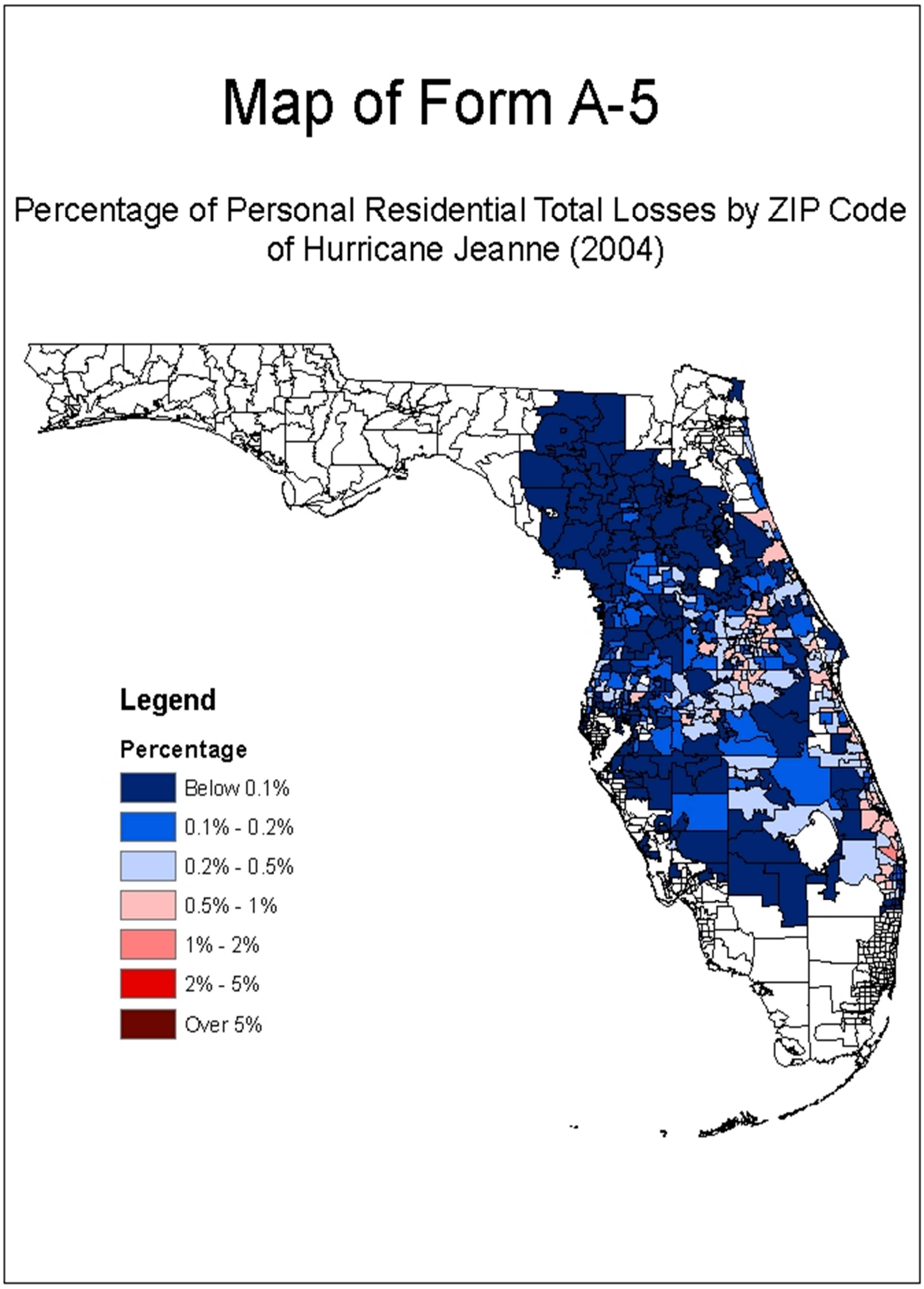


Figure 66. Percentage of total Personal Residential losses for Jeanne.

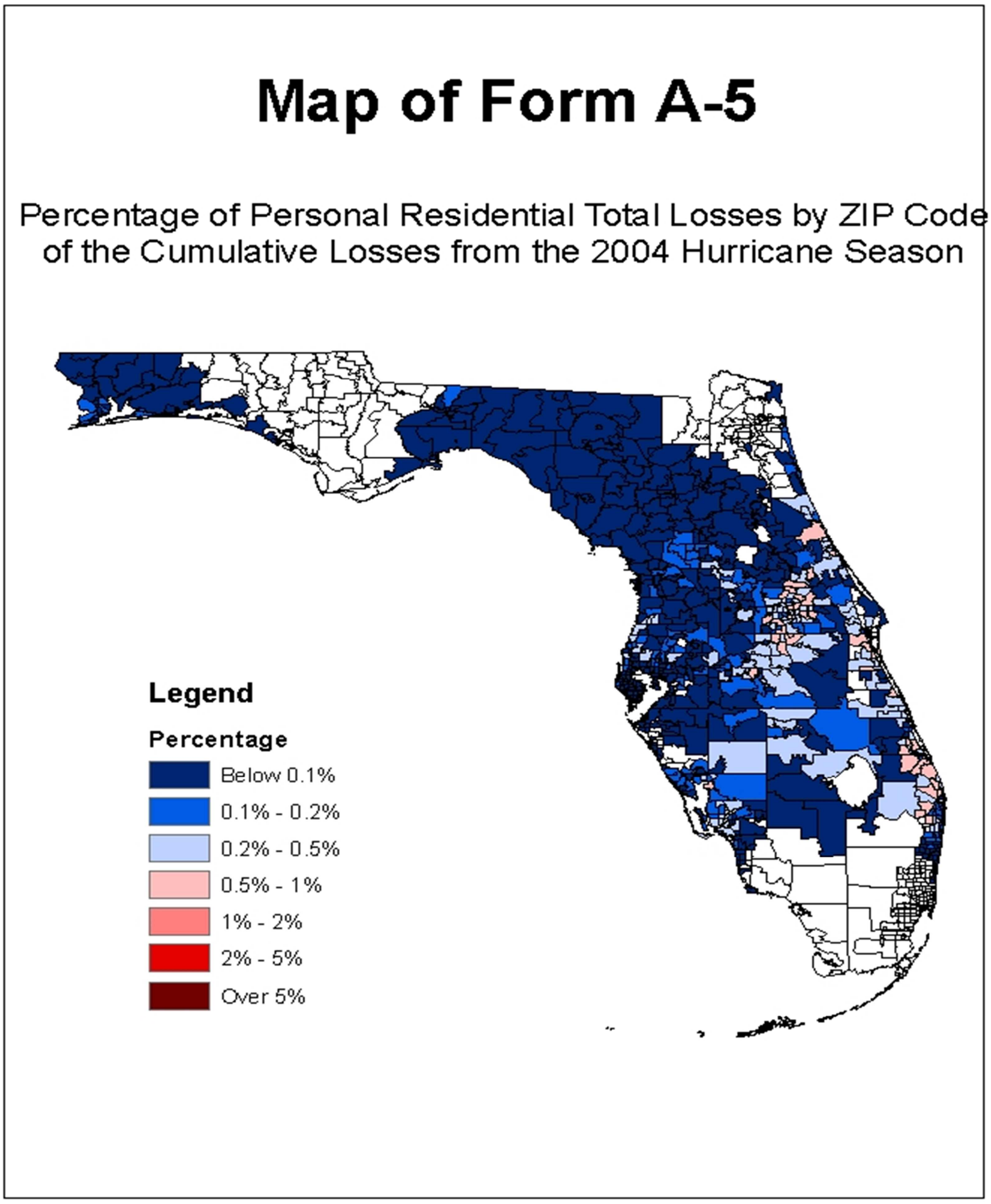


Figure 67. Cumulative percentage of total Personal Residential losses.

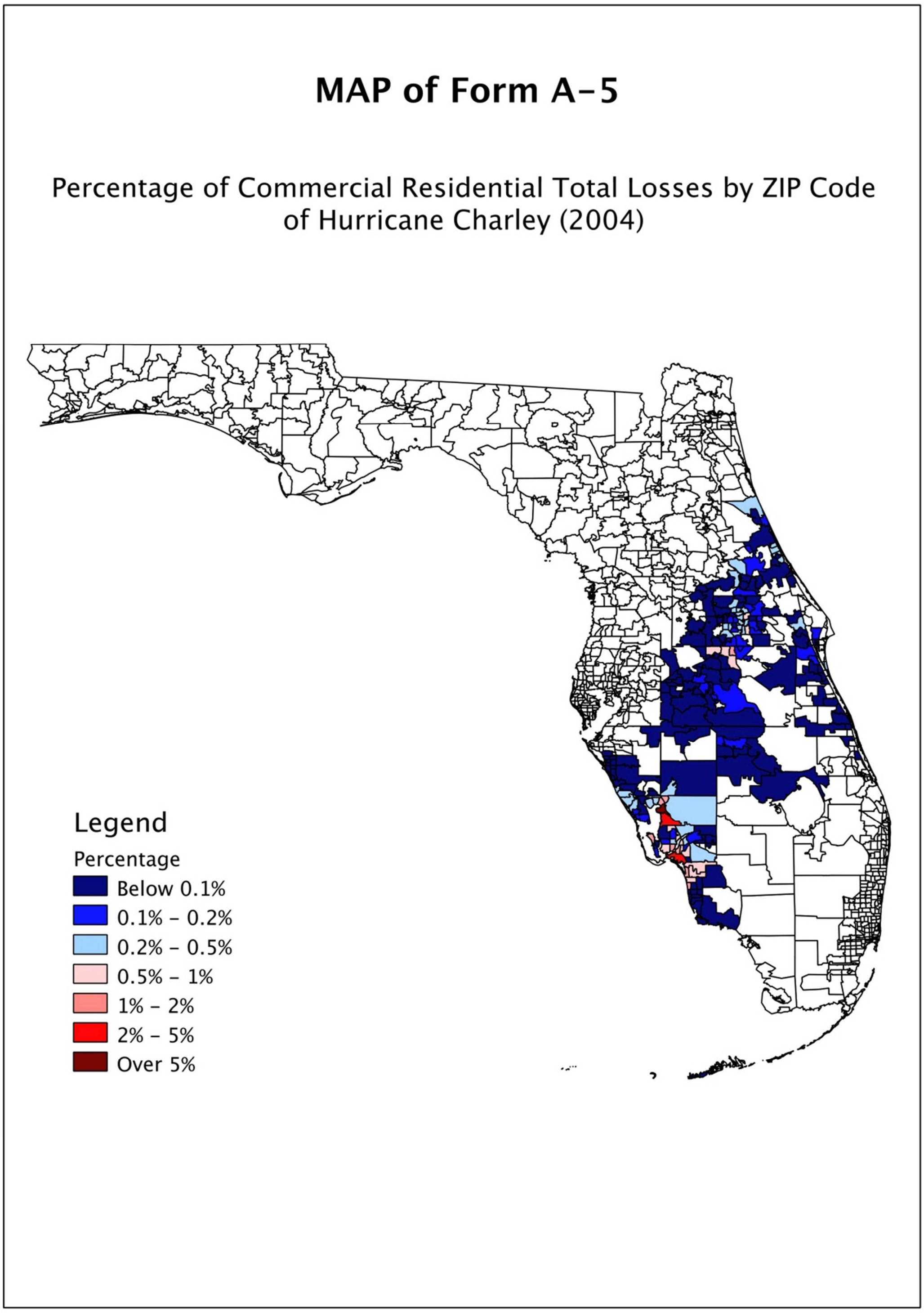


Figure 68. Percentage of total Commercial Residential losses for Charley.

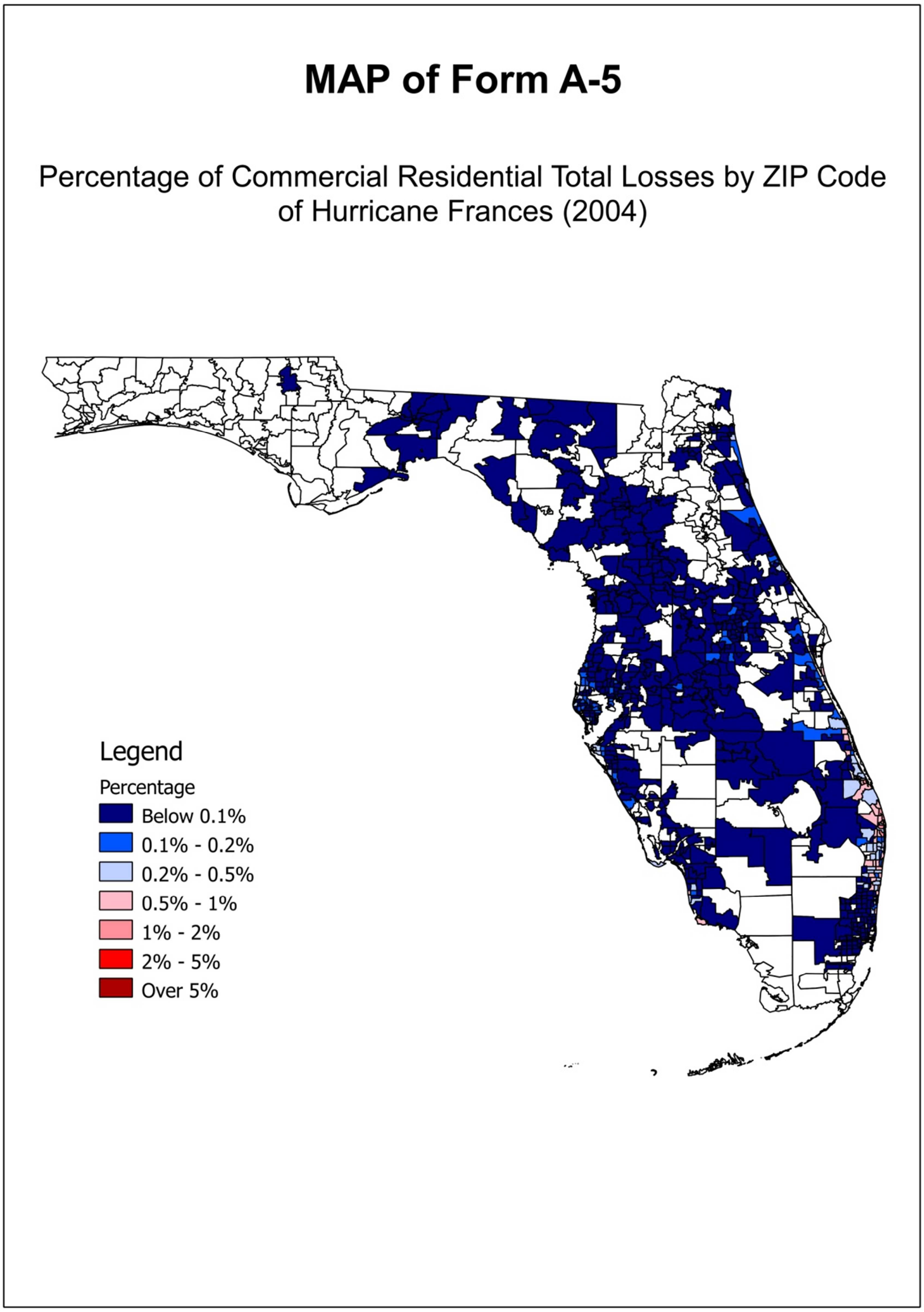


Figure 69. Percentage of total Commercial Residential losses for Frances.

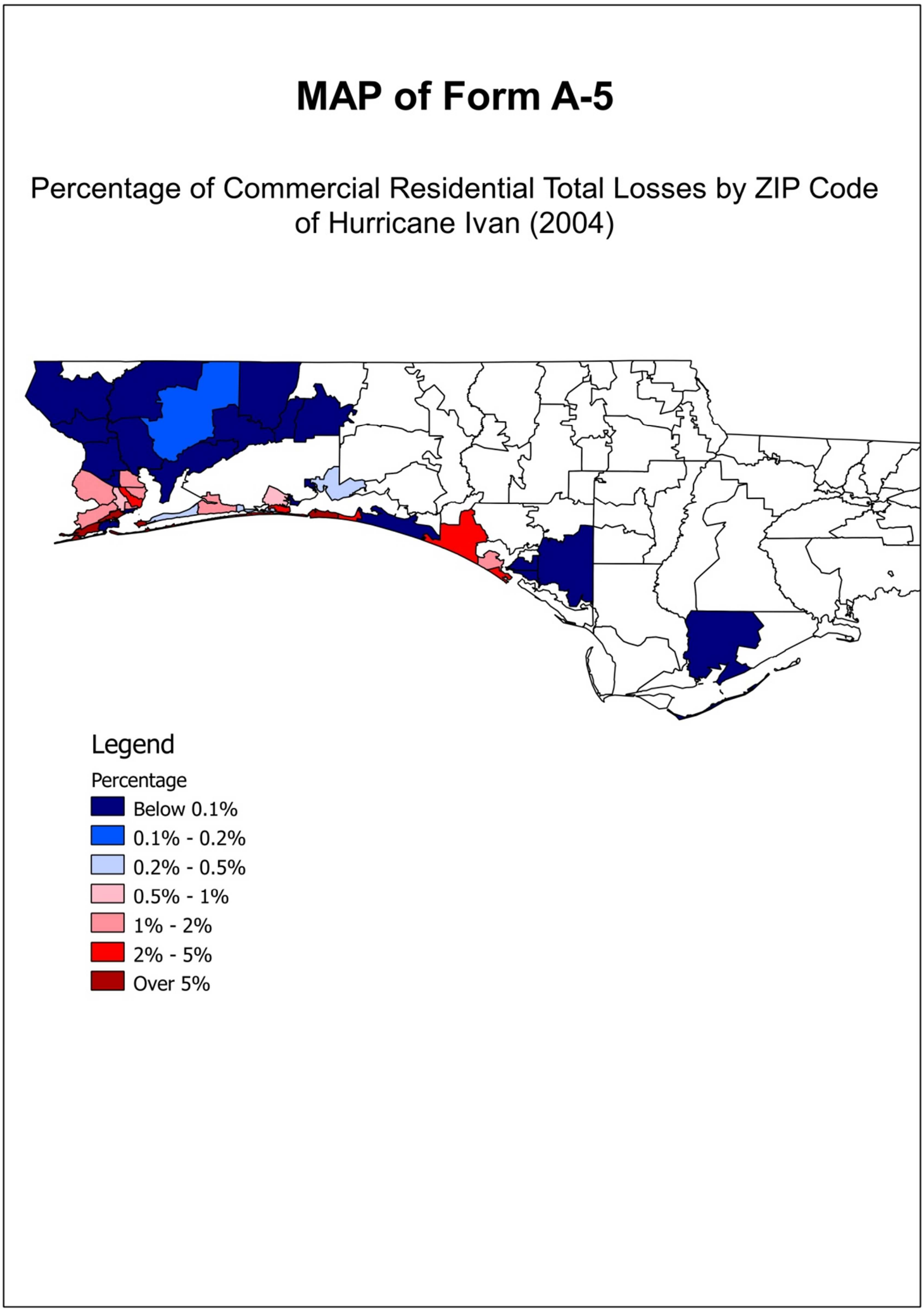


Figure 70. Percentage of total Commercial Residential losses for Ivan.

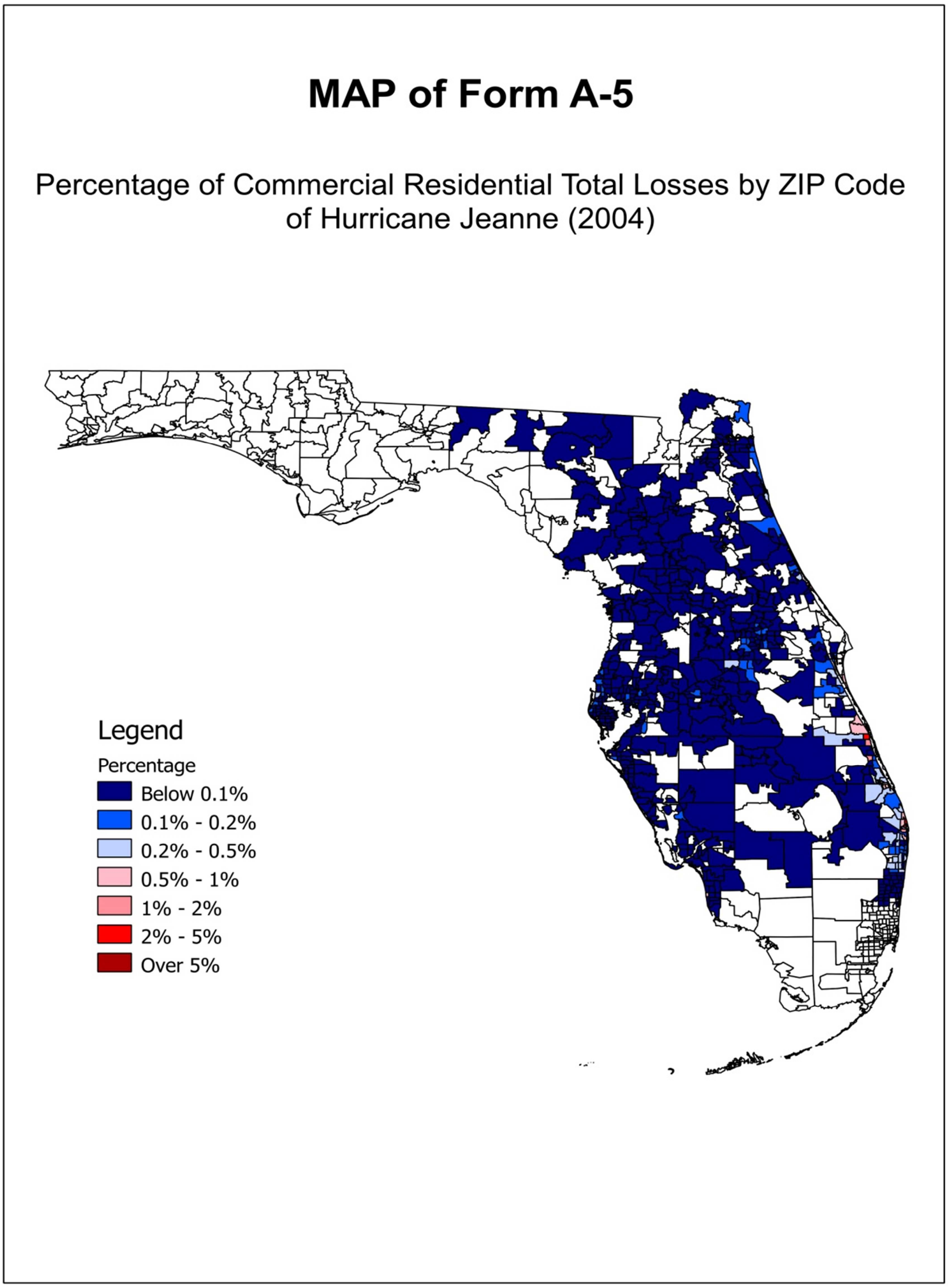


Figure 71. Percentage of total Commercial Residential losses for Jeanne.

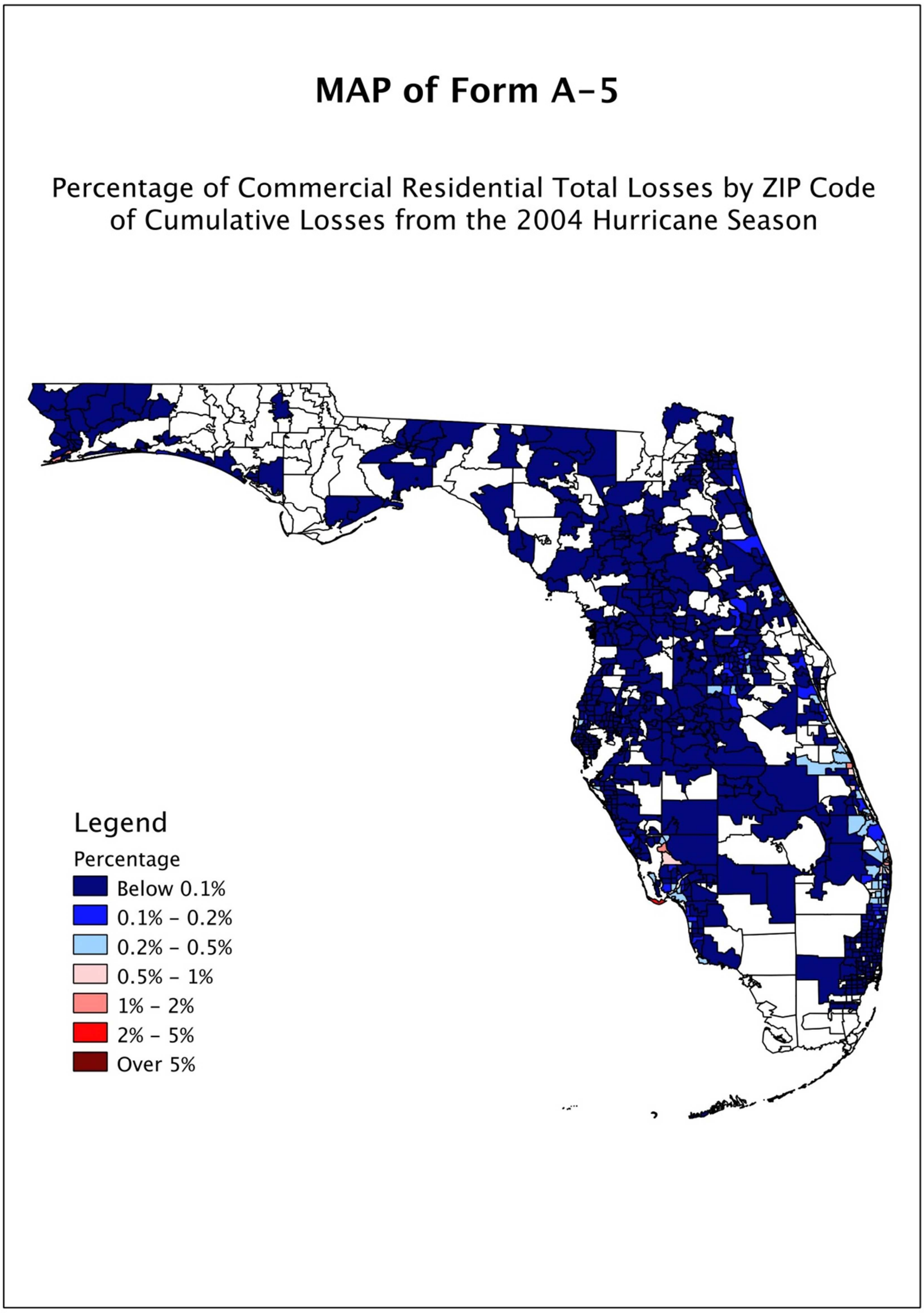


Figure 72. Cumulative percentage of total Commercial Residential losses.

Form A-6: Personal Residential Output Ranges

A. *Provide personal residential output ranges in the format shown in the file named **"2009FormA6.xls"** by using an automated program or script. A hard copy of the personal residential output range spreadsheets shall be included in the submission. Provide the personal residential output ranges on CD in Excel format. The file name shall include the abbreviated name of the modeler, the Standards year, and the Form name.*

B. *Provide loss costs by county. Within each county, loss costs shall be shown separately per $1,000 of exposure for personal residential, tenants, condo unit owners, and mobile home; for each major deductible option; and by construction type. For each of these categories using ZIP Code centroids, the personal residential output range shall show the highest loss cost, the lowest loss cost, and the weighted average loss cost based on the 2007 Florida Hurricane Catastrophe Fund aggregate personal residential exposure data provided in the file named **"hlpm2007.exe."** The aggregate personal residential exposure data for this form shall be developed from the information in the file named **"hlpm2007.exe,"** except for insured value and deductibles information. Insured values shall be based on the personal residential output range specifications on the following pages. Deductible amounts prescribed in **"2009FormA6.xls"** for each column will be assumed to be uniformly applied to all risks. When calculating the weighted average loss costs, weight the loss costs by the total insured value calculated above. Include the statewide range of loss costs (i.e., low, high, and weighted average). For each of the loss costs provided, identify what that loss cost represents by line of business, deductible option, construction type, and coverages included, i.e., structure, contents, appurtenant structures, or additional living expenses as specified.*

C. *If a modeling organization has loss costs for a ZIP Code for which there is no exposure, give the loss costs zero weight (i.e., assume the exposure in that ZIP Code is zero). Provide a list in the submission document of those ZIP Codes where this occurs.*

D. *If a modeling organization does not have loss costs for a ZIP Code for which there is some exposure, do not assume such loss costs are zero, but use only the exposures for which there are loss costs in calculating the weighted average loss costs. Provide a list in the submission document of the ZIP Codes where this occurs.*

E. *All anomalies in loss costs that are not consistent with the requirements of Standard A-10 and have been explained in Disclosure A-10.1 shall be shaded.*

Indicate if per diem is used in producing loss costs for Coverage D (ALE) in the personal residential output ranges. If a per diem rate is used in the submission, a rate of $150.00 per day per policy shall be used.

A. and B. See Appendix B for Form A-6.

C. ZIP Codes with loss costs but no exposures
None

D. ZIP Codes with exposure but no loss costs

32335
32613
33188
33697

Per Diem: No per diem was used in producing loss costs for Coverage D (ALE).

E. Anomalies are explained in Disclosure A-10.1 and are shaded in the form.

Form A-7: Percentage Change in Personal Residential Output Ranges

A. *Provide the percentage change in the weighted average loss costs using the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named* ***"hlpm2007.exe"*** *from the personal residential output ranges from the previously accepted submission for the following:*
   - *Statewide (overall percentage change),*
   - *By region, as defined in Figure 4– North, Central and South,*
   - *By county, as defined in Figure 5– Coastal and Inland.*

B. *Provide this Form on CD in Excel format. The file name shall include the abbreviated name of the modeling organization, the standards year, and the form name. A hard copy of Form A-7 shall be included in the submission.*

See Appendix B for Form A-7.

Form A-8: Percentage Change in Personal Residential Output Ranges by County

Provide color-coded maps by county reflecting the percentage changes in the weighted average 2% deductible loss costs for frame owners, masonry owners, mobile homes, frame renters, masonry renters, frame condos, and masonry condos from the personal residential output ranges from the previously accepted submission using the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named ***"hlpm2007.exe"****.*

Counties with a negative percentage change (reduction in loss costs) shall be indicated with shades of blue; counties with a positive percentage change (increase in loss costs) shall be indicated with shades of red, and counties with no percentage change shall be white. The larger the percentage change in the county, the more intense the color-shade.

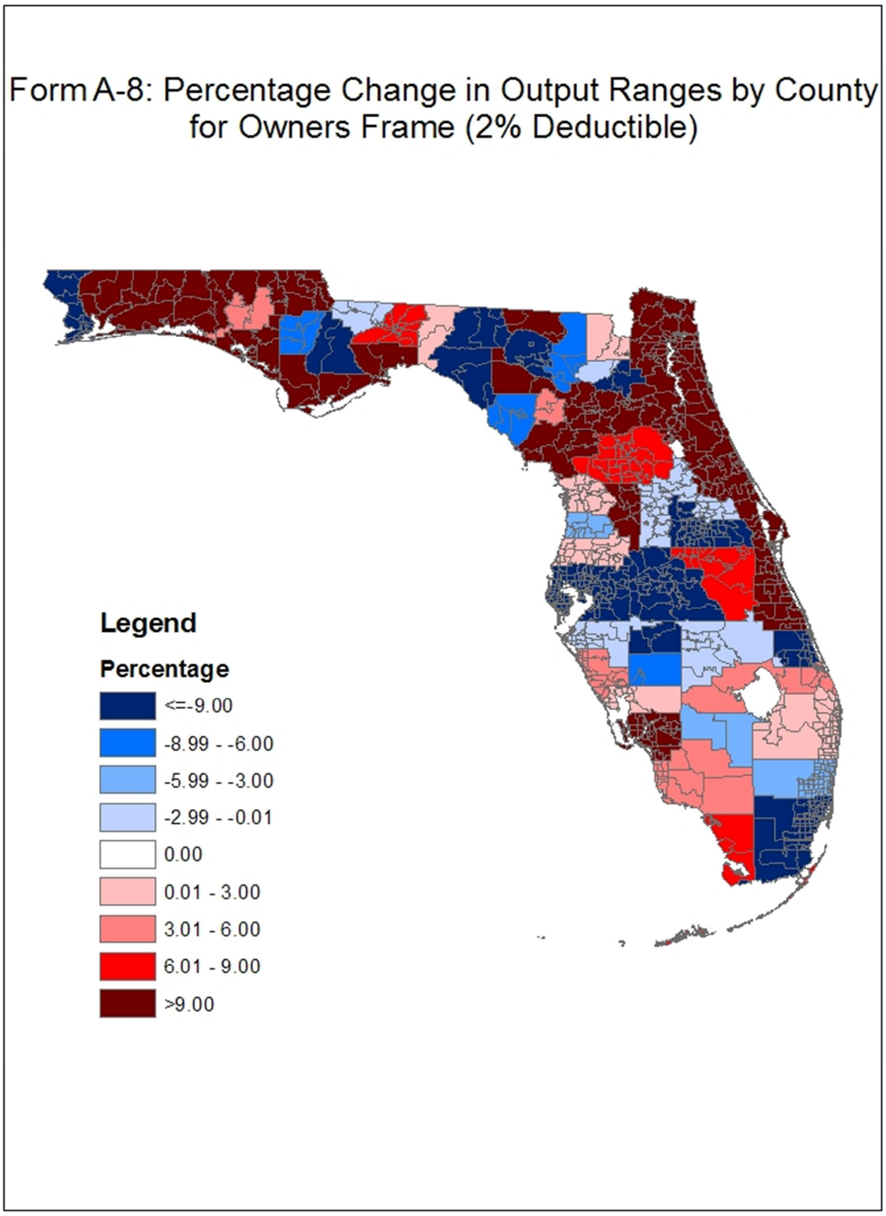


Figure 73. Percentage Change in Output Ranges by County – Owners Frame 2% Deductible.

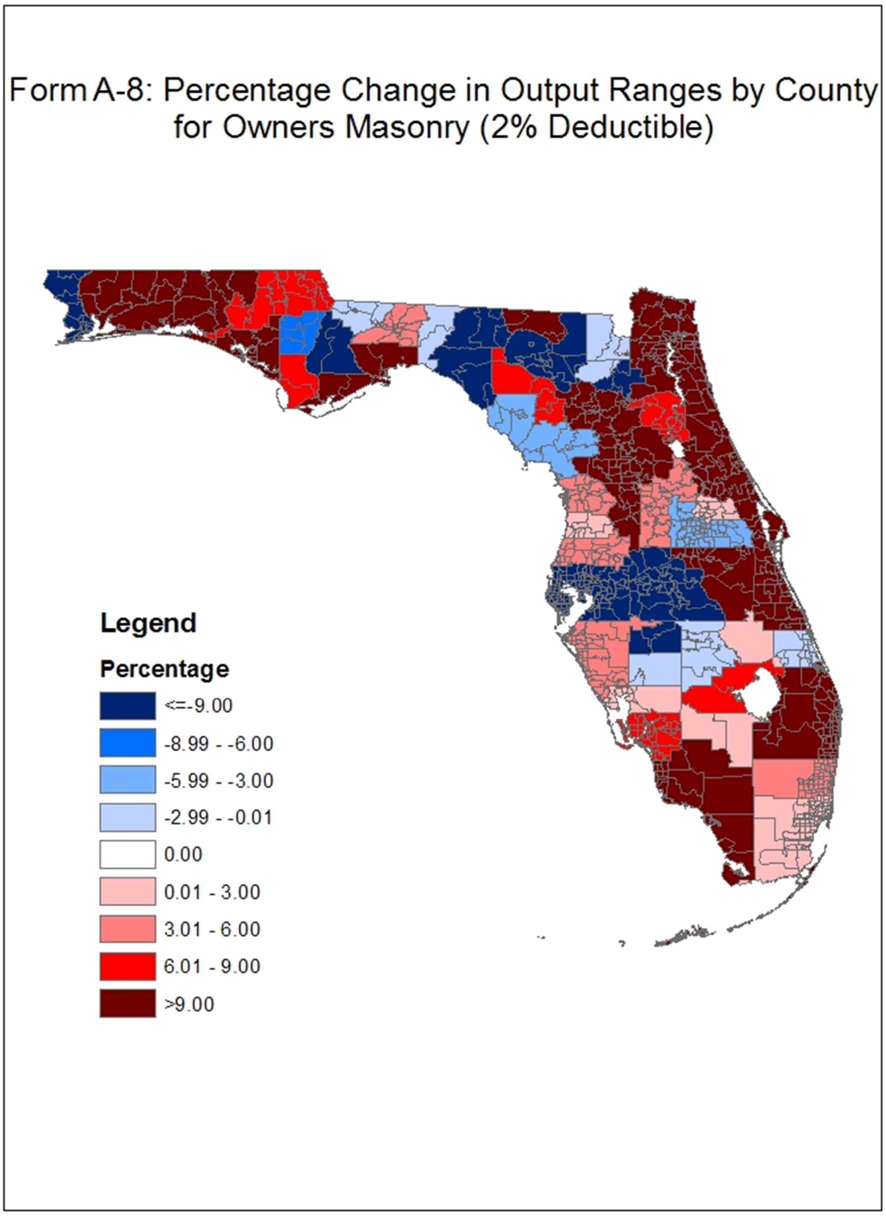


Figure 74. Percentage Change in Output Ranges by County – Owners Masonry 2% Deductible.

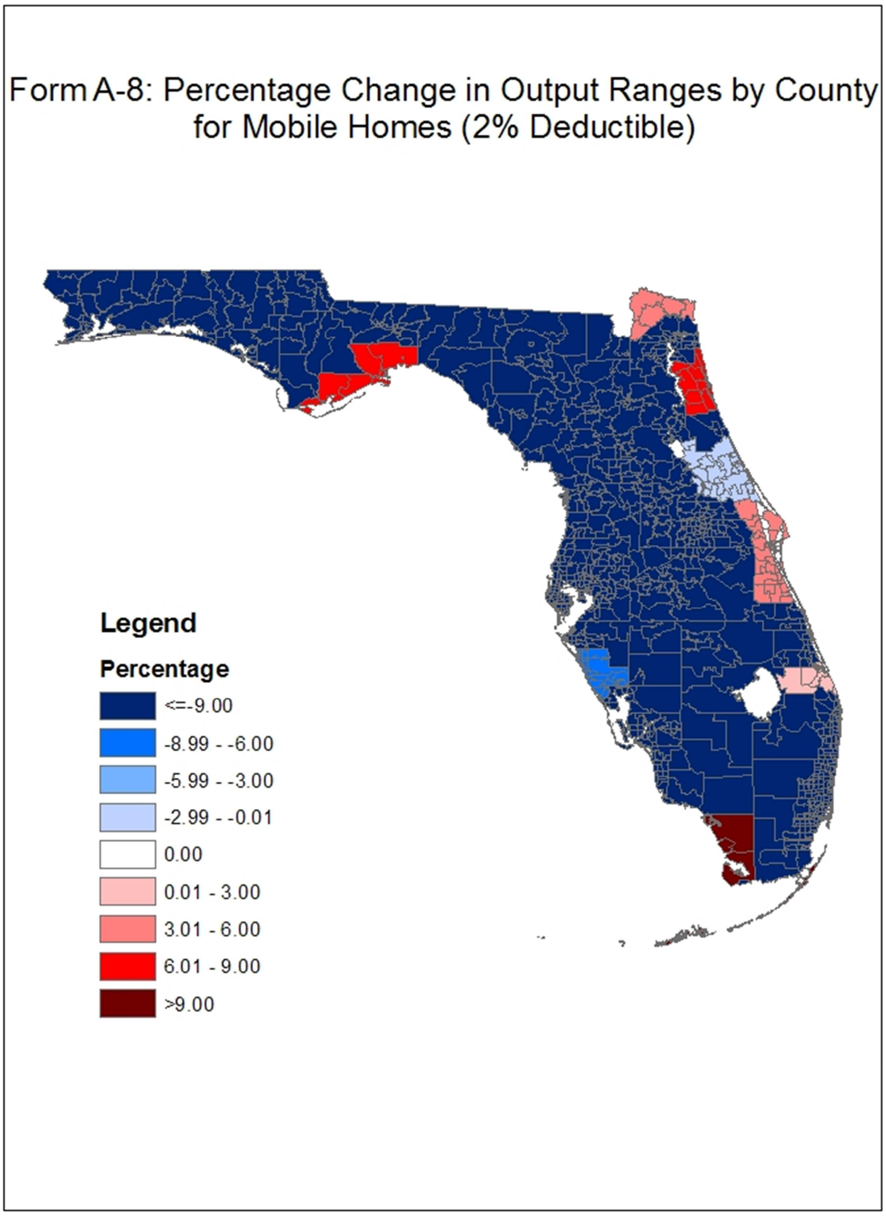


Figure 75. Percentage Change in Output Ranges by County – Mobile Homes 2% Deductible.

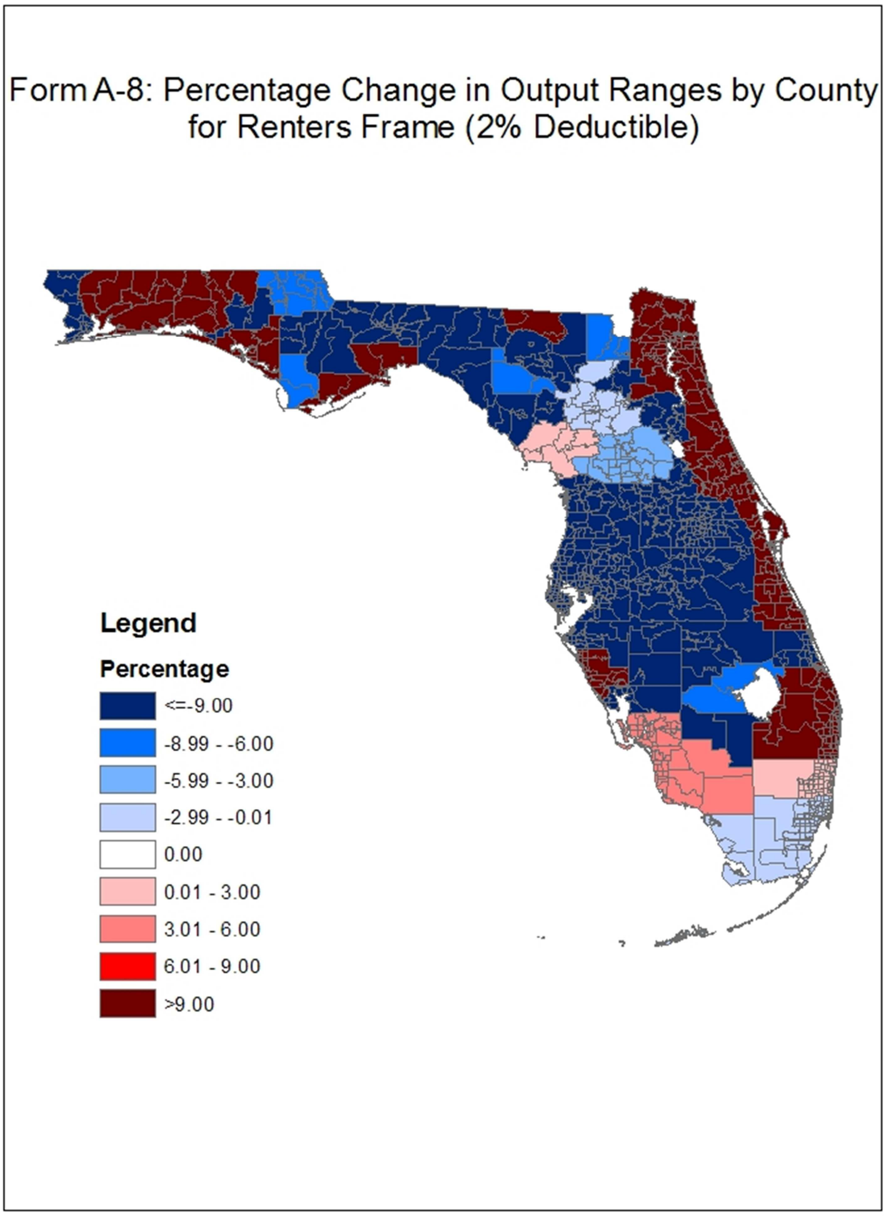


Figure 76. Percentage Change in Output Ranges by County – Renters Frame 2% Deductible.

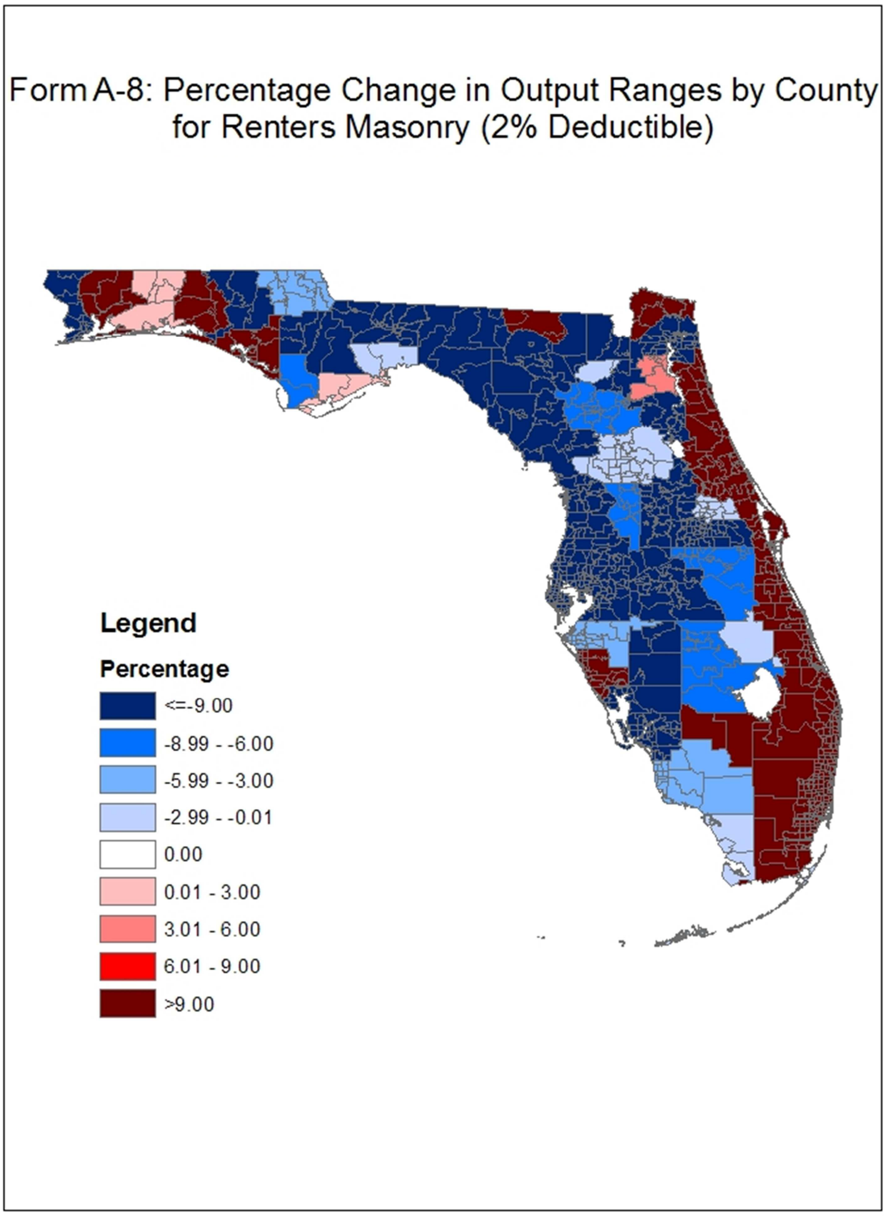


Figure 77. Percentage Change in Output Ranges by County – Renters Masonry 2% Deductible.

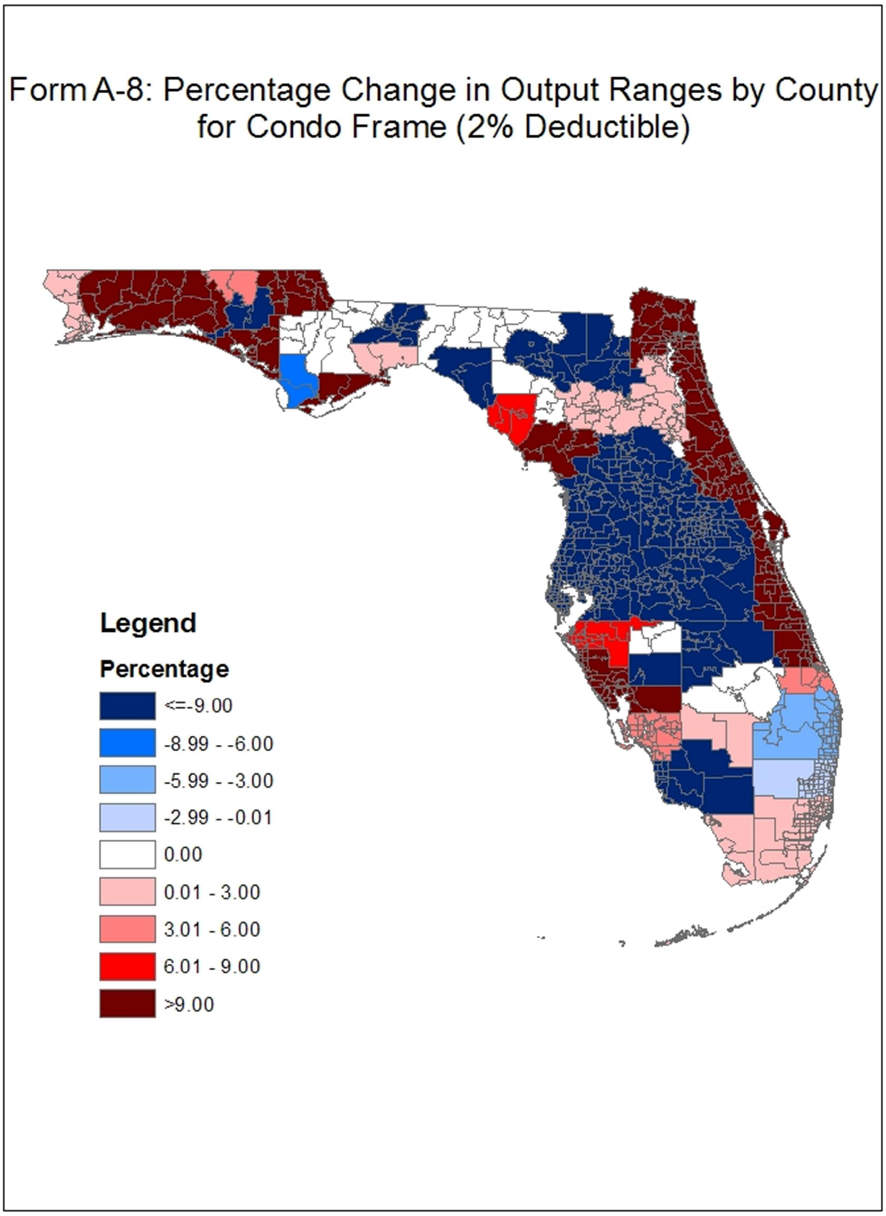


Figure 78. Percentage Change in Output Ranges by County – Condo Frame 2% Deductible.

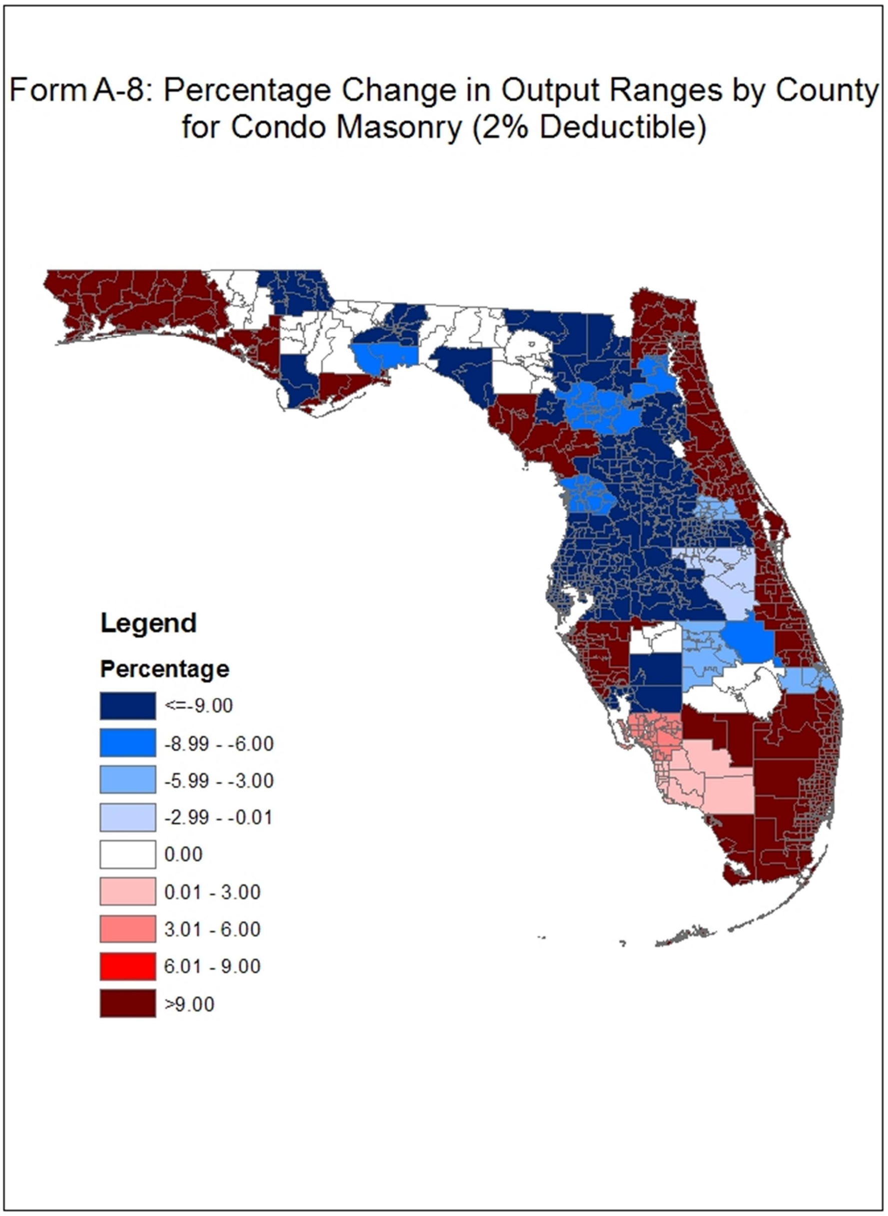


Figure 79. Percentage Change in Output Ranges by County – Condo Masonry 2% Deductible.

Form A-9: Probable Maximum Loss for Florida

A. Provide a detailed explanation of how the Expected Annual Hurricane Losses and Return Periods are calculated.

B. Complete Form A-9, Part A showing the personal residential probable maximum loss for Florida. For the Expected Annual Hurricane Losses column, provide personal residential, zero deductible statewide loss costs based on the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named ***"hlpm2007.exe."***

C. Complete Form A-9, Part C showing the personal and commercial residential probable maximum loss for Florida. For the Expected Annual Hurricane Losses column, provide personal and commercial residential, zero deductible statewide loss costs based on the 2007 Florida Hurricane Catastrophe Fund's aggregate personal and commercial residential exposure data found in the file named ***"hlpm2007c.exe."***

In the column, Return Period (Years), provide the return period associated with the average loss within the ranges indicated on a cumulative basis.

For example, if the average loss is $4,705 million for the range $4,501 million to $5,000 million, provide the return time associated with a loss that is $4,705 million or greater.

For each loss range in millions ($1,001-$1,500, $1,501-$2,000, $2,001-$2,500) the average loss within that range should be identified and then the return period associated with that loss calculated. The return period is then the reciprocal of the probability of the loss equaling or exceeding this average loss size.

D. Provide a graphical comparison of the current submission Personal Residential Return Periods to the previously accepted submission Personal Residential Return Periods. Return Period (Years) shall be shown on the y-axis on a log 10 scale with Losses in Billions shown on the x-axis. The legend shall indicate the corresponding submission with a solid line representing the current year and a dotted line representing the previously accepted submission.

E. Provide the estimated loss for each of the Personal Residential Return Periods given in Part B. Describe how the uncertainty intervals were derived.

F. Provide the estimated loss for each of the Personal and Commercial Residential Return Periods given in Part D.

G. Provide this Form on CD in Excel format. The file name shall include the abbreviated name of the modeler, the Standards year, and the Form name. A hard copy of Form A-9 shall be included in the submission.

Form A-9: Probable Maximum Loss for Florida, Item A

Explanation of Expected Annual Hurricane Losses and Return Period Calculation

For each range of losses:

Expected Annual Hurricane Losses = Total Loss / Number of years in the simulation,

Where:

Total Loss = Sum of losses for all simulated years with aggregate storm losses in the range.

Return Period = 1 / Probability of exceeding the average loss in the range,

Where:

Average Loss = Total Loss / Number of years with aggregate storm losses in the range,

And

Probability of exceeding the average loss in the range =

(Number of years with aggregate storm losses > Average Loss) / Number of years in the simulation.

Form A-9, Part A - Personal Residential Probable Maximum Loss for Florida

Loss Range (Millions)		Total Loss (Millions)	Average Loss per Year (Millions)	Average Loss per Hurricane (Millions)	Number of Hurricanes	Expected Annual Hurricane Losses (Millions)	Return Period (Years)
0	500	1,167,519	34	153.46	7,608	21.23	2.11
501	1000	1,754,367	722	518.12	3,386	31.90	2.81
1001	1500	1,870,355	1,234	839.48	2,228	34.01	3.13
1501	2000	1,927,247	1,735	1,119.84	1,721	35.04	3.37
2001	2500	1,743,773	2,233	1,406.27	1,240	31.70	3.58
2501	3000	1,672,599	2,742	1,698.07	985	30.41	3.75
3001	3500	1,739,762	3,246	1,986.03	876	31.63	3.90
3501	4000	1,840,718	3,741	2,199.19	837	33.47	4.04
4001	4500	1,845,615	4,243	2,545.68	725	33.56	4.19
4501	5000	1,884,477	4,747	2,808.46	671	34.26	4.33
5001	6000	4,239,585	5,499	3,241.27	1,308	77.08	4.54
6001	7000	4,611,050	6,494	3,585.58	1,286	83.84	4.83
7001	8000	4,868,366	7,478	4,139.77	1,176	88.52	5.14
8001	9000	5,153,819	8,491	4,848.37	1,063	93.71	5.46
9001	10000	5,830,625	9,496	5,078.94	1,148	106.01	5.81
10001	11000	6,199,195	10,507	5,466.66	1,134	112.71	6.20
11001	12000	6,181,667	11,490	5,943.91	1,040	112.39	6.62
12001	13000	6,525,907	12,478	6,585.17	991	118.65	7.07
13001	14000	6,995,192	13,504	6,953.47	1,006	127.19	7.58
14001	15000	7,345,846	14,489	7,518.78	977	133.56	8.16
15001	16000	7,162,805	15,504	7,888.55	908	130.23	8.79
16001	17000	6,889,321	16,521	8,654.93	796	125.26	9.45
17001	18000	7,052,491	17,500	8,995.52	784	128.23	10.15
18001	19000	7,290,905	18,505	9,217.33	791	132.56	10.97
19001	20000	6,965,108	19,510	9,935.96	701	126.64	11.84
20001	21000	6,963,181	20,480	9,933.21	701	126.60	12.85
21001	22000	7,174,172	21,480	10,886.45	659	130.44	13.92
22001	23000	7,016,152	22,488	11,334.66	619	127.57	15.19
23001	24000	5,545,077	23,496	12,240.79	453	100.82	16.40
24001	25000	5,834,169	24,513	11,715.20	498	106.08	17.66
25001	26000	6,917,320	25,525	13,100.98	528	125.77	19.20
26001	27000	5,464,581	26,527	13,593.49	402	99.36	20.96
27001	28000	5,608,187	27,491	14,681.12	382	101.97	22.75
28001	29000	5,534,440	28,528	13,336.00	415	100.63	24.71
29001	30000	5,070,955	29,482	14,571.71	348	92.20	27.08
30001	35000	22,183,753	32,480	14,604.18	1,519	403.34	34.18
35001	40000	15,412,804	37,319	16,327.12	944	280.23	52.43
40001	45000	12,779,745	42,177	17,177.08	744	232.36	78.68
45001	50000	8,865,657	47,158	18,279.71	485	161.19	121.95
50001	55000	7,208,848	52,238	20,834.82	346	131.07	191.64
55001	60000	4,862,379	57,204	22,615.72	215	88.41	298.91
60001	65000	3,369,260	62,394	24,066.14	140	61.26	486.73
65001	70000	2,147,152	67,098	26,508.04	81	39.04	785.71

Loss Range (Millions)		Total Loss (Millions)	Average Loss per Year (Millions)	Average Loss per Hurricane (Millions)	Number of Hurricanes	Expected Annual Hurricane Losses (Millions)	Return Period (Years)
70001	75000	1,582,679	71,940	25,945.56	61	28.78	1,309.52
75001	80000	1,003,718	77,209	33,457.28	30	18.25	2,037.04
80001	90000	1,014,029	84,502	28,972.26	35	18.44	4,230.77
90001	100000	662,801	94,686	38,988.31	17	12.05	13,750.00
100001	Maximum	108,441	108,441	54,220.49	2	1.97	55,000.00
Total		253,087,811			45,010	4,601.60	

Form A-9, Part B – Personal Residential Probable Maximum Loss for Florida

Return Period (Years)	Estimated Loss Level (Billions)	Uncertainty Interval (Billions)		
Top Event	$108.44		-	$1,622.67
1000	$69.70	$67.22	-	$72.95
500	$62.62	$61.19	-	$64.96
250	$55.16	$54.08	-	$56.45
100	$45.07	$43.97	-	$46.08
50	$36.76	$36.09	-	$37.47
20	$25.92	$25.60	-	$26.40
10	$17.27	$16.93	-	$17.63
5	$7.05	$6.81	-	$7.28

Form A-9, Part C – Personal and Commercial Residential Probable Maximum Loss for Florida

Loss Range (Millions)		Total Loss (Millions)	Average Loss per Year (Millions)	Average Loss per Hurricane (Millions)	Number of Hurricanes	Expected Annual Hurricane Losses (Millions)	Return Period (Years)
0	500	1,139,587	34	118.41	9624	20.72	2.09
501	1000	1,605,586	726	490.85	3271	29.19	2.75
1001	1500	1,739,043	1,240	762.07	2282	31.62	3.02
1501	2000	1,893,163	1,738	1086.78	1742	34.42	3.24
2001	2500	1,904,696	2,241	1327.31	1435	34.63	3.43
2501	3000	1,792,795	2,737	1680.22	1067	32.60	3.60
3001	3500	1,788,766	3,246	1845.99	969	32.52	3.75
3501	4000	1,811,538	3,743	2267.26	799	32.94	3.89
4001	4500	1,990,017	4,243	2386.11	834	36.18	4.02
4501	5000	1,850,875	4,734	2647.89	699	33.65	4.15
5001	6000	3,861,478	5,493	3104.08	1244	70.21	4.33
6001	7000	4,366,693	6,498	3561.74	1226	79.39	4.58
7001	8000	4,483,346	7,472	3929.31	1141	81.52	4.83
8001	9000	4,902,078	8,496	4345.81	1128	89.13	5.10
9001	10000	4,607,434	9,500	5176.89	890	83.77	5.36
10001	11000	5,246,693	10,514	5459.62	961	95.39	5.62
11001	12000	5,769,952	11,471	5798.95	995	104.91	5.93
12001	13000	5,584,052	12,492	6043.35	924	101.53	6.26
13001	14000	6,212,208	13,505	6708.65	926	112.95	6.60
14001	15000	6,358,689	14,484	7033.95	904	115.61	6.97
15001	16000	6,125,522	15,468	7479.27	819	111.37	7.37
16001	17000	6,928,256	16,496	8228.33	842	125.97	7.79
17001	18000	6,409,328	17,512	8444.44	759	116.53	8.23
18001	19000	6,422,664	18,509	9110.16	705	116.78	8.70
19001	20000	6,456,651	19,506	9593.83	673	117.39	9.19
20001	21000	6,511,780	20,477	9777.45	666	118.40	9.74
21001	22000	6,412,438	21,518	10651.89	602	116.59	10.28
22001	23000	6,288,735	22,540	11170.04	563	114.34	10.87
23001	24000	6,352,759	23,529	11029.09	576	115.50	11.52
24001	25000	5,533,412	24,484	11649.29	475	100.61	12.14
25001	26000	6,165,785	25,478	11460.57	538	112.11	12.79
26001	27000	6,357,518	26,490	12869.47	494	115.59	13.55
27001	28000	6,185,589	27,492	12623.65	490	112.47	14.40
28001	29000	5,245,428	28,508	13484.39	389	95.37	15.18
29001	30000	5,631,399	29,484	14008.45	402	102.39	16.01
30001	35000	25,571,089	32,287	15166.72	1686	464.93	18.80
35001	40000	21,922,470	37,347	16734.71	1310	398.59	24.60
40001	45000	18,728,587	42,277	18747.33	999	340.52	31.85
45001	50000	16,596,151	47,418	20338.42	816	301.75	41.23
50001	55000	14,287,647	52,336	20323.82	703	259.78	53.71
55001	60000	11,844,466	57,497	23879.97	496	215.35	69.89

Loss Range (Millions)		Total Loss (Millions)	Average Loss per Year (Millions)	Average Loss per Hurricane (Millions)	Number of Hurricanes	Expected Annual Hurricane Losses (Millions)	Return Period (Years)
60001	65000	10,994,326	62,468	25991.32	423	199.90	92.13
65001	70000	7,838,783	67,576	27995.65	280	142.52	119.83
70001	75000	6,937,192	72,262	29646.12	234	126.13	161.29
75001	80000	4,651,117	77,519	31856.96	146	84.57	205.99
80001	90000	9,264,988	85,000	36191.36	256	168.45	298.91
90001	100000	5,673,419	94,557	39953.65	142	103.15	550.00
100001	Maximum	8,073,578	115,337	47213.91	171	146.79	2,391.30
Total		324,319,765		581395.53	49716		

Form A-9, Part D – Personal and Commercial Residential Probable Maximum Loss for Florida

Return Period (Years)	Estimated Loss Level (Billions)	Uncertainty Interval (Billions)		
Top Event	$170.16		-	$2,214.63
1000	$103.84	$100.07	-	$106.39
500	$92.88	$90.00	-	$95.98
250	$81.17	$79.34	-	$84.17
100	$63.79	$62.59	-	$65.42
50	$51.01	$50.03	-	$52.10
20	$33.40	$32.76	-	$34.19
10	$20.97	$20.51	-	$21.46
5	$8.12	$7.81	-	$8.45

Form A-9 Probable Maximum Loss for Florida, Item D

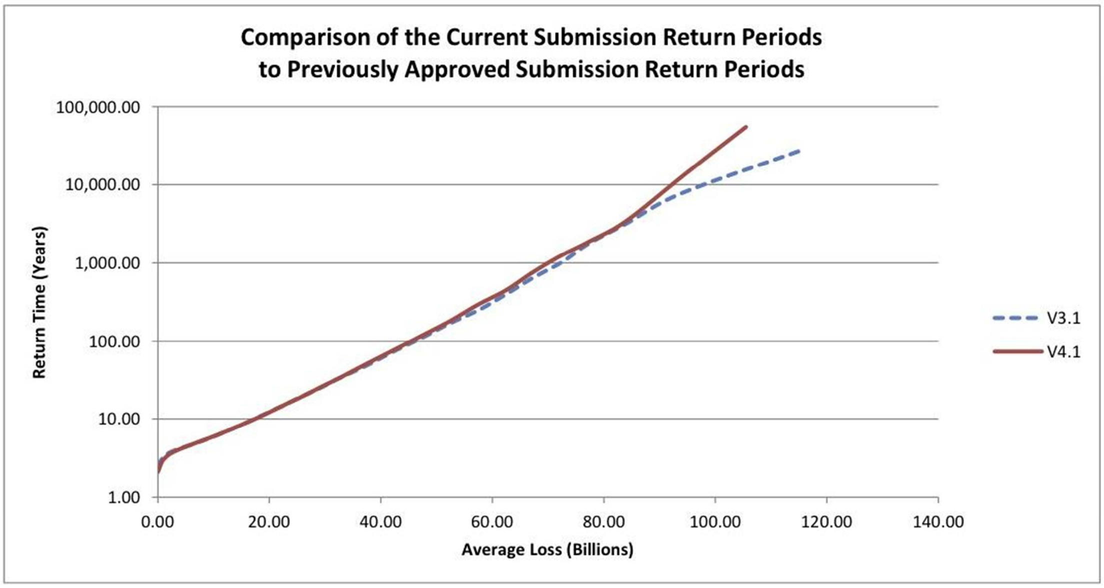


Figure 80. Comparison of return periods.

Form A-9: Probable Maximum Loss for Florida, Item E

Description of Uncertainty Intervals

The uncertainty intervals (except for the top event) are approximate 95% confidence intervals.

Let $X_1, X_2, \ldots, X_N$ be the ordered set of annual losses produced by the simulation with $X_{(1)} \leq X_{(2)} \leq \ldots \leq X_{(N)}$.

Since the sample is large enough to assume a normal approximation for the pth quantile of the ordered set, an approximate 95% confidence interval for the PML is given by $(X_{(r)}, X_{(s)})$, where

$$r = Np - 1.96\sqrt{Np(1-p)}$$

$$s = Np + 1.96\sqrt{Np(1-p)}$$

and N and p are defined as in Standard A-11, i.e.

N = number of years in the simulation

and

p = 1 – 1 / return period.

If r and/or s are not integers, let r* be the smallest integer greater than r and let s* be the smallest integer greater than or equal to s. The 95% approximate confidence interval is given by $(X_{(r^*)}, X_{(s^*)})$

The top event itself is estimated by the highest order statistic, $X_{(N)}$. Although it is not possible to compute a confidence interval for the top event using the above methods, an upper bound can be placed on the ***expected*** top event, $E(X_{(N)})$.

As per Wilkinson (1982), $E(X_{(N)}) \leq \mu + \dfrac{(N-1)\sigma}{\sqrt{2N-1}}$

where μ and σ are the mean and the standard deviation of the losses, respectively.

Thus an upper bound for the top even is computed as :

$$\overline{X} + \frac{(N-1)s}{\sqrt{2N-1}}$$

where $\overline{X}$ is the sample mean of the simulated annual losses and s is the sample standard deviation.

STATISTICAL STANDARDS

S-1 Modeled Results and Goodness-of-Fit

A. The use of historical data in developing the model shall be supported by rigorous methods published in currently accepted scientific literature.

The historical data for the period 1900-2009 were modeled using scientifically accepted methods that have been published in accepted scientific literature.

B. Modeled and historical results shall reflect agreement using currently accepted scientific and statistical methods in the appropriate disciplines.

Modeled and historical results are in agreement as indicated by appropriate statistical and scientific tests. Some of these tests will be discussed below.

Disclosures

1. ***Identify the form of the probability distributions used for each function or variable, if applicable. Identify statistical techniques used for the estimates and the specific goodness-of-fit tests applied. Describe whether the p-values associated with the fitted distributions provide a reasonable agreement with the historical data. Provide a completed Form S-3, Distributions of Stochastic Hurricane Parameters.***

Form S-3 at the end of this section identifies the form of the probability distribution used for each variable. Some of the methods and distributions are described below.

Historical initial conditions are used to provide the seed for storm genesis in the model. Small uniform random error terms are added to the historical starting positions, intensities and changes in storm motion. Subsequent storm motion and intensity are determined by randomly sampling empirical probability distribution functions derived from the HURDAT historical record.

Figure 81 shows the occurrence rate of both modeled and historical land-falling hurricanes in Florida. The figure shows a high level of agreement between historical and modeled occurrences. A chi-square goodness-of-fit test, for the number of years with 0, 1, and 2 or more hurricanes per year (3 bins each with 5 or more occurrences giving 2 degrees of freedom), gives a *p*-value of approximately 0.92. An analysis of landfalls by each region and intensity in Florida is given in Form M-1. The landfall occurrences by region are reasonable as indicated by the chi-square goodness-of-fit tests that are shown in Form M-1, especially given the large uncertainties in the historical record, particularly with regard to intensity.

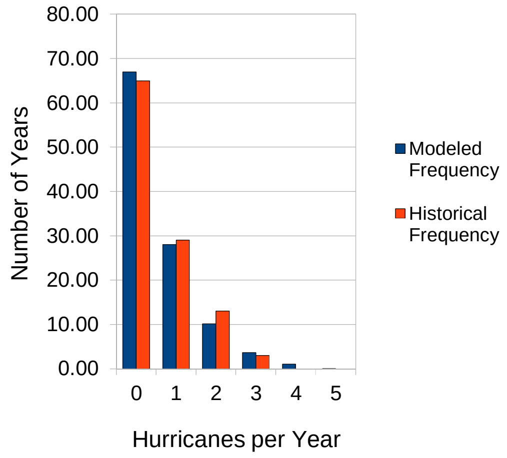


Figure 81. Comparison of modeled vs. historical occurrences.

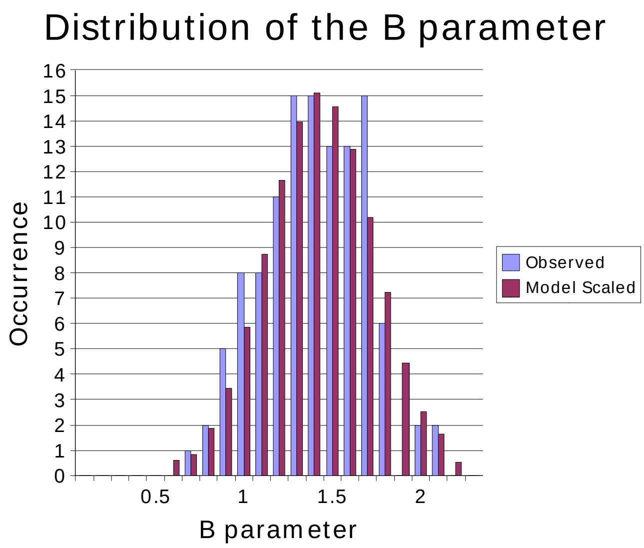


Figure 82. Comparison between the modeled and observed Willoughby and Rahn (2004) *B* data set.

The random error term for the *Holland B* is modeled using a Gaussian distribution with a standard deviation of 0.286. Figure 82 shows a comparison between the Willoughby and Rahn (2004) *B* data set (see Standard M-2.1) and the modeled results (scaled to equal the 116 measured occurrences in the observed data set). The modeled results with the error term have a mean of about 1.38 and are consistent with the observed results. The figure indicates a high level of agreement, and the chi-square goodness-of-fit test gives a *p*-value about 0.57, using 8 degrees of freedom (re-binning to 11 bins and two estimated parameters). A KS goodness-of-fit yields a *p*-value of 0.845 (ks=0.057).

We developed an *Rmax* model using the revised landfall *Rmax* database which includes 108 measurements for storms up to 2005. We have opted to model the *Rmax* at landfall rather than the entire basin for a variety of reasons. One is that the distribution of landfall *Rmax* may be different from the *Rmax* distribution over open water. An analysis of the landfall *Rmax* database and the 1988-2007 DeMaria Extended Best Track data show that there appears to be a difference in the dependence of

Rmax on central pressure (*Pmin*) between the two data sets. The landfall data set provides a larger set of independent measurements, which is more than 100 storms compared to about 31 storms affecting the Florida threat area region in the Best Track Data. Since landfall *Rmax* is most relevant for loss cost estimation, and has a larger independent sample size, we have chosen to model the landfall data set. Future studies will examine how the Extended Best Track Data can be used to supplement the landfall data set.

Based on the semi-boundedness and skewness of *Rmax*, we sought to model the distribution using a gamma distribution. Using the maximum likelihood estimation method, we found the estimated location and scale parameters for the gamma distribution are respectively as follows, $\hat{k} = 5.53547$ and $\hat{\theta} = 4.67749$. Using these estimated values, we plotted the observed and expected distribution in Figure 83. The *Rmax* values are binned in 5 sm intervals, with the *x*-axis showing the end value of the interval.

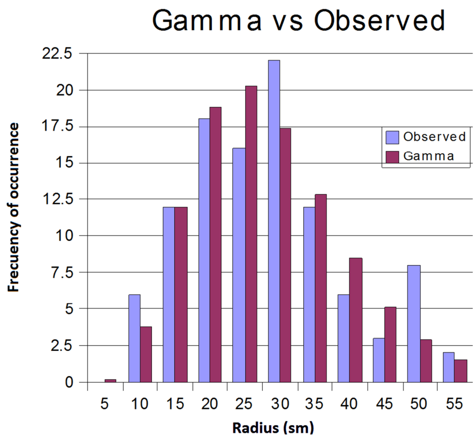


Figure 83. Observed and expected distribution using a gamma distribution.

The gamma distribution showed a reasonable fit. A chi-square goodness-of-fit test yields a *p*-value of 0.49 with 4 degrees of freedom (re-binning to 7 bins to ensure more than 5 occurrences per bin and 2 estimated parameters). A KS goodness-of-fit yields a *p*-value of 0.80 (ks= 0.0838).

2. Describe the nature and results of the tests performed to validate the windspeeds generated.

We compared the cumulative effect of a series of modeled and observed wind fields by comparing the peak winds observed at a particular ZIP Code during the entire storm life-cycle. We also compared our modeled wind fields to those that have been constructed from all available observations which are freely available on the NOAA AOML-HRD web site. A subsequent section describes the process for recording the peak modeled and observed wind speeds (wind swaths) from which the validation statistics are generated. Our validation is based on nine hurricanes that passed by or made landfall in Florida. These hurricanes were well-observed. We will have the ability to add new storms and quickly conduct new validation studies as our validation set grows and we make enhancements to the model. In order to run the Loss Model in "scenario" mode for doing validation studies, we had to construct detailed storm track histories for recent storms affecting Florida using the HURDAT, *Rmax* and *Holland B* databases. The validation suite included 1992 Hurricane Andrew and the following 2004 and 2005 storms: Charley, Frances, Jeanne, Ivan, Dennis, Katrina, Rita, and Wilma. The validations make use of the Hurricane Research Division's Surface Wind Analysis System (H*Wind).

H*WIND

The HRD approach to hurricane wind analysis employed in H*Wind evolved from a series of peer-reviewed, scientific publications analyzing landfalls of major hurricanes including Frederic of 1979, Alicia of 1983, Hugo of 1989, and Andrew of 1992 (Powell et al., 1991; Powell et al., 1996; Powell et al., 1998). In Powell et al. (1991) which described Hurricane Hugo's landfall, a concept was developed for conducting a real-time analysis of hurricane wind fields. The system was first used in real-time during Hurricane Emily in 1993 (Burpee et al., 1994). Since 1994, HRD wind analyses have been conducted on a research basis to create real time hurricane wind field guidance for forecasters at the National Hurricane Center. During hurricane landfall episodes from 1995-2005, HRD scientists have conducted research side by side with hurricane specialists at NHC analyzing wind observations on a regular 3 or 6 hour schedule consistent with NHC's warning and forecast cycle.

An HRD wind analysis requires the input of all available surface weather observations (e.g., ships, buoys, coastal platforms, surface aviation reports, reconnaissance aircraft data adjusted to the surface, etc.). Observational data are downloaded on a regular schedule and then processed to fit the analysis framework. This includes the data sent by NOAA P3 and G4 research aircraft during the HRD hurricane field program, including the Step Frequency Microwave Radiometer measurements of surface winds and U.S. Air Force Reserves (AFRES) C-130 reconnaissance aircraft, remotely sensed winds from the polar orbiting SSM/I and ERS, the QuikScat platform and TRMM microwave imager satellites, and GOES cloud drift winds derived from tracking low level near-infrared cloud imagery from geostationary satellites. These data are composited relative to the storm over a 4-6 hour period. All data are quality controlled and processed to conform to a common framework for height (10 m or 33 feet), exposure (marine or open terrain over land), and averaging period (maximum sustained 1 minute wind speed) using accepted methods from micrometeorology and wind engineering (Powell et al., 1996). This framework is consistent with that used by the National Hurricane Center (NHC) and is readily converted to wind load frameworks used in building codes.

Based on a qualitative examination of various observing platforms and methods used to standardize observations, Powell et al. (2005) suggest that the uncertainty of the maximum wind from a given analysis ranges from 10-20% depending on the observing platform. In general the uncertainty of a given H*Wind analysis is of the order of 10% for analysis of Hurricanes Ivan, Frances, Jeanne, and Katrina, all of which incorporated more accurate surface wind measurements from the Stepped Frequency Microwave Radiometer (SFMR) aboard the NOAA research aircraft. The SFMR data used for those analyses was post-processed during the fall of 2005 using the latest geophysical model function relating wind speed to sea surface foam emissivity. Hurricanes Charley, Dennis, Rita, Wilma, and Andrew did not have the benefit of SFMR measurements but relied on adjusting Air Force reconnaissance observations at the 3 km altitude to the surface with empirical reduction methods. The method used was based on how SFMR measurements compared to flight level winds and depended on storm relative azimuth. Preliminary results suggest that this method has an uncertainty of 15%.

We created wind swaths for both the modeled and observed winds. We also computed the maximum winds at ZIP Codes for both the observed and modeled winds; from that we derived the mean and root-mean-square error (see Table 33 and Table 34).

WIND SWATHS

For each storm in the validation set, the peak sustained surface wind speed is recorded at each ZIP Code in Florida for the duration of the storm event. Observed wind fields from H*Wind and modeled wind fields from the public model are moved along the exact same tracks, which are the observed high-resolution storm tracks assembled from reconnaissance aircraft and radar data. For each storm, the recorded peak of the observed and modeled wind speed is saved at each grid point and each ZIP Code, and the resulting ZIP Code comparison pairs provide the basis for the model validation statistics. The peak grid point values are color contoured and mapped as graphics showing the “swath” of maximum winds swept out by the storm passage. Wind swaths are sometimes confused with wind fields. The winds depicted in a wind swath do not have time continuity, cannot depict a circulation, and therefore cannot be described as a wind field. A wind field represents a vector field that represents a representative instance of the surface wind circulation.

Wind swaths were constructed for both the modeled and observed winds. Maximum marine exposure winds were compared at all ZIP Codes for both the observed and modeled winds (Figure 84) from which we derived the mean and root-mean-square error statistics shown in Table 33 and Table 34. This type of comparison provides an unvarnished assessment of model performance.

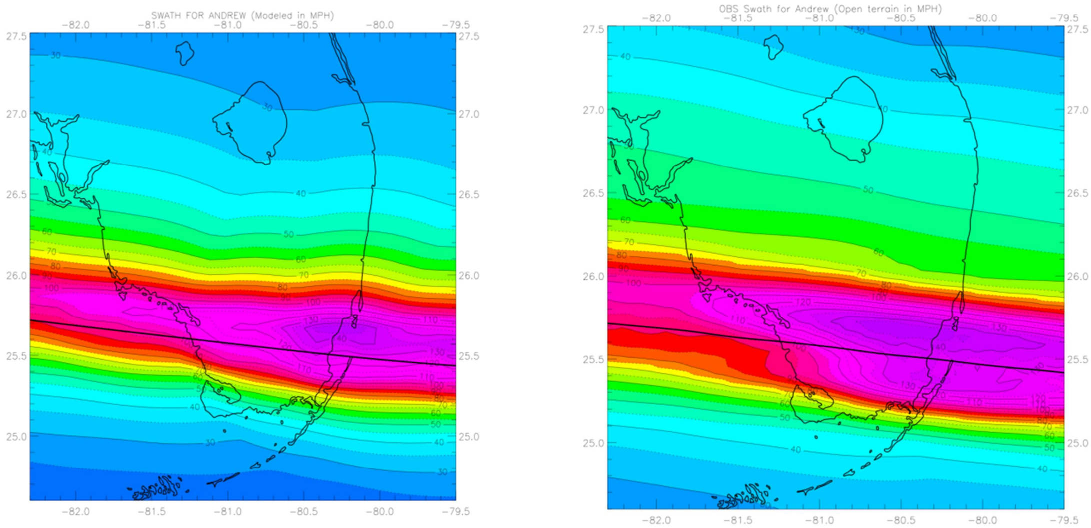


Figure 84. Comparison of modeled (left) and observed (right) swaths of maximum sustained open terrain surface winds for Hurricane Andrew of 1992 in South Florida. The Hurricane Andrew observed swath is based on adjusting flight-level winds with the SFMR-based wind reduction method.

Table 33. Validation Table based on ZIP Code wind swath comparison of the Public wind field model to H*Wind. Mean errors (bias) of model for the set of validation wind swaths. Errors (upper number in each cell) are computed as Modeled – Observed (Obs) at ZIP Codes where modeled winds were within wind thresholds (model threshold) or where observed winds were within respective wind speed threshold (H*Wind threshold). Number of ZIP Codes for the comparisons is indicated as the lower number in each cell.

Storms	Year	56-74 Model Threshold	75-112 Model Thresh.	>112mph Model Thresh.	>56mph Model Thresh.	56-74 H*Wind Thresh.	75-112 H*Wind Thresh.	>112mph H*Wind Thresh.	>56mph H*Wind Thresh.
Andrew	1992	5.25 92	13.86 107	2.73 100	7.49 299	10.26 139	12.47 54	0.66 88	7.68 281
Charley	2004	12.96 112	21.36 244	-7.36 13	17.80 369	8.58 122	-3.09 63	-8.91 17	3.47 202
Frances	2004	3.99 693	-0.99 96	None	3.38 789	-0.59 372	-4.48 96	None	-1.38 468
Ivan	2004	-6.95 20	-3.35 38	None	-4.59 58	-5.76 22	-3.73 41	None	-4.44 63
Jeanne	2004	6.78 250	3.95 190	None	5.56 440	2.67 225	-3.87 121	None	0.38 346
Dennis	2005	2.45 15	6.98 46	None	5.87 61	5.22 29	7.57 29	-4.37 3	5.87 61
Dennis Keys	2005	None	None	None	None	-12.65 5	None	None	-12.65 5
Katrina	2005	-11.43 77	-2.42 100	None	-6.34 177	-8.93 93	-11.57 149	None	-10.55 242
Rita	2005	6.28 5	14.54 3	None	9.38 8	12.01 5	None	None	12.01 5
Wilma	2005	0.44 133	-9.99 394	None	-7.35 527	6.54 87	-13.35 396	None	-9.77 483

Table 34. Validation Table based on ZIP Code wind swath comparison of the Public wind field model to H*Wind. Root mean square (RMS) wind speed errors (mph) of model for the set of validation wind swaths. Errors are based on Modeled – Observed (Obs) at ZIP Codes where modeled winds were within wind thresholds (model threshold) or where observed winds were within respective wind speed threshold (H*Wind threshold). Number of ZIP Codes for the comparisons is indicated as the lower number in each cell.

Storms	Year	56-74 Model Threshold	75-112 Model Thresh.	>112mph Model Thresh.	>56mph Model Thresh.	56-74 H*Wind Thresh.	75-112 H*Wind Thresh.	>112mph H*Wind Thresh.	>56mph H*Wind Thresh.
Andrew	1992	6.11	15.75	7.024	10.81	12.19	14.26	5.82	11.10
Charley	2004	19.84	26.59	10.08	24.30	16.65	8.60	11.69	14.21
Frances	2004	8.08	11.20	None	8.52	4.99	10.20	None	6.41
Ivan	2004	7.07	5.20	None	5.91	6.11	5.51	None	5.72
Jeanne	2004	10.14	9.65	None	9.93	10.88	6.16	None	9.50
Dennis	2005	3.06	9.19	None	8.12	6.15	9.93	4.59	8.12
Dennis Keys	2005	None	None	None	None	12.67	None	None	12.67
Katrina	2005	14.66	8.25	None	11.49	12.50	17.97	None	16.09
Rita	2005	6.4992	14.54	None	10.28	12.41	None	None	12.41
Wilma	2005	14.73	14.05	None	14.22	12.51	14.83	None	14.44
RMS N	All	10.18 1397	14.87 1218	6.26 113	12.37 2728	9.75 1099	12.79 949	6.71 108	11.19 2156

Comparison of model and H*Wind sustained marine exposure wind speeds at ZIP Codes receiving model wind speeds over the given thresholds (Table 33) indicates a positive bias. For ZIP Codes where model wind speeds exceeded 56 mph, the bias is +3.3 mph ; negative bias was apparent in Hurricanes Ivan, Katrina, and Wilma. At other wind speed thresholds, low bias is evident for winds > 112 mph in Hurricane Charley, and winds of 75-112 mph in Hurricanes Frances, Ivan, Katrina, and Wilma. For winds of 56-74 mph, low bias is noted in Hurricanes Ivan, and Katrina. Errors for Hurricane Andrew are relatively high, but the lack of observations for Hurricane Andrew makes it difficult to determine if it was a Cat 4 or Cat 5 hurricane during its landfall in South Florida. Hurricane Rita in the Keys also shows relatively high bias, but observations indicate that there were fluctuations in intensity over a short period of time during its passage past the Keys. Model errors for Hurricane Charley are also relatively high, likely due to the model producing a wind field that was too broad. When model winds are compared to H*Wind at ZIP Codes exceeding H*Wind and sustained wind speed thresholds of 56 mph are considered, the mean bias is -2.2 mph. However, bias at other wind speed thresholds is larger, primarily caused by large model - H*Wind differences in Hurricanes Andrew, Charley, and Rita.

When swaths are evaluated at ZIP Codes, a positive wind speed bias of ~3 mph is indicated. However, the model can also under-predict swaths for individual cases. While bias correction is an accepted practice for numerical weather prediction, there is no evidence that the model has a consistent bias. The swath bias is probably associated with limitations in specifying the radial pressure profile after landfall. The tendency for the Holland pressure profile parameter to produce too broad an area of strong winds near the eyewall is the most likely cause of bias and is likely a feature found in many of the current risk models. Therefore we have decided to forgo any corrective measures at this point.

Our validation set is unique in that the values of storm position, motion, *Rmax* and *Pmin* are observed, and *B* is determined independently from the H*Wind field. In other words, it is impossible to fine-tune our results. Although additional validation storms are desired, we believe the positive bias for locations with winds > 56 mph is a characteristic of models that use the *Holland B* pressure profile parameter, which tends to produce model fields that are too broad outside the radius of maximum winds. Our validation method provides an objective means of assessing model performance by evaluating the portion of the wind field that contains damaging winds.

The root mean square (RMS) error (Table 34) provides a better estimate of model uncertainty. For ZIP Codes in which model winds were 56-74 mph, the RMS error is +/- 10 mph (~ 15%), for 75-112 mph the error is +/- 15 mph (~16%), and for winds > 112 mph the errors is +/- 6 mph (~ 5%). In general, for winds > 56 mph, the RMS error is +/- 12 mph or ~ 13%. RMS errors are similar for ZIP Codes in which H*Wind wind speeds fell into the respective thresholds.

SUMMARY OF WIND SWATH VALIDATION

Validation of the winds from the wind model against the H*WIND analyses was prepared by considering winds that would be strong enough to be associated with damage. Threshold-based comparisons could miss places where the observed winds were greater than the model and the model was below the threshold. Conversely, observed winds over the same thresholds can be compared to the co-located model grid points but would miss places where the observed winds were below the threshold. It is important to evaluate the errors both ways to see if a consistent bias is evident. According to our validation statistics, albeit for a relatively small number of cases, wind swath ZIP Code comparisons show evidence of a 3 mph positive bias, but it is not consistent for all storms. The bias is likely related to the limitations of the *Holland B* pressure profile specification. The model uncertainty, as estimated by the RMS error, is on the order of 15%.

3. Provide the date of loss of the insurance company data available for validation and verification of the model.

The following hurricane data from different insurance companies are used to validate the model:

Andrew	1992
Erin	1995
Charley	2004
Frances	2004
Jeanne	2004

4. Provide an assessment of uncertainty in loss costs for output ranges using confidence intervals or other accepted scientific characterizations of uncertainty.

While the model does not automatically produce confidence intervals for the output ranges, the data do allow for the calculation of confidence intervals. We calculated the mean and the standard deviation of the losses for each county, and it was found that the standard errors were within 2.5% of the means for all counties. We also calculated the coefficient of variation (CV) for all counties and drew a histogram which is provided in Figure 85. The range of the CVs was between 2.6863 and 5.1714. Finally, we computed 95% confidence intervals for the average loss for each county. Some of these intervals are reproduced in Table 35.

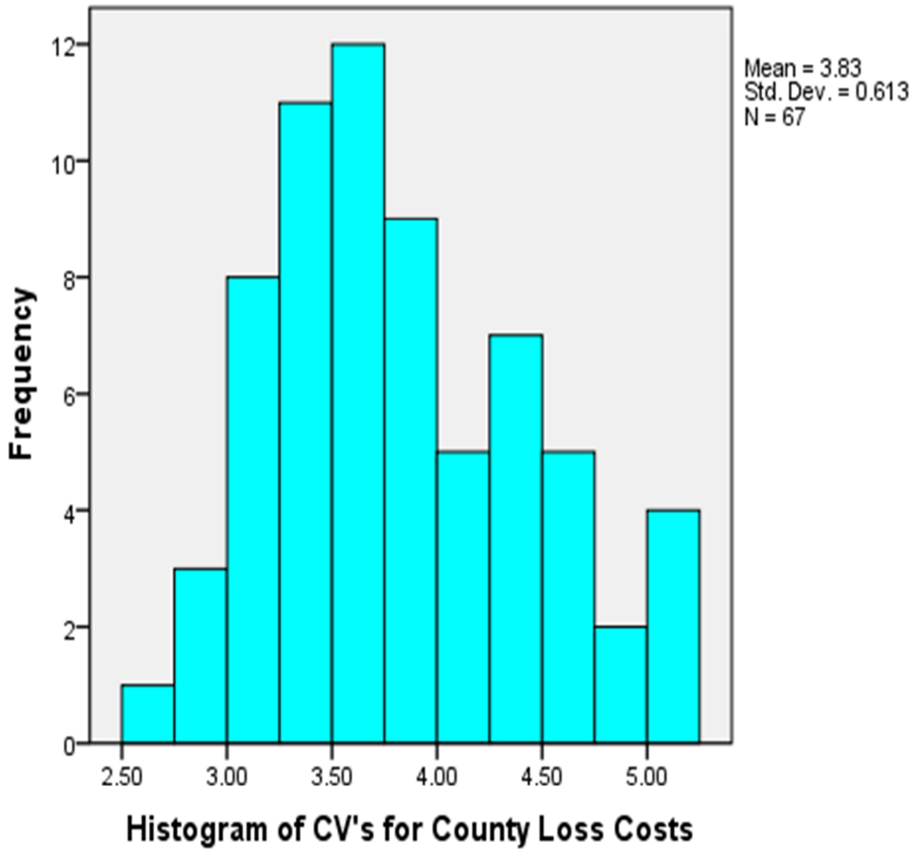


Figure 85. Histogram of CVs for all counties combined.

Table 35. 95% Confidence Intervals for Mean Loss for Selected Counties (based on 55,000 year simulation).

county	average_loss	stdev_loss	95% LCL	95%UCL
Jackson	$1,910,559.08	$7,408,587.07	$1848642.05	$1972476.11
Gulf	$1,904,365.21	$7,207,561.40	$1844128.246	$1964602.174
Nassau	$6,073,129.49	$30,685,589.85	$5816675.652	$6329583.328
Okeechobee	$9,447,970.21	$31,525,149.67	$9184499.778	$9711440.642
Leon	$11,096,848.91	$51,470,844.50	$10666682.97	$11527014.85
Alachua	$12,007,552.10	$47,710,506.53	$11608813.06	$12406291.14
Escambia	$42,785,946.46	$153,019,677.21	$41507089.39	$44064803.53
Osceola	$46,417,965.86	$158,716,544.26	$45091497.41	$47744434.31
Duval	$47,051,930.53	$208,176,392.68	$45312102.97	$48791758.09
Monroe	$84,449,740.54	$242,839,067.82	$82420220.78	$86479260.3
Hamilton	$204,406.58	$1,057,068.17	$195572.1665	$213240.9935
Sarasota	$141,682,633.89	$448,095,351.43	$137937691.3	$145427576.5
Brevard	$168,644,670.64	$597,297,817.13	$163652773.2	$173636568.1
Pinellas	$185,097,384.13	$641,911,257.59	$179732631.3	$190462137
Lee	$253,069,964.87	$700,804,668.70	$247213012.2	$258926917.5
Hillsborough	$202,838,225.96	$687,470,434.58	$197092713.7	$208583738.2
Broward	$607,027,616.65	$1,972,043,123.73	$590546329.2	$623508904.1
Miami-Dade	$659,191,980.08	$2,046,616,152.20	$642087450.9	$676296509.2
Palm Beach	$612,525,906.28	$1,893,749,367.84	$596698956.4	$628352856.2

95% LCL: 95% Lower Confidence Limit for the Average Loss
95% UCL: 95% Upper Confidence Limit for the Average Loss

5. ***Justify any differences between the historical and modeled results using current accepted scientific and statistical methods in the appropriate disciplines.***

The various statistical tests as well as other validation tests presented here and elsewhere indicate that any differences between modeled results and historical observations are not statistically significant given the large known uncertainties in the historical record.

6. ***Provide graphical comparisons of modeled and historical data and goodness-of-fit tests. Examples include hurricane frequencies, tracks, intensities, and physical damage.***

For hurricane frequencies as a function of intensity by region, see Form M-1 plots and the goodness-of-fit table. The histogram in Figure 81 compares the modeled and historical annual landfall distribution by number of events per year. The agreement between the two distributions is quite close and the histogram shows a good fit. The chi-square goodness-of-fit test gives a *p*-value of approximately 0.92 as described in S-1.1. Plots and goodness-of-fit tests for the radius of maximum wind and the Holland pressure profile parameter are shown in Disclosure 1 of this standard. Plots and statistical comparisons of historical and modeled losses are shown in Standard S-5, Form S-4 and Form S-5.

7. ***Provide a completed Form S-1, Probability and Frequency of Florida Landfalling Hurricanes per Year.***

Please see the completed Form S-1 at the end of this section.

8. Provide a completed Form S-2, Examples of Loss Exceedance Estimates.

Please see the completed Form S-2 at the end of this section.

S-2 Sensitivity Analysis for 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 currently accepted scientific and statistical methods in the appropriate disciplines and have taken appropriate action.

We have performed sensitivity analysis on the temporal and spatial outputs of the model using currently accepted scientific and statistical methods. We examined the effects of five input variables on the expected loss cost. The input variables were as follows:

CP = central pressure (in millibars)
Rmax = radius of maximum winds (in statute miles)
VT = translational velocity (forward speed in miles per hour)
Holland B= pressure profile parameter and
FFP = far field pressure

The effects of the above input variables on the expected loss cost were examined using the methods described by Iman et al. (2000a).

Disclosures

1. ***Identify the most sensitive aspect of the model and the basis for making this determination. Provide a full discussion of the degree to which these sensitivities affect output results and illustrate with an example.***

Figure 86 provides the graph of the standardized regression coefficients of the expected loss cost as a function of the input variables for Category 1, 3 and 5 hurricanes. From the graph, we observe that the sensitivity of expected loss cost depends on the category of the hurricanes. For a Category 1 hurricane, expected loss cost is most sensitive to *Holland B* parameter followed by *FFP* and then *CP*. For a Category 3 hurricane, expected loss cost is most sensitive to *Holland B* followed by *FFP* and *Rmax* and finally for a Category 5 hurricane, expected loss cost is most sensitive to *Rmax*, followed by *Holland B* and then *CP* and *FFP*. The expected loss cost is least sensitive to *Rmax* for Category 1, while the expected loss cost is least sensitive to VT for Category 3 and 5.

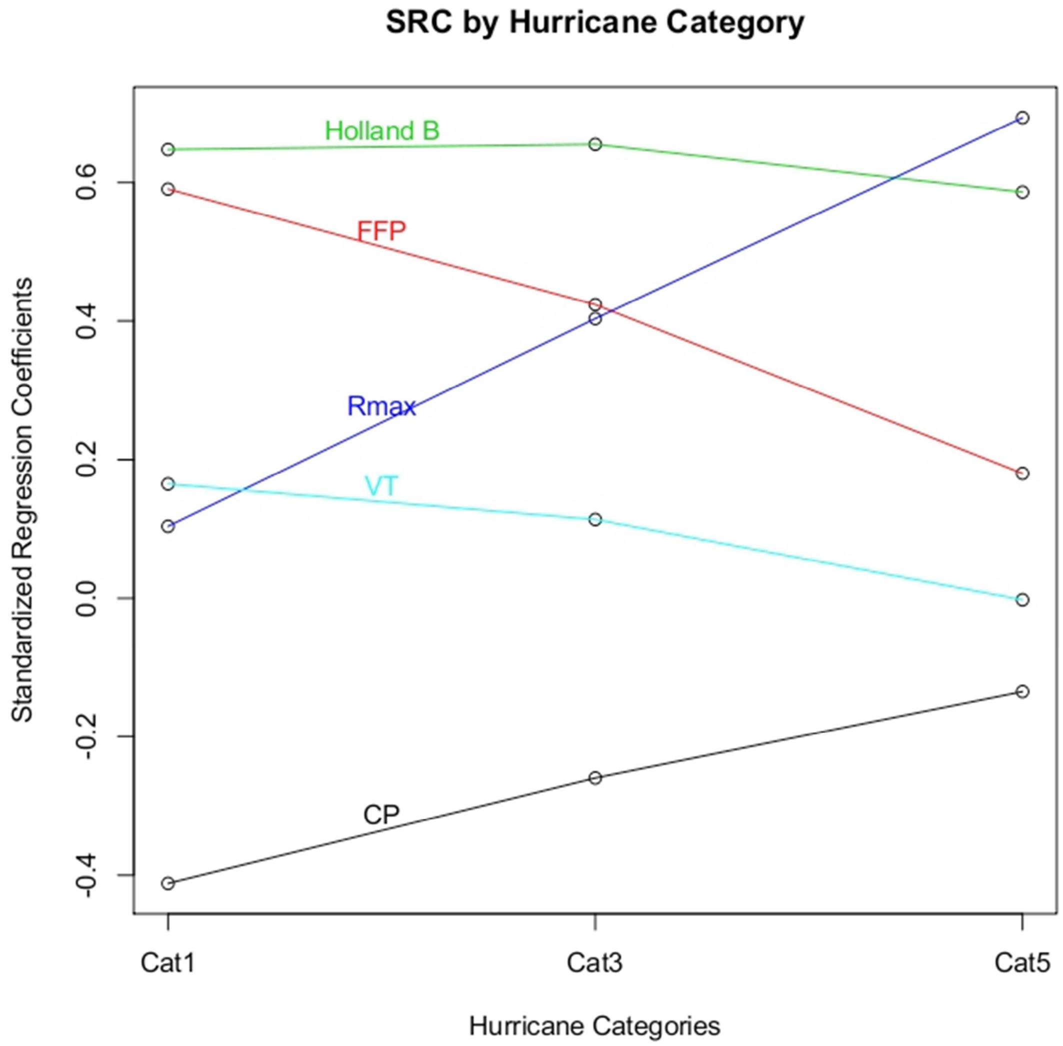


Figure 86. STCs for Expected Loss Cost for all Input Variables for all Hurricane Categories.

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

Validation studies (described in Standard S-1.2) indicated that air density, boundary layer height, fraction of the boundary layer depth over which the turbulent stresses act, the drag coefficient, the averaging time chosen to represent the boundary layer slab winds, and the conversion of the 0-500 m layer mean wind to 10 m surface wind could all have a significant impact on the output. These quantities were evaluated during the validation process, resulting in the selection of physically consistent values. For example, the values chosen for air density, marine boundary layer height and reduction factor from the mean boundary layer to the surface are representative of near surface GPS dropsonde measurements in hurricanes.

Model wind speeds (and therefore, output results) are very sensitive to surface roughness, which in turn depend on land use/land cover determined from satellite remote sensing. The assignment of roughness to mean land use / land cover classifications as well as the upstream filtering or weighting factor was applied to integrate the upstream roughness elements within a 45 degree sector to windward of the corresponding ZIP Code.

3. Describe actions taken in light of the sensitivity analyses performed.

No actions were taken in light of the aforementioned sensitivity experiments.

4. Provide a completed Form S-6, Hypothetical Events for Sensitivity and Uncertainty Analysis.

Please see the completed Form S-6 at the end of this section.

S-3 Uncertainty Analysis for Model Output

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

We have performed uncertainty analysis on the temporal and spatial outputs of the model using currently accepted scientific and statistical methods. We examined the effects of five input variables on the expected loss cost. The input variables were as follows:

CP = central pressure (in millibars)
Rmax = radius of maximum winds (in statute miles)
VT = translational velocity (forward speed in miles per hour)
Holland B= pressure profile parameter and
FFP = far field pressure

The effects of the above input variables on the expected loss cost were examined using the methods described by Iman et al. (2000b).

Disclosures

1. ***Identify the major contributors to the uncertainty in 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.***

Figure 87 gives the expected percentage reductions in the variance of expected loss costs for Category 1, 3 and 5 hurricanes as a function of the input variables. As with the sensitivity analysis, the category of the hurricane determines which variables contributes most to the uncertainty of the expected loss costs. For a Category 1 hurricane, the major contributor to the uncertainty in expected loss cost is the Holland *B* parameter followed by *FFP* and then *CP*. For a Category 3 hurricane, the major contributor to the uncertainty in loss costs is Holland *B* followed by *Rmax* and then *FFP* and finally for a Category 5 hurricane, the major contributor to the uncertainty of expected loss costs is *Rmax* followed by Holland *B* and then *FFP* and *CP*. The variable *VT* has negligible effect on the uncertainty in expected loss costs.

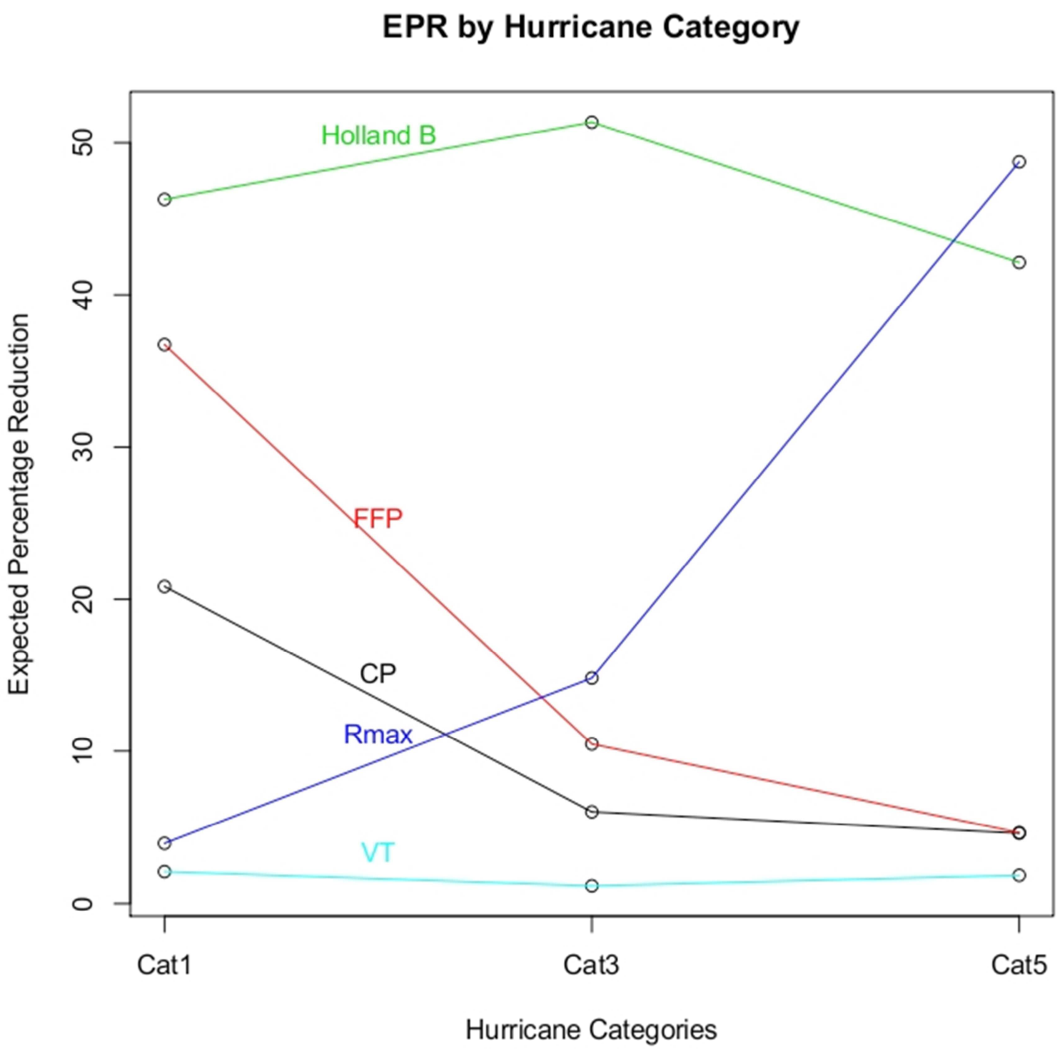


Figure 87. EPRs for Expected Loss Cost for all Input Variables for all Hurricane Categories.

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

Limitations in the HURDAT record contribute to the uncertainty of modeled tracks and pressures. Surface pressure measurements are not always available in HURDAT and estimating surface pressures by pressure-wind relationships is also fraught with uncertainty since well-observed hurricanes can demonstrate a large variation in maximum wind speeds for a given minimum surface pressure. The HURDAT record prior to the advent of satellites in the mid 1960s could have missed or incorrectly classified many hurricanes that affected Florida in the early 20th century. Even today, there is still considerable uncertainty in the assessment of hurricane intensity. Recent research results based on SFMR measurements (Powell et al., 2009) indicate that some Saffir-Simpson 1-3 Category hurricanes may be rated too highly while the Category 4 and 5 storms are probably rated accurately.

Uncertainty in surface roughness has a significant impact on wind uncertainty which in turn leads to a significant impact on losses.

3. Describe actions taken in light of the uncertainty analyses performed.

No actions were taken in light of the aforementioned uncertainty analysis.

4. Form S-6 disclosed under Standard S-2 will be used in the verification of Standard S-3.

Please see the completed Form S-6 at the end of this section.

S-4 County Level Aggregation

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

The error in the county level loss costs induced by the sampling process can be quantified by computing standard errors for the county level loss costs. These loss costs have been computed for all counties in the state of Florida using 55,000 years of simulation. The results indicate that the standard errors are less than 2.5% of the average loss cost estimates for all counties.

Disclosure

1. ***Describe the sampling plan used to obtain the average annual loss costs and output ranges. For a direct Monte Carlo simulation, indicate steps taken to determine sample size. For an importance sampling design, describe the underpinnings of the design.***

The number of simulation years was determined through the following process:

The average loss cost, $\overline{X}_Y$, and standard deviation, S_Y, were determined for each county Y using an initial run of an 11,000 year simulation. Then the maximum error of the estimate will be 2.5% of the estimated mean loss cost, if the number of simulation years for county Y is:

$$N_Y = \left(\frac{s_Y}{0.025 \overline{X}_Y} \right)^2$$

Based on the initial 11,000 year simulation run, the minimum number of years required is N_Y = 41353 for Madison County, which had the highest number of years required of all the counties. Therefore, we have decided to use 55,000 (500x110) years of simulation for our final results. For the 55,000 year simulation run, we found that the standard errors are less than 2.5% of the average loss costs for each county.

S-5 Replication of Known Hurricane Losses

The model shall estimate incurred 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 experience may be used to replicate structure-only and contents-only losses. The replications shall be produced on an objective body of loss data by county or an appropriate level of geographic detail.

Table 36 compares the modeled and actual total losses by hurricane and company for personal residential coverage. Moreover, Figure 88 indicates reasonable agreement between the observed and modeled losses. This was also supported by the various statistical tests described below.

Disclosures

1. ***Describe the nature and results of the analyses performed to validate the loss projections generated by the model. Include analyses for the 2004 hurricane season.***

For model validation purposes, the actual and modeled losses for some selected companies and hurricanes are provided in Table 36

Table 36. Total Actual vs. Total Modeled Losses.

Name	Event	Total Actual Loss	Total Modeled Loss
D	Charley	$274,702,333.00	$205,170,157.75
D	Frances	$224,656,954.00	$147,788,073.19
A	Charley	$110,471,361.00	$129,719,440.82
A	Frances	$20,201,407.00	$70,928,282.86
C	Charley	$63,889,029.00	$22,488,294.07
C	Frances	$122,776,727.00	$82,540,439.80
G	Charley	$952,353.00	$656,953.83
G	Frances	$10,007,410.00	$4,506,129.52
K	Charley	$113,313,510.00	$48,097,457.82
K	Frances	$78,377,163.00	$64,406,578.63
K	Jeanne	$40,245,030.00	$75,727,341.54
L	Charley	$32,316,645.00	$21,092,458.18
E	Charley	$62,086,256.00	$52,304,353.27
E	Frances	$43,799,401.00	$8,432,229.10
P	Jeanne	$84,545,829.00	$95,021,662.32
O	Charley_Mob	$79,751,698.00	$58,313,762.21
O	Jeanne_Mob	$81,552,694.00	$98,969,927.20
H	Charley_Mob	$4,511,656.00	$2,603,433.59
H	Charley	$8,645,559.00	$3,244,462.56
H	Frances_Mob	$4,009,884.00	$1,513,170.45

Name	Event	Total Actual Loss	Total Modeled Loss
H	Frances	$11,489,176.00	$5,932,333.02
H	Jeanne_Mob	$3,590,284.00	$3,556,001.65
H	Jeanne	$4,812,837.00	$6,360,220.52
Q	Charley	$15,135,021.00	$22,977,924.44
Q	Frances	$9,399,468.00	$17,545,730.01
Q	Jeanne	$9,048,905.00	$29,436,110.46
J	Charley	$2,015,902.00	$3,217,888.14
J	Frances	$2,659,551.00	$5,248,521.24
J	Jeanne_Mob	$29,144,703.00	$38,101,003.47
J	Jeanne	$2,059,383.00	$6,603,498.05
N	Jeanne	$31,066,792.00	$55,298,493.58
B	Andrew	$2,984,373,067.00	$2,150,330,055.01
B	Charley_Mob	$23,395,988.00	$17,031,032.54
B	Charley	$1,037,108,745.00	$624,170,159.60
B	Erin	$50,519,119.00	$61,783,719.14
B	Frances_Mob	$18,467,176.00	$8,459,966.87
B	Frances	$614,006,549.00	$441,541,456.53
M	Jeanne	$3,125,588.00	$15,352,946.83
F	Charley	$111,013,524.00	$219,956,933.05
F	Frances	$94,272,660.00	$391,440,205.11
I	Charley	$54,207,520.00	$43,026,775.45
I	Frances	$121,893,725.00	$54,994,786.67

Figure 88 provides a comparison of total actual losses vs. total modeled losses for different hurricanes. The comparison indicates a reasonable agreement between the actual and modeled losses. The correlation between actual and modeled losses is found to be 0.985, which shows a strong positive linear relationship between actual and modeled losses. We tested whether the difference in paired mean values equals zero using the paired t test (t = 1.337, df = 41, *p*-value = 0.189) and Wilcoxon signed rank test (Z = 1.0878, *p*-value = 0.2767). Based on these tests, we failed to reject the null hypothesis of equality of paired means and concluded that there is insufficient evidence to suggest a difference between actual and modeled losses. We also observed from Table 36 that about 43% of the actual losses are more than the corresponding modeled losses, and 57% of the modeled losses are more than the corresponding actual losses. This shows that our modeling process is not biased. Following Lin (1989), the bias correction factor (measure of accuracy) is obtained as 0.930, and the sample concordance correlation coefficient is found to be 0.916, which again shows a strong agreement between actual and modeled losses.

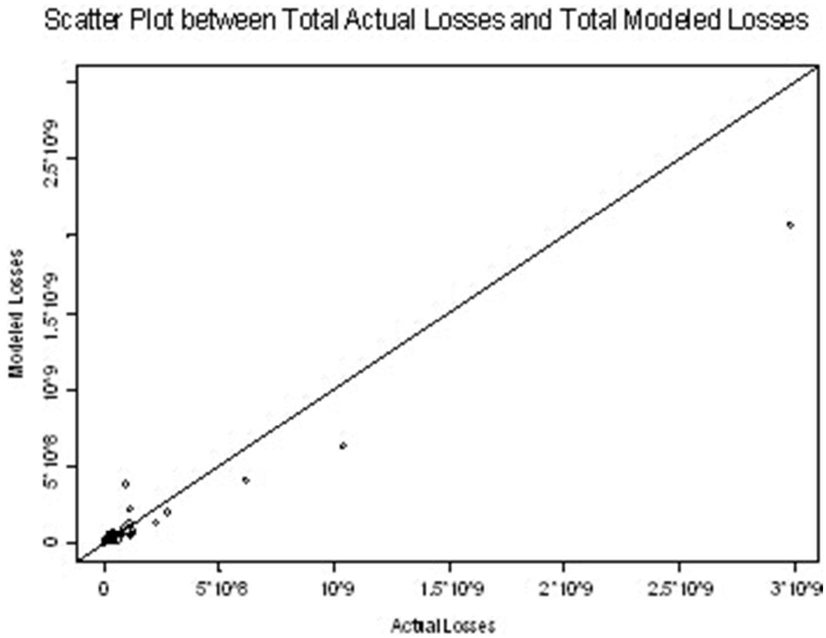


Figure 88. Scatter plot between total actual losses vs. total modeled losses.

2. Provide a completed Form S-4, Validation Comparisons.

Please see the completed Form S-4 at the end of this section.

Reference:

Lin, L. I. (1989). A concordance correlation coefficient to evaluate reproducibility. *Biometrics*, 45(1), 255-268.

S-6 Comparison of Projected Hurricane Loss Costs

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

The difference, due to uncertainty, between historical and modeled annual average statewide loss costs is reasonable as shown in the following description.

Disclosures

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

Loss costs are generated using a simulated number of hurricanes. The number of years used in the simulations was calculated as described in Standard S-4, and was found to be 55,000. The standard errors are within 2.5% of the means for all counties. Extensive validation tests for generated loss costs are not possible owing to a lack of a sufficient amount of claims data. From Form S-5 we found that the 95% confidence interval on the difference between the mean of the losses from the historical and modeled contains 0, indicating that there is no statistically significant difference.

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

The historical and stochastic storm loss costs are treated the same.

3. ***Provide a completed Form S-5, Average Annual Zero Deductible Statewide Loss Costs – Historical versus Modeled.***

Please see the completed Form S-5 at the end of this section.

Form S-1: Probability and Frequency of Florida Landfalling Hurricanes per Year

Complete the table below showing the probability and modeled frequency of landfalling Florida hurricanes per year. Modeled probability shall be rounded to four decimal places. The historical probabilities and frequencies below have been derived from the Base Hurricane Storm Set as defined in Standard M-1.

If the data are partitioned or modified, provide the historical probabilities and frequencies for the applicable partition (and its complement) or modification as well as the modeled probabilities and frequencies in additional copies of Form S-1.

Model Results
Probability and Frequency of Florida Landfalling Hurricanes per Year

Number Of Hurricanes Per Year	Historical Probabilities	Modeled Probabilities	Historical Frequencies	Modeled Frequencies
0	0.5909	0.6091	65	67
1	0.2636	0.2552	29	28
2	0.1182	0.0923	13	10
3	0.0273	0.0330	3	4
4	0.0000	0.0096	0	1
5	0.0000	0.0009	0	0
6	0.0000	0.0000	0	0
7	0.0000	0.0000	0	0
8	0.0000	0.0000	0	0
9	0.0000	0.0000	0	0
10 or more	0.0000	0.0000	0	0

Note: Historical and modeled frequencies are the number of occurrences in a 110 year period, rounded to nearest integer.

Form S-2: Examples of Loss Exceedance Estimates

*Provide projections of the insured loss for various probability levels using the hypothetical data set provided in the file named **"FormA1Input09.xls"** and using the 2007 Florida Hurricane Catastrophe Fund aggregate personal residential exposure data set provided in the file named **"hlpm2007.exe"** and using the 2007 Florida Hurricane Catastrophe Fund aggregate personal and commercial residential exposure data set provided in the file named **"hlpm2007c.exe."** Provide the total average annual loss for the loss exceedance distribution using each data set. If the methodology of your model does not allow you to produce a viable answer, please state so and why.*

Part A

Return Period (years)	Probability of Exceedance	Estimated Loss Hypothetical Data Set	Estimated Personal Residential Loss FHCF Data Set	Estimated Personal & Commercial Residential Loss FHCF Data Set
Top Event	N/A	$86,414,345	$108,440,989,657	$170,158,436,397
10000	0.01%	$69,783,186	$92,451,895,657	$147,414,774,870
5000	0.02%	$65,072,422	$85,423,624,475	$128,142,821,405
2000	0.05%	$58,697,619	$77,074,687,520	$112,892,682,552
1000	0.10%	$53,900,440	$69,704,695,603	$103,839,152,168
500	0.20%	$47,971,740	$62,622,248,923	$92,881,417,601
250	0.40%	$42,382,340	$55,155,167,148	$81,170,252,382
100	1.00%	$33,342,336	$45,074,398,629	$63,785,243,885
50	2.00%	$26,782,665	$36,758,174,324	$51,011,167,360
20	5.00%	$17,445,386	$25,919,156,466	$33,401,093,327
10	10.00%	$10,084,867	$17,273,311,156	$20,969,821,842
5	20.00%	$3,271,659	$7,049,634,477	$8,124,265,325

Part B

Mean (Total Average Annual Loss)	$2,887,343	$4,601,596,570	$5,896,723,005
Median	$9	$228,791	$1,227,246
Standard Deviation	$6,863,914	$9,757,474,927	$13,319,332,219
Interquartile Range	$1,740,187	$3,584,762,327	$4,163,102,223
Sample Size	55,000	55,000	55,000

Form S-3: Distributions of Stochastic Hurricane Parameters

Provide the probability distribution functional form used for each stochastic hurricane parameter in the model. Provide a summary of the rationale for each functional form selected for each general classification.

Stochastic Hurricane Parameter (Function or Variable)	Functional Form of Distribution	Data Source	Year Range Used	Justification for Functional Form
Holland B Error term	Normal	Willoughby and Rahn (2004)	1977-2000	The Gaussian Distribution provided a good fit for the error term. See Standard S-1, Disclosure 1.
Rmax	Gamma	Ho et al. (1987), DeMaria best track data (Pennington et al., 2000), and H*Wind analyses (Powell et al., 1996, 1998).	1901-2005	Rmax is skewed, semi-bounded and does not have a long tail. So the gamma distribution was tried and found to be a good fit. See Standard S-1, Disclosure 1.
Pressure decay Term	Normal	Vickery (2005)	1979-1996	Vickery (2005)

Form S-4: Validation Comparisons

A. Provide five validation comparisons of actual personal residential exposures and loss to modeled exposures and loss. These comparisons must be provided by line of insurance, construction type, policy coverage, county or other level of similar detail in addition to total losses. Include loss as a percent 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 loss. If this is not available, use exposures for only those policies that had a loss. Specify which was used. Also, specify the name of the hurricane event compared.

B. Provide a validation comparison of actual commercial residential exposures and loss to modeled exposures and loss. Use and provide a definition of the model's relevant commercial residential classifications.

C. Provide scatter plot(s) of modeled vs. historical losses for each of the required validation comparisons. (Plot the historical losses on the x-axis and the modeled losses on the y-axis.)

Rather than using directly a specific published hurricane wind field, the winds underlying the modeled loss cost calculations must be produced by the model being evaluated and should be the same hurricane parameters as used in completing Form A-3.

Personal Residential

Comparison #1: Hurricane Charley and Company J by Coverage

	Company Actual	Modeled	Difference
Coverage	Loss/Exposure	Loss/Exposure	
Building	0.00747	0.00945	-0.00198
Contents	0.00007	0.00249	-0.00242
Appurtenants	0.00105	0.01063	-0.00958
ALE	0.00024	0.00178	-0.00154
Total	0.00415	0.00662	-0.00247

Comparison #2: Different Companies by Different Hurricanes

		Company Actual	Modeled	Difference
Company	Event	Loss/Exposure	Loss/Exposure	
J	Charley	0.00415	0.00662	-0.00247
B	Andrew	0.09568	0.06894	0.02674
J	Frances	0.00238	0.00469	-0.00232
O	Jeanne	0.01324	0.01488	-0.00164
H	Jeanne	0.04325	0.04284	0.00041

Comparison #3: Company J by Hurricane Jeanne, Charley, Frances.

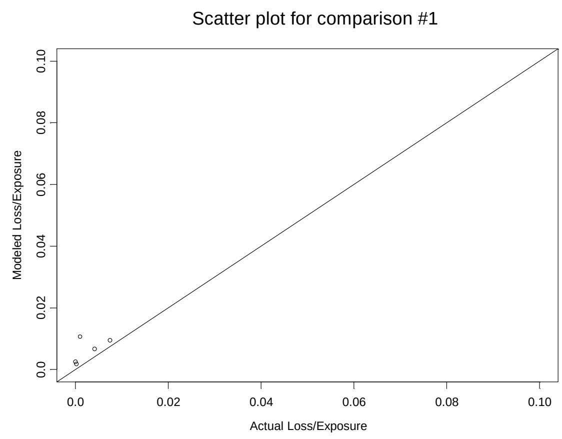
		Company Actual	Modeled	Difference
Company	Event	Loss/Exposure	Loss/Exposure	
J	Jeanne	0.00135	0.00433	-0.00298
J	Charley	0.00415	0.00662	-0.00247
J	Frances	0.00238	0.00469	-0.00232

Comparison #4: Construction Type for Hurricane Charley

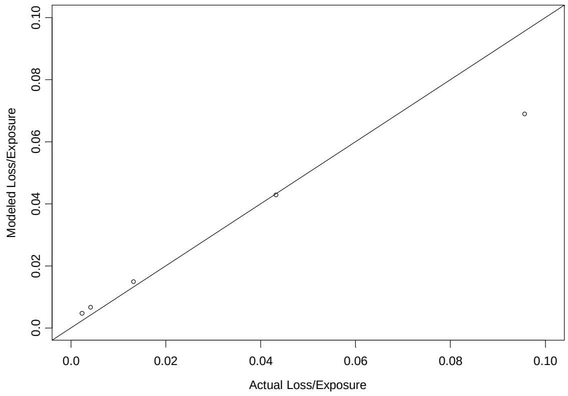
Construction	Company	Company Actual	Modeled	Difference
		Loss/Exposure	Loss/Exposure	
Frame	E	0.02295	0.02067	0.00228
Masonry	A	0.01527	0.01745	-0.00218
Manufactured	H	0.04325	0.04284	0.00041

Comparison #5: County wise for Company D and Hurricane Frances

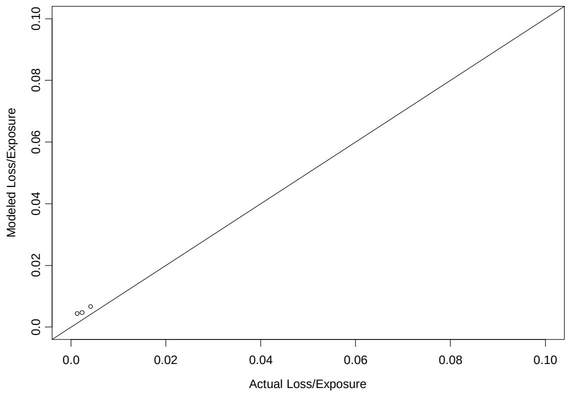
	Company Actual	Modeled	Difference
County	Loss/Exposure	Loss/Exposure	
Collier	0.00003	0.00004	-0.00001
Lee	0.00002	0.00000	0.00002
Sarasota	0.00012	0.00018	-0.00006
Manatee	0.00026	0.00021	0.00004
Levy	0.00157	0.00151	0.00006



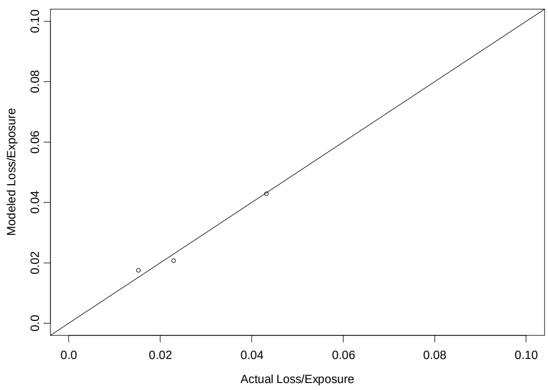
Scatter plot for comparison #2

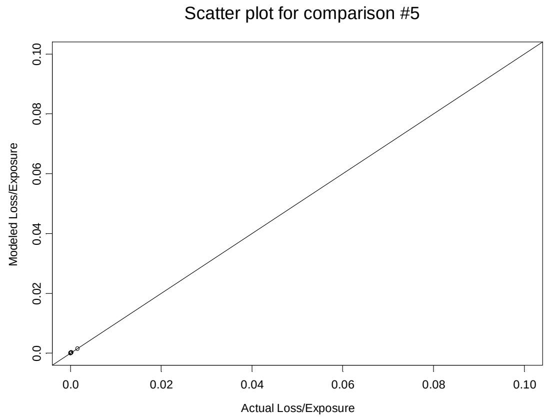


Scatter plot for comparison #3



Scatter plot for comparison #4

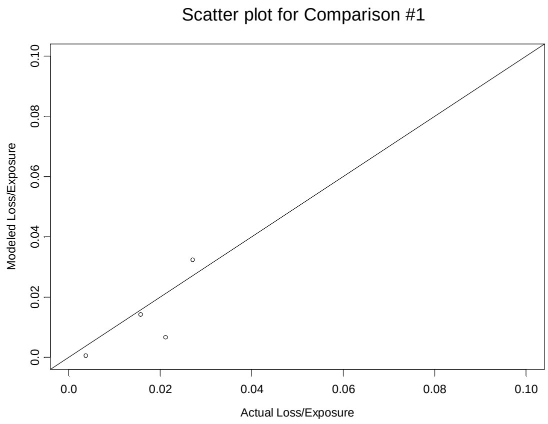




Commercial Residential:

Comparison # 1: Companies C and A by Hurricane Charley, Frances, Wilma

		Company Actual	Modeled	Difference
Company	Event	Loss/Exposure	Loss/Exposure	
C	Charley	0.02713	0.03232	-0.00519
C	Frances	0.02118	0.00660	0.01458
C	Wilma	0.01572	0.01416	0.00156
A	Wilma	0.00375	0.00055	0.00319



Form S-5: Average Annual Zero Deductible Statewide Loss Costs – Historical versus Modeled

A. *Provide the average annual zero deductible statewide personal residential loss costs produced using the list of hurricanes in the Base Hurricane Storm Set as defined in Standard M-1 based on the 2007 Florida Hurricane Catastrophe Fund's aggregate personal residential exposure data found in the file named **"hlpm2007.exe."***

Average Annual Zero Deductible Statewide Personal Residential Loss Costs (in millions of dollars)

Time Period	Historical Hurricanes	Produced by Model
Current Submission	$4,826.64	$4,601.60
Previously Accepted Submission	$4,948.36	$4,596.50
Second Previously Accepted Submission	$4,937.12	$4,608.76
Percentage Change Current Submission/Previously Accepted Submission	-2.46%	0.11%
Percentage Change Current Submission/Second Previously Accepted Submission	-2.24%	-0.16%

B. *Provide a comparison with the statewide personal residential loss costs produced by the model on an average industry basis.*

The loss cost produced by the model on an average industry basis is 4.6 billion dollars and the corresponding historical average loss is 4.8 billion dollars.

C. *Provide the 95% confidence interval on the differences between the mean of the historical and modeled personal residential loss.*

The 95% confidence interval on the difference between the mean of the historical and the mean of the modeled losses is between -1.60 and 2.05 billion dollars. Since the interval contains 0, we are 95% confident that there is no significant difference between the historical and the modeled losses.

D. If the data are partitioned or modified, provide the average annual zero deductible statewide personal residential loss costs for the applicable partition (and its complement) or modification as well as the modeled average annual zero deductible statewide personal residential loss costs in additional copies of Form S-5.

Not applicable.

E. Provide the average annual zero deductible statewide personal and commercial residential loss costs produced using the list of hurricanes in the Base Hurricane Storm Set as defined in Standard M-1 based on the 2007 Florida Hurricane Catastrophe Fund's aggregate personal and commercial residential exposure data found in the file named ***"hlpm2007c.exe."***

Average Annual Zero Deductible Statewide Personal and Commercial Residential Loss Costs

Time Period	Historical Hurricanes	Produced by Model
Current Submission	$5,938.63	$5,896.72

F. Provide a comparison with the statewide personal and commercial residential loss costs produced by the model on an average industry basis.

The loss cost produced by the model on an average industry basis is 5.89 billion dollars and the corresponding historical average loss is 5.94 billion dollars.

G. Provide the 95% confidence interval on the differences between the mean of the historical and modeled personal and commercial residential loss.

The 95% confidence interval on the difference between the mean of the historical and the mean of the modeled losses (under the assumption of equal variances) is between -2.45 and 2.53 billion dollars. Since the interval contains 0, we are 95% confident that there is no significant difference between the historical and the modeled losses.

H. If the data are partitioned or modified, provide the average annual zero deductible statewide personal and commercial residential loss costs for the applicable partition (and its complement) or modification as well as the modeled average annual zero deductible statewide personal and commercial residential loss costs in additional copies of Form S-5.

Not applicable.

Form S-6: Hypothetical Events for Sensitivity and Uncertainty Analysis

We have provided the output in ASCII files based on running a series of hurricanes as provided in the Excel file **“FormS5Input09.xls.”** The output files consist of wind speeds (in miles per hour for one minute sustained 10 meter winds) at hourly intervals over a 21×40 grid for the 500 combinations of initial conditions specified in the Excel file for the following model inputs:

- *CP* = central pressure (in millibars)
- *Rmax* = radius of maximum winds (in statute miles)
- *VT* = translational velocity (forward speed in miles per hour)
- Holland *B* = pressure profile parameter for other input used by the modeler ($0 \le p \le 1$)
- *FFP* = far field pressure (in millibars)

The value of *CP*, *Rmax*, *VT*, *FFP* and Quantile are used as direct inputs. Quantiles from 0 to 1 have been provided in the Excel input file. For the FPHLM (V4.1) model, we used the first quantile input for the Holland *B* parameter.

On a CD, we have provided an ASCII file and a PDF file named FPHLM09Expected Loss Costs. This file gives aggregate and expected loss costs for each input vector for each category of hurricane and contains 3x100=300 rows.

We have also provided, on a CD, the results in an ASCII file and a PDF file named FPHLM09Loss Cost Contour, which contains 3 x 682 = 2,046 rows. This file gives the mean loss cost at each of the 682 land based vertices over all 100 input vectors for each hurricane category.

Distribution of Loss Costs

Figure 89 provides the comparison of CDFs of the Expected Loss Costs for all Hurricane Categories.

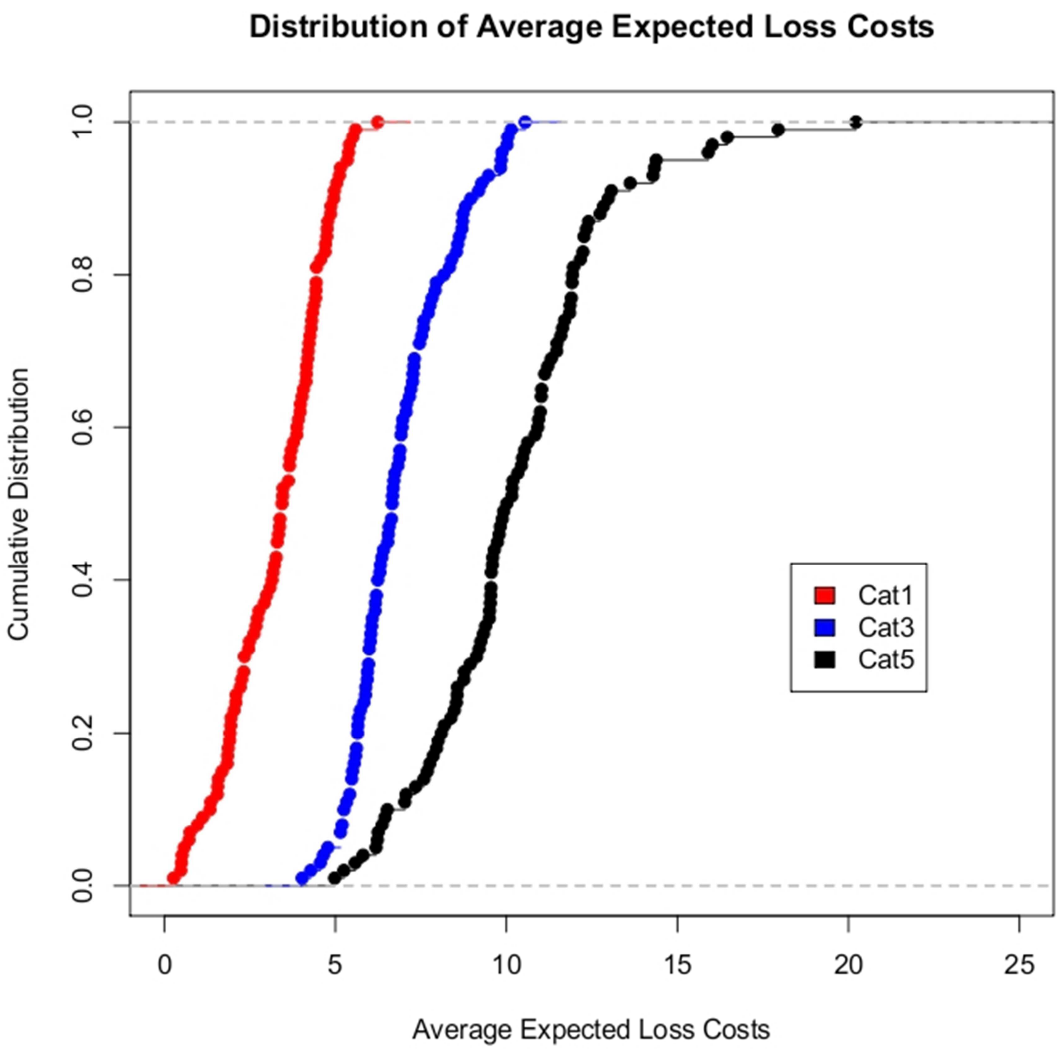


Figure 89. Comparison of CDFs of Loss Costs for all Hurricane Categories.

Figure 90 – Figure 92 show contours of the mean lost cost for Category 1, 3 and 5 hurricane respectively for each land based grid point. The mean percentage loss costs are found to be about between 1.14 %-8.3% for Category 1, between 3.64%-24.6% for Category 3 and between 2.57%-41.84% for Category 5 hurricanes. The largest losses occur shortly after landfall to the right of the hurricane path.

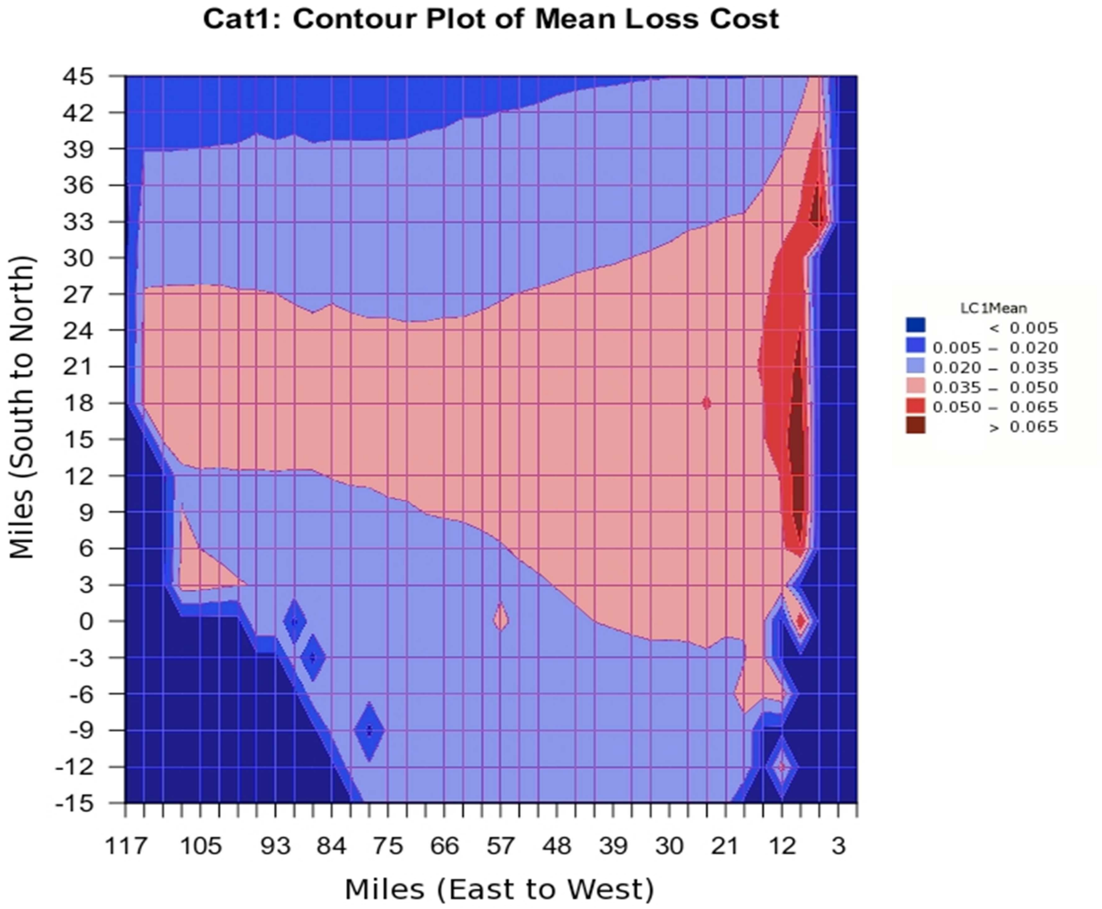


Figure 90. Contour Plot of Loss Cost for a Category 1 Hurricane.

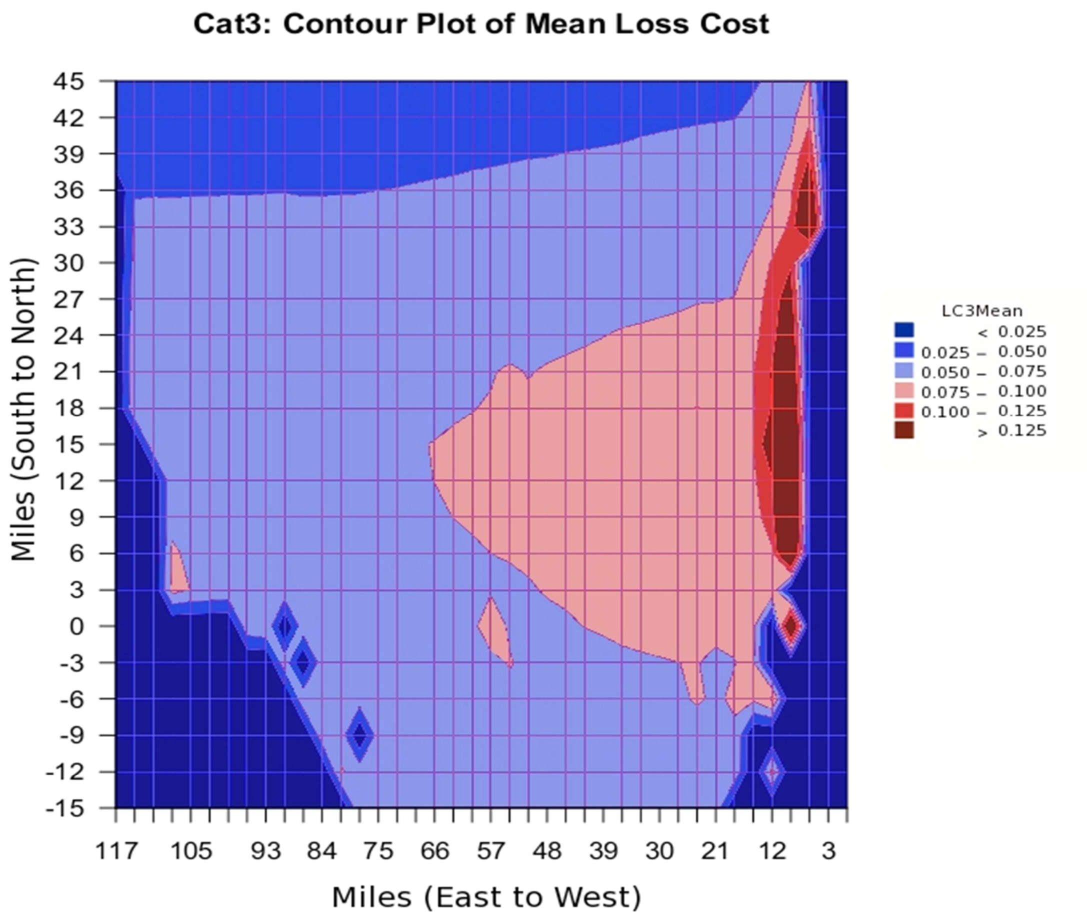


Figure 91. Contour Plot of Loss Cost for a Category 3 Hurricane.

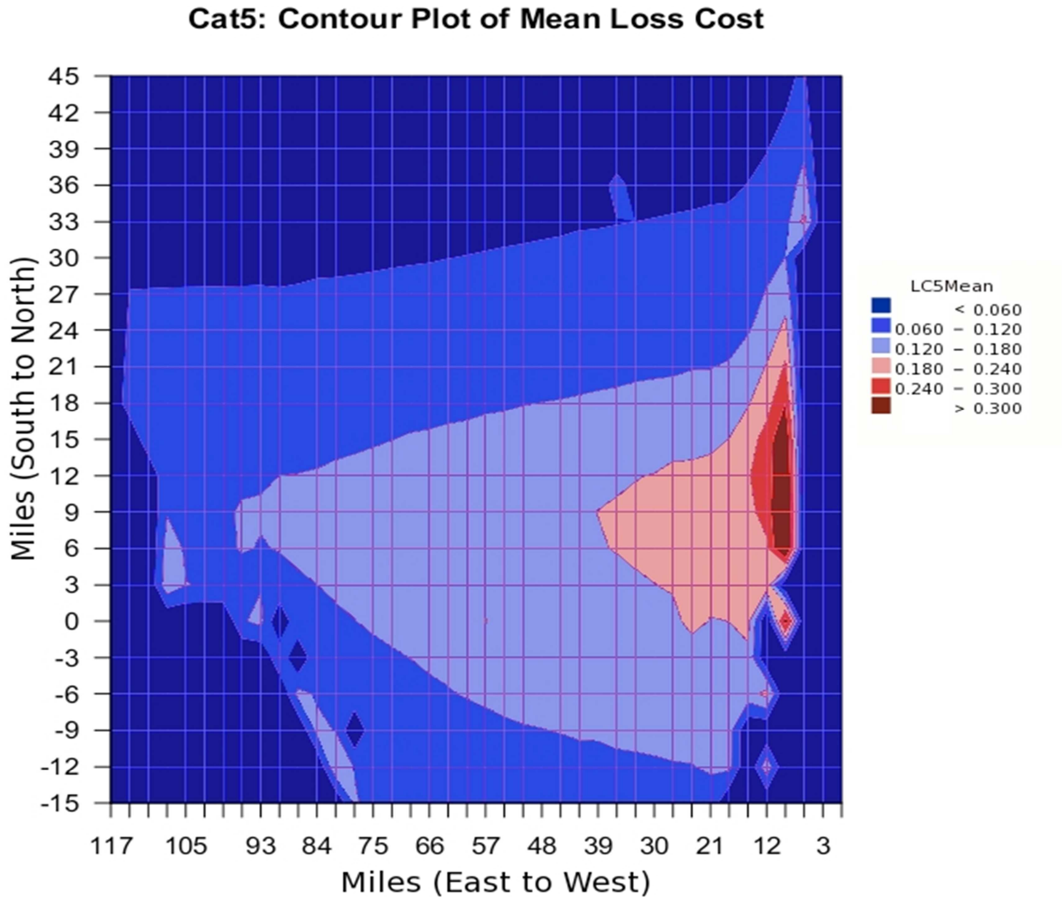


Figure 92. Contour Plot of Loss Cost for a Category 5 Hurricane.

Sensitivity and Uncertainty Analysis for Expected Loss Costs

Sensitivity analysis for the expected loss costs was conducted through the use of the standardized regression coefficients of the expected loss cost as a function of the input variables for Category, 1, 3 and 5 hurricanes. We used the methods described by Iman et al. (2000a, 2000b). The values of standardized regression coefficients are summarized in the table below.

Category	*CP*	*Rmax*	*VT*	*Holland B*	*FFP*
1	-0.4118	0.1039	0.1648	0.6477	0.5905
3	-0.2599	0.4033	0.1137	0.6552	0.4236
5	-0.1349	0.6939	-0.0022	0.5862	0.1801

Figure 93 gives the graph of the standardized regression coefficients for all input variables for Category 1, 3 and 5 hurricanes. From the graph, we observed that the sensitivity of expected loss cost depends on the category of the hurricanes. For a Category 1 hurricane, expected loss cost is most sensitive to *Holland B* parameter followed by *FFP*, *CP* and *VT*. For a Category 3 hurricane, expected loss cost is most sensitive to *Holland B* followed by *FFP, Rmax and CP* and finally for a Category 5 hurricane, expected loss cost is most sensitive to *Rmax*, followed by *Holland B*, *CP* and *FFP*. The expected loss cost is least sensitive to *Rmax* for Category 1 while the expected loss cost is least sensitive to *VT* for Categories 3 and 5.

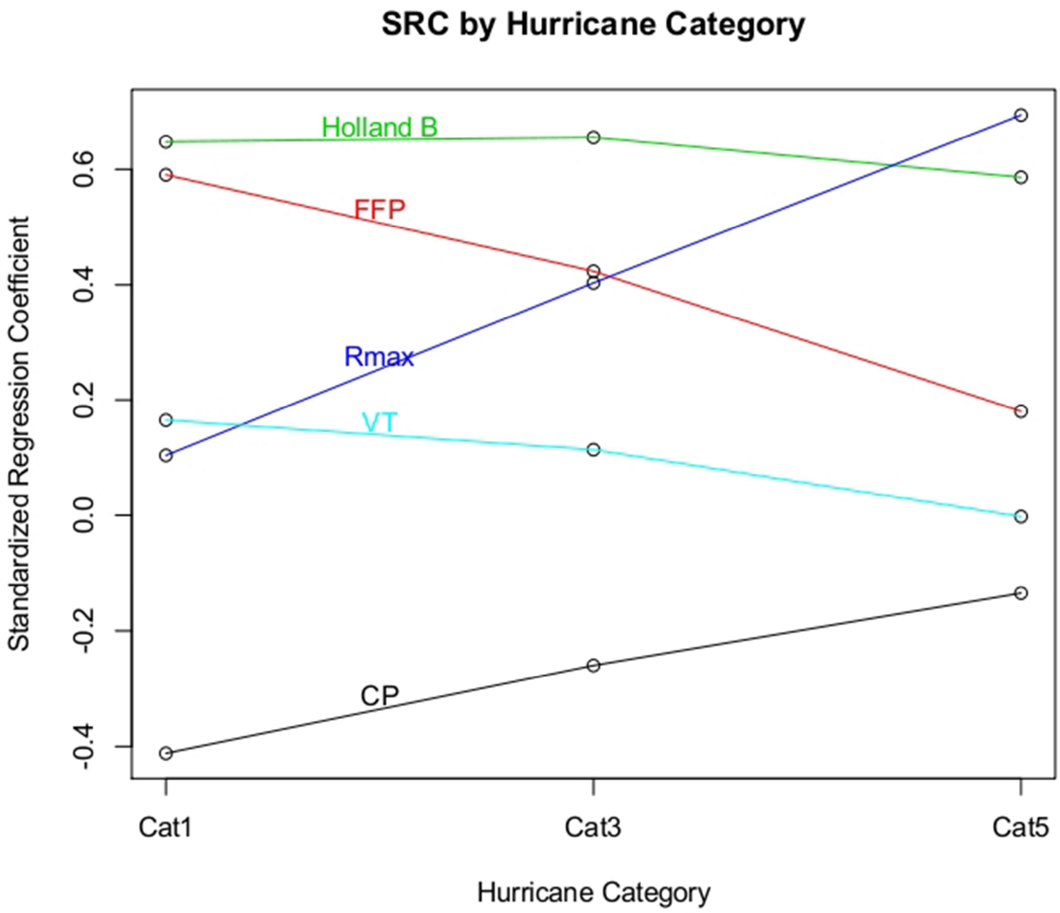


Figure 93. SRCs for Expected Loss Cost for all Input Variables for all Hurricane Categories.

Uncertainty analysis for the expected loss costs was conducted through the use of the expected percentage reduction (EPR) in the variance of the expected loss cost as a function of the input variables for Category, 1, 3 and 5 hurricanes. We used the methods described by Iman et al. (2000a, 2000b). The values of EPR's are summarized in the table below.

Category	*CP*	*Rmax*	*VT*	*Holland B*	*FFP*
1	20.8398%	3.9463%	2.0921%	46.2717%	36.7245%
3	6.0155%	14.8201%	1.1625%	51.3594%	10.4668%
5	4.6087%	48.7428%	1.8529%	42.1176%	4.6455%

Figure 94 gives the expected percentage reductions in the variance of expected loss cost for Category 1, 3 and 5 Hurricanes for all input variables. As with the sensitivity analysis, the category of the hurricane determines which variable contributes most to the uncertainty of the expected loss cost. For a Category 1 hurricane, the major contributor to the uncertainty in loss cost is the *Holland B* parameter, followed by *FFP*, then *CP*. For a Category 3 hurricane, the major contributor to the uncertainty in loss cost is *Holland B*, followed by *Rmax*, then *FFP*. For a Category 5 hurricane, the major contributor to the uncertainty of expected loss cost is *Rmax*, followed by *Holland B*, then *FFP*, and finally *CP*. The variable *VT* has negligible effect on the uncertainty in expected loss costs.

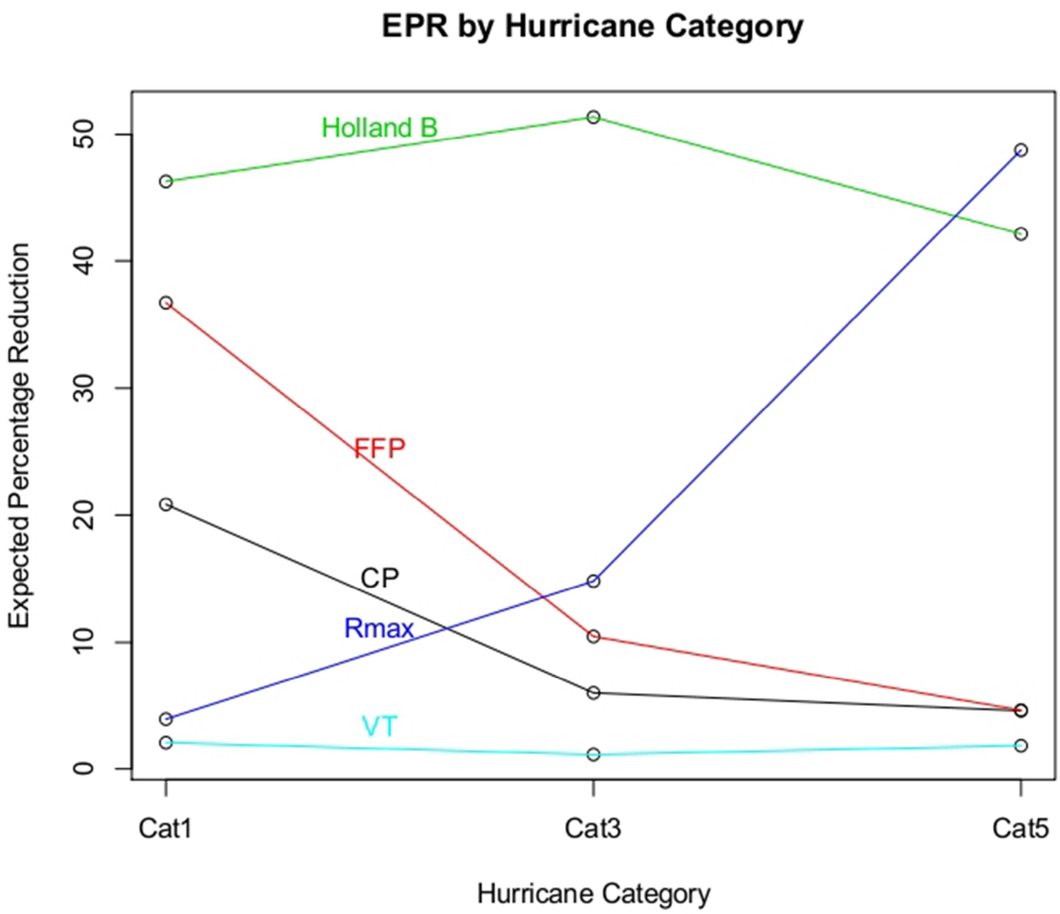


Figure 94. EPRs for Expected Loss Cost for all Input Variables for all Hurricane Categories.

COMPUTER STANDARDS

C-1 Documentation

A. The modeling organization shall maintain a primary document binder, containing a complete set of documents specifying the model structure, detailed software description, and functionality. Development of each section shall be indicative of accepted software engineering practices.

Florida Public Hurricane Loss Model (FPHLM) maintains a primary document binder, in both electronic and physical formats, to satisfy the above-mentioned requirements. In addition, FPHLM maintains a user manual, designed for the end user, which provides a high-level introduction and a step-by-step guide to the whole system. All documents are easily available for inspection, and electronic copies are also available online. Accepted software engineering practices are used to render all the documents more readable, self-contained, consistent, and understandable. Every component of the system is documented with standard use case, class, data flow, and sequence diagrams. The diagrams describe, in detail, the structure, logic flow, information exchange among submodules of each component and increase the visibility of the system. The diagrams describing the component functionality and structure also make each component of the system reusable and easily maintainable.

B. All computer software (i.e., user interface, scientific, engineering, actuarial, data preparation, and validation) relevant to the submission shall be consistently documented and dated.

The primary document binder contains all of the required documents arranged in subfolders linked to one another on the basis of their mutual relationships. Thus, the entire document can be viewed as a hierarchical referencing scheme in which each module is linked to its submodule, which ultimately refers to the corresponding codes.

C. The modeling organization shall maintain (1) a table of all changes in the model from the previously accepted submission to the initial submission this year and (2) a table of all substantive changes since this year's initial submission.

These tables are maintained and documented and will be available for review.

D. Documentation shall be created separately from the source code.

Databases and formats of all the input/output data files are comprehensively documented. All source code is properly documented in terms of both in-line detailed comments and external higher-level documentation, and they are maintained under version control systems. Source-code documentation has been created separately from the source code.

C-2 Requirements

The modeling organization shall maintain a complete set of requirements for each software component as well as for each database or data file accessed by a component. Requirements shall be updated whenever changes are made to the model.

FPHLM is divided into several major modules, each providing one or more inputs to other modules. Requirements of each of the modules, including input/output formats, are precisely documented. Apart from maintaining a detailed documentation of each module of the system using standard software practices, several other documents are maintained as part of a large-scale project management requirement. These include a quality assurance document, a system hardware and software specification document, a training document, a model maintenance document, a testing document, a user manual, etc. Moreover, detailed documentation has been developed for the database consisting of the schema and information about each table. Additionally, information about the format for each data file (in the form of an Excel or text file) accessed by different programs is documented. Whenever changes are made to a model, the corresponding requirements documentation is updated to reflect such changes.

Disclosure

1. ***Provide a description of the documentation for interface, human factors, functionality, documentation, data, human and material resources, security, and quality assurance.***

The user interface, functionality requirements, and material resources for every module are described in the module documentation. Database schemata and table formats are separately documented for the whole system and attached to the primary document binder. A separate software testing and quality assurance document describes the system quality, performance, and stability concerns. Additionally, a user manual and a human resource management document are maintained. Apart from these, security, software, and hardware specifications for the system as well as training plans are documented.

C-3 Model Architecture and Component Design

The modeling organization shall maintain and document (1) detailed control and data flow diagrams and interface specifications for each software component, and (2) schema definitions for each database and data file. Documentation shall be to the level of components that make significant contributions to the model output.

Interface specifications for every module are included in the module documentation. In addition, the user manual provides further information about the user interface specification. Control and data flow diagrams are presented at various levels of the model documentation. High-level flow diagrams are used to illustrate the interaction between modules. Technical and detailed diagrams are used in module-level descriptions.

The database schema are documented and attached as part of the document binder. A detailed schema representation of the active database is documented with additional information such as database maintenance, tuning, and data loading methodologies to provide a complete view of the database maintained for the project.

These documents will be made available to the professional team during the site visit.

C-4 Implementation

A. The modeling organization shall maintain a complete procedure of coding guidelines consistent with accepted software engineering practices.

FPHLM has developed and followed a set of coding guidelines that is consistent with accepted software engineering practices. These documents include guidelines for code version control. All the developers involved in the system development adhere to the instructions in these documents.

B. The modeling organization shall maintain a complete procedure used in creating, deriving, or procuring and verifying databases or data files accessed by components.

FPHLM uses an Oracle database to store data necessary for the model. The database documentation includes the procedures for creating and deriving the database. Data files are generated by different modules and used as interfaces between modules. Several data verification techniques are undertaken to ensure the correctness. Details about these are included in the module documentation.

C. All components shall be traceable, through explicit component identification in the flow diagrams, down to the code level.

Traceability, from requirements to the code level and vice versa, is maintained throughout the system documentation.

D. The modeling organization shall maintain a table of all software components affecting loss costs, 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.

The FPHLM primary document binder includes a table that gives the above-requested information. The table is available for review by the professional team.

E. 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.

Software for every module is thoroughly commented at the code level following a consistent format. These code-level comments include a summary of important changes, names of developers involved in each modification, function headers, and in-line comments to explain potentially ambiguous software code.

F. The modeling organization shall maintain the following documentation for all components or data modified by items identified in Standard G-1, Disclosure 5:

1. ***A list of all equations and formulas used in documentation of the model with definitions of all terms and variables.***

2. ***A cross-referenced list of implementation source code terms and variable names to items within F.1.***

Tables that map the equations and formulas used the documentation of the model to implementation source code terms and variable names were added as glossaries to the model's documentation, thus combining F.1 and F.2 into the same table. These tables enhance the model's documentation and include the equations and formulas for each module (not just the modified ones from the prior year's submission).

Disclosure

1. ***Specify the hardware, operating system, other software, and all computer languages required to use the model.***

The system is a mostly web-based application hosted over an Oracle 9i web application server. The backend server environment is Linux, and the server side scripts are written in Java Server Pages (JSP) and JavaBeans. Many backend calculations are coded in C++ using the IMSL library and called through Java Native Interface (JNI). The system uses an Oracle database running on a Sun workstation. Server side software requirements are IMSL library CNL 5.0, OC4J 9.0.2.0.0, Oracle 9iAS 9.0.2.0.0, JNI 1.3.1, and JDK 1.3.1.

The end-user workstation requirements are minimal. Internet Explorer 5.5 or 6 running on Windows 2000 or XP is the recommended web browser. However, other web browsers such as Mozilla Firefox should also deliver optimal user experience. Typically, the manufacturer's minimal feature for a given web browser and operating system combination is sufficient for an optimal operation of the application.

C-5 Verification

A. General

For each component, the modeling organization shall maintain procedures 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.

FPHLM software verification is done in three stages.

1. Code inspection and verification by the code developer.
2. Inspection of the input and validation of the output by the system modeler.
3. Review and extensive testing of the code by modeler personnel who are not part of the original component development.

The first level of verification includes code-level debugging, walking through the code to ensure a proper flow, inspection of internal variables through intermediate output printing and error logging, use of exception handling mechanisms, calculation crosschecks, and verification of the output against sample calculations provided by the system modeler.

In the second level of the verification, the modeler is provided with sample inputs and corresponding outputs. The modeler then conducts black-box testing to verify the results against his or her model. Finally, each component is rigorously tested by modeler personnel not responsible for original component development.

B. Component Testing

1. ***The modeling organization shall use testing software to assist in documenting and analyzing all components.***

Component testing (C-5.B) and data testing (C-5.C) are done in the third level of verification. The system is rigorously checked for the correctness, precision, robustness, and stability of the whole system. Calculations are performed outside the system and compared against the system-generated results to ensure the system correctness. Extreme and unexpected inputs are given to the system to check the robustness. Several test cases are developed to check the stability and the consistency of the system.

These verification procedures are properly documented and are available for inspection.

2. ***Unit tests shall be performed and documented for each component.***

Unit testing is done at the first and third levels of verification. The developer tests all the units as the unit is developed and modified. Then all the units are tested again by the external testing team. Both “black-box” and “white-box” tests are performed and documented in a separate testing document.

3. ***Regression tests shall be performed and documented on incremental builds.***

Regression testing is performed for each module. In this kind of testing methodology, the modules that have undergone some changes and revisions are retested to ensure that the changes have not affected the system in any undesired manner.

4. ***Aggregation tests shall be performed and documented to ensure the correctness of all model components. Sufficient testing shall be performed to ensure that all components have been executed at least once.***

Aggregation testing is performed at all three levels of verification. Aggregation testing is performed by running each major module as a complete package. It ensures that all components have been executed at least once during the testing procedure. All test cases executed are described in the software testing and verification documentation.

C. Data Testing

1. ***The modeling organization shall use testing software to assist in documenting and analyzing all databases and data files accessed by components.***

FPHLM uses an Oracle database to store the required data. Data integrity and consistency are maintained by the database itself. Moreover, different queries are issued and PL/SQL is implemented to check the database. Oracle 9i has a very robust loader, which is used to load the data into the database. The loader maintains a log to verify that the loading procedure has taken place properly and completely without any discrepancy. Data files are manually tested using commercial data manipulation software such as Excel and Access.

2. ***The modeling organization shall perform and document integrity, consistency, and correctness checks on all databases and data files accessed by the components.***

All tests are well documented in a separate testing document.

Disclosures

1. ***State whether two executions of the model with no changes in input data, parameters, code, and seeds of random number generators produce the same loss costs and probable maximum loss levels.***

The model produces the same loss costs and probable maximum loss levels if it is executed more than once with no changes in input data, parameters, code, and seeds of random number generators.

2. ***Provide an overview of the component testing procedures.***

FPHLM software testing and verification is done in three stages.

[A] Code inspection and the verification by the code developer

The code developer sufficiently tests the code and does not deliver it until convinced of its proper functionality and robustness.

The first level of verification includes code-level debugging, walking through the code to ensure proper flow, inspection of internal variables through intermediate output printing and error logging, use of exception handling mechanisms, calculation crosschecks, and verification of the output against sample calculations provided by the system modeler.

[B] Verification of results by the person who developed the system model

Once the first level of testing is done, the developer sends the sample inputs and the generated results back to the modeler. Then, the system modeler double-checks the results against his or her model. The code is not used in the production environment unless approved by the modeler.

[C] Review and extensive testing of the code by modeler personnel other than the original component developers

The system is rigorously checked by modeler personnel (testers) other than the original component developers for correctness, precision, robustness, and stability of the whole system. Calculations are performed outside the system and compared against the system-generated results to ensure the system correctness. Extreme and unexpected inputs are given to the system to check the robustness. Several test cases are developed to check the stability and the consistency of the system.

Unit, regression, and aggregation testing (both white-box and black-box) are performed and documented.

Any flaw in the code is reported to the developer, and the bug-corrected code is again sent to the tester. The tester then performs unit testing again on the modified units. Additionally, regression testing is performed to determine if the modification affects any other parts of the code.

Different testing tools and software packages are used to test different components of the system. The detailed list of the various testing tools and/or techniques used for different components of the system is provided in the main document and will be available for audit.

C-6 Model Maintenance and Revision

A. The modeling organization shall maintain a clearly written policy for model revision, including verification and validation of revised components, databases, and data files.

FPHLM model will be periodically enhanced to reflect new knowledge acquired about hurricanes and Florida ZIP Code information. FPHLM maintains a clearly written policy for model revision.

B. A revision to any portion of the model that results in a change in any Florida residential hurricane loss cost shall result in a new model version number.

Whenever a revision results in a change in any Florida residential hurricane loss cost, a new model version number will be assigned to the revision. Verification and validation of the revised units are repeated according to the above-mentioned “software verification procedures” document.

C. The modeling organization shall use tracking software to identify all errors, as well as modifications to code, data, and documentation.

FPHLM uses Subversion for version control. Subversion is a revision control system widely used in recent years by important projects and has been termed the successor of CVS (Concurrent Versions System). We can record the history of source files and documents by using Subversion.

D. The modeling organization shall maintain a list of all model versions since the initial submission for this year. Each model description shall have a unique version identification, and a list of additions, deletions, and changes that define that version.

A list of all model versions since the initial submission will be maintained. Each model revision will have a unique model version number (i.e., unique version identification) and a list of additions, deletions, and changes that define that version. The unique model version will consist of the scheme “V[major].[minor].” The terms “[major]” and “[minor]” are positive numeric numbers that correspond to substantial and minor changes in the model, respectively. A minor change in the model would cause the minor number to be incremented by one, and a major change in the model would cause the major number to be incremented by one with the minor reset to zero. The rules that prompt changes in the major and minor numbers are described in Disclosure 2.

Disclosures

1. Identify procedures used to maintain code, data, and documentation.

FPHLM's software development team employs source revision and control software for all software development. In particular, FPHLM employs Subversion, an accepted and effective system for managing simultaneous development of files. Recently, it has been used in large programming projects both in the open-source community and in the corporate world to track modifications to source code and documentation files. Subversion maintains a record of the changes to each file and allows the user to revert to a previous version, merge versions, and track changes. This software is able to record the information for each file, the date of each change, the author of each change, the file version, and the comparison of the file before and after the changes. The detailed information will be made available to the professional team during its site visit.

2. Describe the rules underlying the model and code revision numbering systems.

The model numbering system consists of the scheme "V[major].[minor]." The terms "[major]" and "[minor]" are positive numeric numbers that correspond to major and minor changes in the model, respectively; a minor change causes the minor number to be incremented by one, and similarly, a major change causes the major number to be incremented by one with the minor number reset to zero. The rules that prompt major or minor changes in the model are the following:

Rules that trigger a change in the major number:

- Updates in any of the main modules of FPHLM: any change resulting in the partial or total modification of the algorithm/model of the Storm Generation, Wind Field, Damage Estimation, and/or Insurance Loss models.

Rules that trigger a change in the minor number:

- Slight changes to the Storm Generation, Wind Field, and/or Damage Estimation modules: small updates such as a change in the *Holland B* parameter or any change to correct deficiencies that do not result in a new algorithm for the component.

- Updates to correct errors in the computer code: modifications in the code to correct deficiencies or errors such as a code bug in the computer program.

- Changes in the probability distribution functions using updated or corrected historical data, such as the updates of the HURDAT database: each year the model updates its HURDAT database with the latest HURDAT data released by the National Hurricane Center, which is used as the input in the Storm Generation Model.

- Updates of the ZIP Code list: every two years the ZIP Codes used in the model must be updated according to information originating from the United States Postal Service.

- Updates in the validation of the vulnerability matrices: the incorporation of new data, such as updated winds and insurance data, may trigger a tune-up of the vulnerability matrices used in the Insurance Loss Model.

If any change results in a change in lost costs estimates, there will be at least a change in the minor revision number.

Consequently, for the submission of November 15, 2010, the Florida Public Hurricane Loss Model changed its version number from 3.1 to 4.0 because of the incorporation of the most recent HURDAT database, the updated ZIP Code list, the significant changes in the meteorological and vulnerability models, and the incorporation of the commercial residential component. For a detailed description of the aforementioned changes, please refer to Standard G-1, Disclosure 5.

For the re-submission of April 22, 2011, the version number of the Florida Public Hurricane Loss Model was changed from 4.0 to 4.1 due to an update in the Commercial Residential model.

C-7 Security

The modeling organization shall have implemented and fully documented security procedures for: (1) secure access to individual computers where the software components or data can be created or modified, (2) secure operation of the 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.

FPHLM maintains a set of security procedures to protect data and documents from deliberate and inadvertent changes. These procedures include both physical and electronic measures. A set of policies identifies different security issues and addresses each of them. All the security measures are properly documented and attached to the primary document binder.

Disclosure

1. Describe methods used to ensure the security and integrity of the code, data, and documentation.

Electronic measures include the use of different authorization levels, special network security enforcements, and regular backups. Each developer is given a separate username and password and assigned a level of authorization so that even a developer cannot change another developer's code. The users of the system are given usernames and passwords so that unauthorized users cannot use the system. Unauthorized users are not allowed access to any of the data sources of the system. The network is extensively monitored for any unauthorized actions using standard industry practices. Since the system runs on a Linux sever environment, minimal virus attacks are expected.

Any sensitive or confidential data (insurance data, for example) are kept on an unshared disk on a system that has user access control and requires a login. Screen locks are enforced whenever the machine is left unattended. In addition, for system security and reliability purposes, we also deploy a development environment besides the production environment. Modifications to the code and data are done in the development environment and tested by in-house developers. The final production code and data can only be checked into the production environment by the authorized personnel. The models resulting from FPHLM project can only be used by the authorized users. Authorized user accounts are created by the project manager. Regular backups of the server are taken and stored in two ways: physically and electronically. Backups are performed daily and are kept for six weeks. Nightly backups of all UNIX data disks and selected Windows data disks (at user requests) are performed over the network onto LT02 and LT03 tapes. The tape drives have built-in diagnostics and verification to ensure that the data is written correctly to the tapes. This ensures that if the tape is written successfully, it will be readable, provided no physical damage occurred to the tape. A copy of each backup is placed in a secure and hurricane-protected building. Additionally, the application server and the database server are physically secured in a secure server room with alarm systems. In case of disaster, we have implemented a set of preparation procedures and recovery plans as outlined in "FIU SCS Hurricane Preparation Procedures."

Appendix A - Expert Review Letters

Assessment of the meteorological portion of the State of Florida Public Hurricane Model

February 15, 2007

Gary M. Barnes
Professor, Department of Meteorology
School of Ocean and Earth Science and Technology
University of Hawaii at Manoa

Introduction

My review of the State of Florida Public Hurricane Model is based on a three day visit to Florida International University in December, and an examination of the submission draft provided to me in February. I have had full access to the meteorological portion of the model, access to the draft for the Florida commission, and access to prior submittals to the commission from several other groups in order to establish a sense of what is desired by the commission. I am pleased to report that the issues that I have raised have received their attention and I believe that the model meets all the standards set forth by the commission. Ultimately this model, when linked to engineering and actuarial components, will provide objective guidance for the estimation of wind losses from hurricanes for the state of Florida. It does not address losses from other aspects of a tropical cyclone such as storm surge, or fresh water flooding. I now offer specific comments on each of the six meteorological standards established by the commission to ascertain this model's suitability.

M-1 Official Hurricane Set

The consortium of scientists working on the Public model have adopted HURDAT (1900- 2006) to determine landfall frequency and intensity at landfall. The NWS report by Ho et al. (1987), DeMaria's extension of the best track, H*Wind analyses (Powell & Houston, 1996, 1998; Powell et al. 1996, 1998) and NOAA Hurricane Research Division aircraft data are used to estimate the radius of maximum winds (RMW) at landfall. The strength of HURDAT is that it is the most complete and accessible historical record for hurricanes making landfall or passing closely by Florida. HURDAT weaknesses include the abbreviated record and questionable intensity estimates for those hurricanes early in the record, especially those that remain offshore. Evidence for the shortness of record is the impact of the last few hurricane seasons on landfall return frequency. The meteorological team has scrutinized the base set developed by the commission and made a number of adjustments to the dataset based on refereed literature and the HURDAT record. I have looked at several of these adjustments in detail and find the corrections to be an improvement over the initial base set.

M-2 Hurricane Characteristics

The model has two main components. The track portion of the model produces a storm with either an initial location or genesis point and an intensity that is derived from an empirical distribution derived from HURDAT (2006). Storm motion and intensity is then initialized by using a Monte Carlo approach, drawing from probability density functions (PDFs) based on the historical dataset to create a life for a bogus hurricane. Examination of the PDFs reveals that they are faithful to the observed patterns for storms nearing Florida, and the evolution of any particular hurricane appears realistic.

The second component of the meteorological model is the wind field generated for a given hurricane, which only comes into play when the hurricane comes close enough to place high winds over any given ZIP Code of Florida. To generate a wind field the minimum sea-level pressure (MSLP) found in the eye, the RMW at landfall, and a distant environmental pressure (1013 mb) are entered into the Holland (1980) B model for the axisymmetric pressure distribution around the hurricane. The behavior of the RMW is based on a variety of sources that include Ho et al. (1987), DeMaria's extension of the best track data, H*wind analyses, and aircraft reconnaissance radial wind profiles. The B coefficient is based on the extensive aircraft dataset acquired in reconnaissance and research flights over the last few decades. RMW and B use a random or error term to introduce variety into the model. The Holland pressure field is used to produce a gradient wind at the top of the boundary layer. The winds in the boundary layer are estimated following the work proposed by Ooyama (1969) and later utilized by Shapiro (1983) which includes friction and advection effects. These boundary layer winds are reduced to surface winds (10 m) using reduction factors based on the work of Powell et al. (2003). Maximum sustained winds and 3 second gusts are estimated using the guidance of Vickery and Skerlj (2005). Once the hurricane winds come ashore there are further adjustments to the wind to account for local roughness as well as the roughness of the terrain found upstream of the location under scrutiny. The pressure decay of the hurricane is modeled to fit the observations presented by Vickery (2005).

Gradient balance has been demonstrated to be an accurate representation for vortex scale winds above the boundary layer by Willoughby (1990) and is a fine initial condition. The slab boundary layer concept of Ooyama and Shapiro has been shown to produce wind fields much like observed once storm translation and surface friction come into play. The reduction to 10 m altitude is based on Powell et al. (2003); they use the state of the art Global Positioning System sondes to compare surface and boundary layer winds.

Perhaps the most questionable part of the wind portion of the model is the reliance on the estimates of the RMW at landfall. The scatter in RMW for a given MSLP is large; larger RMWs coupled with the B parameter control the size of the annulus of the damaging winds. The typical length of an aircraft leg from the eye is about 150 km so the choice of the B parameter is based on a small radial distance in the majority of hurricanes. The collection of quality wind observations over land in hurricanes remains a daunting task; therefore the actual response of the hurricane winds to variations in roughness is less certain. Applying roughness as a function of ZIP Code is a coarse approximation to reality. However, this is the approach chosen by the commission, and given the data limitations, a reasonable course to take.

M-3 Landfall Intensity

The model uses one minute winds at 10 m elevation to determine intensity at landfall and categorizes each hurricane according to the Saffir-Simpson classification. The model considers any hurricane that makes landfall or comes close enough to place high winds over Florida. Multiple landfalls are accounted for, and decay over land between these landfalls is also estimated. Maximum wind speeds for each category of the Saffir-Simpson scheme are reasonable as is the worst possible hurricane the model generates. Simulations are conducted for a hypothetical 60,000 years. Any real climate change would alter results, but maybe not as much as have an actual record of order of 1,000 years to base the PDFs on.

M-4 Hurricane Probabilities

Form M-1 demonstrates that the model is simulating the landfalls very well for the entire state, region A (NW Florida) and region B (SW Florida). There are subsections of the state where the historical and the simulated landfalls have a discrepancy. In region C (SE Florida) the observations show an unrealistic bias toward Category 3 storms. This is likely due to an overestimate of intensity for the hurricanes prior to the advent of aircraft sampling or advanced satellite techniques. The historical distribution for region C also does not fit any accepted distributions that we typically see for atmospheric phenomena. This discrepancy is probably due to the shortness of the historical record. I note that other models also have difficulty with this portion of the coast. I believe the modeled distribution, based on tens of thousands of years, is more defensible than the purported standard. Regions D (NE Florida) and E (Georgia) have virtually no distribution to simulate, again pointing to a very short historical record. There is no documented physical reason why these two regions have escaped landfall events. Perhaps a preferred shape of the Bermuda High may bias the situation, but this remains speculative.

M-5 Land Friction and Weakening

Land use and land cover are based on high resolution satellite imagery. Roughness for a particular location is then based on HAZUS tables that assign a roughness to a particular land use. There are newer assessments from other groups but the techniques were not consistently applied throughout the state, nor are the updated HAZUS maps for 2000 available yet. Winds at a particular location are a function of the roughness at that point and conditions upwind. A pressure decay model based on the work of Vickery (2005) produces weakening winds that are reasonable approximations of the observed decay rates of several hurricanes that made landfall in Florida in 2004 and 2005.

The maps (Form M-2) of the 100 year return period maximum sustained winds shows the following trends: (1) a reduction in the sustained winds from south to north, (2) a reduction of winds from coastal to inland ZIP Codes, and (3) the highest winds in the Keys and along the SE and SW coasts. The plotting thresholds requested by the commission partially obfuscate the gradients in wind speed, but Form M-2 produced with finer contours highlights the above trends clearly. The open terrain maps look logical; the actual terrain maps are perhaps overly sensitive to the local roughness. Convective scale motions, which cannot be resolved in this type of model, would probably be responsible for making the winds closer to the open terrain results.

M-6 Logical Relationships of Hurricane Characteristics

The RMW is a crucial but poorly measured variable. Making RMW a function of intensity and latitude explains only a small portion of the variance (~20%). Examination of aircraft reconnaissance radial profiles shows that RMW is highly variable. Currently there are no other schemes available to explain more of the variance. Form M-3 reflects the large range of RMW. Note that only the more intense hurricanes (MSLP < 940 mb) show a trend, and only with the upper part of the range. Even open ocean studies of the RMW show such large scatter.

Tests done during my visits show that wind speed decreases as a function of roughness, all other variables being held constant. The evolution of the wind field as a hurricane comes ashore is logical.

Summary

The consortium that has assembled the meteorological portion of the Public Model for Hurricane Wind Losses for the State of Florida is using the HURDAT with corrections based on other refereed literature. These data yield a series of probability density functions that describe frequency, location, and intensity at landfall. Once a hurricane reaches close enough to the coast the gradient winds are estimated using the equations by Holland (1980), then a sophisticated wind model (Ooyama 1969, Shapiro 1983) is applied to calculate the boundary layer winds. Reduction of this wind to a surface value is based on recent boundary layer theory and observations. Here the consortium has exploited other sources of data (e.g., NOAA/AOML/HRD aircraft wind profiles and GPS sondes) to produce a surface wind field. As the wind field transitions from marine to land exposure changes in roughness are taken into account. Form M-1 (frequency and category at landfall as a function of coastal segment) and Form M-2 (100 year return maximum sustained winds for Florida) highlight the good performance of the model.

I suspect that the differences between the historical record and the simulation are largely due to the shortness and uncertainty of the record. If the consortium had the luxury of 1000 years of observations agreement between the record and the simulation would be improved. I believe that the meteorological portion of the model is meeting all the standards established by the commission. Tests of the model against H*Wind analyses and the production of wind speed swaths go beyond the typical quality controls of prior models and demonstrate that this model is worthy of consideration by the commission.

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November 11, 2010

Dr. Shahid Hamid
Professor of Finance,
Department of Finance, CBA
and International Hurricane Research Center
Florida International University, RB 202 B
Miami, FL 33199

Re: Florida Public Hurricane Loss Model
Version 4.0
Independent Actuarial Review

Dear Dr. Hamid:

AMI Risk Consultants, Inc. was engaged by the International Hurricane Research Center ("IHRC") at Florida International University ("FIU") to review the actuarial components of its hurricane model, ***Florida Public Hurricane Loss Model, Version 4.0***. I am a Fellow of the Casualty Actuarial Society, a Member of the American Academy of Actuaries, and have more than twenty-five years of actuarial experience in the property/casualty insurance industry. I am an employee of the actuarial consulting firm AMI Risk Consultants, Inc.

It is my understanding that between Versions 3.1 and 4.0 there were major changes to the Florida Public Hurricane Loss Model ("FPHLM"). Those changes included:

- A new methodology for treating surface friction (conversion of marine winds to actual terrain).
- A new set of weighting factors for the vulnerability matrices.
- New variants of the weak and medium vulnerability functions for both frame and masonry site-built homes.
- The definition of additional eras for the strength characterization of the Florida building population over time.
- An adjustment to the leak model for frame vulnerabilities.
- The ability to model losses at the geocode level given exposures by street address or latitude-longitude.
- The addition of a module for modeling Commercial Residential losses.

My review is based the IHRC's November 2010 model submission to the Commission. I focused my review on the new Commercial Residential module, and on the impact of the meteorology and vulnerability changes on the Personal Residential loss costs. I revisited each of the Actuarial Standards, and have the following comments:

Standard A-1: I was directly involved in the testing of included and excluded bypassing storms for Version 2.6 of the model. Although Version 4.0 incorporates a different set of stochastic storms, the criteria for inclusion/exclusion have not changed, and the computer code categorizing each storm is also unchanged. Therefore, I did not sample bypassing storms again this year.

Standard A-2: There was no additional validation data collected for Personal Residential risks since the previous submission. Furthermore, the model's underwriting assumptions with regards to Personal Residential risks, as disclosed in the standard, have not changed. However, I inserted into this standard comments on the handling of the insurance company data used in the validation the new Commercial Residential portion of the model, and a list of underwriting assumptions that appear to be implicit in the model design. I also updated the Disclosures as necessary to include responses relevant to the Commercial Residential modules, including a new disclosure regarding the estimation of coinsurance penalty impact on loss costs and probable maximum loss levels.

Standard A-3: The approach to estimating Personal Residential loss costs and probable maximum loss has not changed in this version of the model. I incorporated into this standard's response a description of the loss cost and probable maximum loss calculation for Commercial Residential properties. Disclosure #2 was also modified to address the model's capabilities at the geocode level.

Standard A-4: The approach to incorporating demand surge in the loss costs has not changed in this version of the model. Demand surge factors were calculated for each storm in the new stochastic set using the same functions and parameters as were applied in the previous submission. We decided to apply the same demand surge factors to both Personal and Commercial Residential modeled losses. This decision was made after comparing the RS Means commercial construction cost indices for Florida to the Marshall Swift Boeckh construction cost indices for Florida that underlie the demand surge function for structures.

Standard A-5: The editing process for the input of Personal Residential exposures, and the process for handling missing values have not changed since the prior submission. The input requirements have changed this year in that the model input form now requests either street address or latitude and longitude of the property. In addition mitigation attributes are requested if available. I have some concerns that companies may submit input that that is a mix of true mitigation attributes on some policies, and default attributes applied for rating purposes on policies not yet inspected. If this is done I think the model output will be biased and will overstate average loss costs and probable maximum loss levels for the company. It is important that unknown attributes be reported as "unknown" so that weighted average vulnerability assumptions can be applied.

The Commercial Residential portion of the model has only been run on company data for validation purposes and on Cat Fund exposures for the submission. The Cat Fund inputs are lacking key input requirements of the model such as number of stories, and number of units, and these attributes have been assigned by random shuffling in proportions determined by county statistics collected by the engineers. I have reviewed this process and find it acceptable.

In the submission a response was inserted for Disclosure #3 outlining the steps necessary to run the model.

Standard A-6: I examined Forms A-1, A-2, A-3, A-4 and A-5 for reasonability, and compared the Personal Residential results to the prior submission. To review the Commercial Residential results from Forms A-3, A-4 and A-5, I selected a sample of storms or zip codes producing either a high or low volume of commercial residential losses, and checked for reasonability relative to exposure and hurricane path.

Standard A-7: The methods used by the model to reflect the impact of deductibles and policy limits on Personal Residential losses have not changed since the prior submission. I reviewed the assumptions underlying the approach to incorporating deductibles and policy limits in the estimation of Commercial Residential losses, and a sample manual calculation.

We were unable to obtain data on the prevalence of coinsurance penalties among Commercial Residential risks, and the coinsurance approach in the model is a theoretical one based on assumptions about how gaps between insured values and coinsurance requirements might develop over successive renewals. The input form for running the model includes questions relating to company practices with respect to coinsurance. Although these are needed to run the current coinsurance procedure, they will also serve to collect data on coinsurance practices. That data can be used to adjust or revamp the model's approach.

Standard A-8: The method used by the model to estimate Personal Residential contents losses has not changed since the prior submission. I reviewed the assumptions underlying the approach to estimating the contents losses of Commercial Residential exposures, and a sample manual calculation.

Standard A-9: The method used by the model to estimate time element losses for Personal Residential exposures has not changed since the prior submission. I reviewed the assumptions underlying the approach to estimating the time element losses of Commercial Residential exposures, and a sample manual calculation. The approach is entirely judgmental as there were no time element exposures or losses in the Commercial Residential validation data. There appear to be no time element exposures in the 2007 Cat Fund Commercial Residential data as well. As the Commercial Residential portion of the model is run on insurance company portfolios, we will note whether or not any companies report this coverage in any significant volume. If so, a data call from the OIR to those companies should be considered for validation, assuming those companies have 2004 or 2005 hurricane losses.

Standard A-10: I tested the loss costs for compliance with this standard. As in past submissions, I received assistance from the Computer Science team in testing at the zip code level in instances where compliance could not be verified from the weighted averages in Form A-6. I also examined the change in loss costs compared to the prior submission. Again, the Computer Science team provided considerable assistance in isolating, to the extent possible, the source of each county's change. There were significant loss cost changes for many counties since the model underwent major revisions to both the meteorological and engineering components.

Standard A-11: I reviewed Form A-9 for overall reasonability, and verified the return time and uncertainty interval with manual calculations for a sample of entries.

My conclusion is that the IHRC hurricane model reflects reasonable actuarial assumptions, and meets the Commission's Standards A-1 through A-11.

If you have any questions about my review, I would be happy to discuss them.

Sincerely,

Gail Flannery

Gail Flannery, FCAS, MAAA
Consulting Actuary

Appendix B – Output Ranges

LOSS COSTS PER $1,000
Personal Residential -- Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.7684	0.0817	0.0516	0.0173	0.6072	0.2918	0.1368	0.2918	0.1551	0.0758
	HIGH	1.2658	0.1438	0.0791	0.0365	1.1258	0.7374	0.4189	0.7374	0.4955	0.2173
	WGHTD AVE	0.9233	0.0988	0.0569	0.0230	0.7816	0.4632	0.2379	0.4632	0.2841	0.1093
Baker	LOW	0.5823	0.0603	0.0344	0.0134	0.4779	0.2667	0.1308	0.2667	0.1573	0.0577
	HIGH	0.6922	0.0722	0.0417	0.0163	0.5792	0.3402	0.1692	0.3402	0.2059	0.0715
	WGHTD AVE	0.6729	0.0701	0.0410	0.0157	0.5530	0.3075	0.1526	0.3075	0.1819	0.0704
Bay	LOW	1.2772	0.1420	0.0804	0.0337	1.1122	0.6927	0.3722	0.6927	0.4407	0.1807
	HIGH	3.7569	0.6459	0.1824	0.2112	4.1129	3.4343	2.6524	3.4343	2.8603	1.9947
	WGHTD AVE	2.3587	0.3260	0.1435	0.0942	2.3207	1.7388	1.2088	1.7388	1.3317	0.8342
Bradford	LOW	0.6942	0.0730	0.0401	0.0166	0.5801	0.3377	0.1686	0.3377	0.2039	0.0729
	HIGH	1.0199	0.1102	0.0624	0.0261	0.8746	0.5321	0.2805	0.5321	0.3338	0.1327
	WGHTD AVE	0.8197	0.0867	0.0477	0.0200	0.6931	0.4137	0.2098	0.4137	0.2536	0.0912
Brevard	LOW	2.9591	0.1757	0.1069	0.0435	2.7582	2.2324	1.3018	2.2324	1.5973	0.4955
	HIGH	12.1805	2.2182	0.3047	0.7728	14.5521	13.6289	11.5321	13.6289	12.2136	9.1804
	WGHTD AVE	4.7165	0.3780	0.1423	0.1191	4.7280	4.1048	2.8862	4.1048	3.2774	1.6482
Broward	LOW	2.9976	0.3447	0.1754	0.1061	2.8941	2.0972	1.4215	2.0972	1.5740	0.9398
	HIGH	16.5580	3.3308	0.3661	1.2194	20.4201	19.3674	16.9890	19.3674	17.7594	14.2019
	WGHTD AVE	7.5089	0.8469	0.2221	0.3151	8.0792	7.2742	5.7363	7.2742	6.2223	4.0840
Calhoun	LOW	1.0009	0.1107	0.0594	0.0255	0.8575	0.5200	0.2675	0.5200	0.3220	0.1179
	HIGH	1.1272	0.1262	0.0694	0.0295	0.9711	0.6010	0.3171	0.6010	0.3790	0.1466
	WGHTD AVE	1.0495	0.1159	0.0626	0.0270	0.9025	0.5516	0.2868	0.5516	0.3441	0.1292
Charlotte	LOW	4.4347	0.2390	0.1170	0.0702	4.3010	3.6656	2.4890	3.6656	2.8606	1.2594
	HIGH	6.5964	0.6144	0.2114	0.2084	6.8674	6.1059	4.5893	6.1059	5.0734	2.9226
	WGHTD AVE	5.2291	0.3363	0.1620	0.1064	5.1422	4.4786	3.1439	4.4786	3.5721	1.7076
Citrus	LOW	2.6564	0.1325	0.0739	0.0336	2.4821	2.0561	1.3237	2.0561	1.5541	0.5540
	HIGH	3.5222	0.1816	0.0934	0.0504	3.3644	2.8826	1.9185	2.8826	2.2297	0.9057
	WGHTD AVE	3.0426	0.1573	0.0860	0.0417	2.8765	2.4257	1.5787	2.4257	1.8495	0.7141
Clay	LOW	0.7991	0.0864	0.0519	0.0201	0.6640	0.3720	0.1932	0.3720	0.2244	0.1013
	HIGH	1.0791	0.1167	0.0629	0.0302	0.9398	0.5949	0.3424	0.5949	0.4018	0.1746
	WGHTD AVE	0.8726	0.0960	0.0562	0.0228	0.7382	0.4298	0.2282	0.4298	0.2660	0.1179
Collier	LOW	4.2638	0.2578	0.1534	0.0704	4.0601	3.3761	2.1950	3.3761	2.5637	1.0235
	HIGH	9.7253	1.1117	0.2899	0.3930	10.5994	9.6805	7.6421	9.6805	8.3033	5.3144
	WGHTD AVE	6.0697	0.4289	0.2030	0.1377	6.0303	5.2410	3.6799	5.2410	4.1791	2.0304
Columbia	LOW	0.6860	0.0710	0.0391	0.0158	0.5677	0.3247	0.1594	0.3247	0.1935	0.0674
	HIGH	0.7907	0.0835	0.0484	0.0188	0.6568	0.3737	0.1869	0.3737	0.2233	0.0856
	WGHTD AVE	0.7257	0.0760	0.0432	0.0170	0.6024	0.3443	0.1715	0.3443	0.2062	0.0763
De Soto	LOW	4.1872	0.2478	0.1314	0.0703	4.0217	3.3835	2.2375	3.3835	2.5981	1.0789
	HIGH	4.6684	0.2615	0.1447	0.0768	4.5076	3.8904	2.6630	3.8904	3.0559	1.3400
	WGHTD AVE	4.4521	0.2488	0.1328	0.0706	4.2836	3.6652	2.4454	3.6652	2.8368	1.1740
Dixie	LOW	1.0121	0.1117	0.0593	0.0274	0.8907	0.5657	0.3051	0.5657	0.3612	0.1467
	HIGH	1.6669	0.2286	0.1023	0.0661	1.6175	1.1725	0.7850	1.1725	0.8730	0.5195
	WGHTD AVE	1.1228	0.1285	0.0679	0.0322	0.9966	0.6471	0.3671	0.6471	0.4292	0.1918

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
Personal Residential -- Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Duval	LOW	0.5605	0.0567	0.0317	0.0123	0.4597	0.2225	0.1064	0.2225	0.1192	0.0505
	HIGH	2.0690	0.3326	0.1079	0.0999	2.1616	1.7174	1.2447	1.7174	1.3682	0.8865
	WGHTD AVE	0.9367	0.1061	0.0566	0.0259	0.8233	0.5251	0.2983	0.5251	0.3477	0.1621
Escambia	LOW	1.4804	0.1727	0.0946	0.0446	1.3678	0.9449	0.5473	0.9449	0.6435	0.2765
	HIGH	4.1876	0.7809	0.2165	0.2556	4.7334	4.0283	3.2290	4.0283	3.4349	2.5516
	WGHTD AVE	2.5840	0.3609	0.1540	0.1061	2.6064	2.0198	1.4038	2.0198	1.5592	0.9356
Flagler	LOW	2.0983	0.1383	0.0794	0.0359	1.9406	1.5116	0.9541	1.5116	1.1168	0.4548
	HIGH	5.7433	0.6694	0.1571	0.2273	6.1929	5.5904	4.3339	5.5904	4.7405	2.9773
	WGHTD AVE	3.2254	0.2784	0.1159	0.0850	3.2160	2.7278	1.9314	2.7278	2.1777	1.1445
Franklin	LOW	2.2388	0.3456	0.1284	0.1044	2.2746	1.7298	1.2523	1.7298	1.3602	0.9137
	HIGH	5.1047	1.0991	0.2408	0.3621	6.0272	5.2483	4.3879	5.2483	4.6035	3.6634
	WGHTD AVE	4.2417	0.7318	0.2114	0.2450	4.7512	4.0484	3.3078	4.0484	3.4905	2.7057
Gadsen	LOW	0.4850	0.0486	0.0327	0.0099	0.3718	0.1688	0.0769	0.1688	0.0872	0.0434
	HIGH	0.8019	0.0867	0.0457	0.0199	0.6801	0.4074	0.2091	0.4074	0.2517	0.0919
	WGHTD AVE	0.6629	0.0691	0.0387	0.0153	0.5481	0.3131	0.1551	0.3131	0.1872	0.0673
Gilchrist	LOW	0.9613	0.1056	0.0586	0.0252	0.8316	0.5139	0.2722	0.5139	0.3243	0.1280
	HIGH	1.0094	0.1107	0.0625	0.0263	0.8709	0.5342	0.2812	0.5342	0.3348	0.1323
	WGHTD AVE	0.9955	0.1092	0.0613	0.0260	0.8593	0.5282	0.2785	0.5282	0.3318	0.1310
Glades	LOW	5.6401	0.3505	0.1666	0.1053	5.5139	4.7479	3.2763	4.7479	3.7470	1.7151
	HIGH	5.8704	0.3587	0.1746	0.1087	5.7421	4.9934	3.4007	4.9934	3.9182	1.7261
	WGHTD AVE	5.6496	0.3583	0.1741	0.1085	5.5238	4.7585	3.2817	4.7585	3.7543	1.7257
Gulf	LOW	1.2617	0.1448	0.0823	0.0346	1.1006	0.6795	0.3666	0.6795	0.4309	0.1832
	HIGH	1.8676	0.2454	0.1224	0.0661	1.7516	1.2036	0.7566	1.2036	0.8523	0.4718
	WGHTD AVE	1.7812	0.2219	0.1173	0.0587	1.6424	1.1154	0.6910	1.1154	0.7814	0.4234
Hamilton	LOW	0.4861	0.0498	0.0286	0.0108	0.3922	0.2102	0.1018	0.2102	0.1217	0.0461
	HIGH	0.5438	0.0564	0.0306	0.0126	0.4491	0.2561	0.1270	0.2561	0.1536	0.0546
	WGHTD AVE	0.5198	0.0535	0.0297	0.0117	0.4244	0.2355	0.1154	0.2355	0.1391	0.0505
Hardee	LOW	3.8617	0.2014	0.1114	0.0544	3.6712	3.1151	2.0353	3.1151	2.3816	0.9250
	HIGH	4.1419	0.2281	0.1269	0.0639	3.9513	3.3447	2.2074	3.3447	2.5695	1.0389
	WGHTD AVE	3.9312	0.2104	0.1163	0.0575	3.7452	3.1770	2.0858	3.1770	2.4349	0.9642
Hendry	LOW	5.0267	0.2862	0.1503	0.0820	4.8473	4.1501	2.7900	4.1501	3.2256	1.3650
	HIGH	6.8309	0.5598	0.1923	0.1861	6.9793	6.1914	4.5476	6.1914	5.0784	2.7551
	WGHTD AVE	5.5752	0.3639	0.1625	0.1084	5.4666	4.7428	3.2995	4.7428	3.7631	1.7670
Hernando	LOW	2.4577	0.1379	0.0742	0.0356	2.2741	1.8209	1.1553	1.8209	1.3573	0.5208
	HIGH	3.9666	0.2064	0.1078	0.0601	3.8460	3.3697	2.3171	3.3697	2.6613	1.1543
	WGHTD AVE	3.0464	0.1630	0.0895	0.0439	2.8792	2.4222	1.5939	2.4222	1.8568	0.7458
Highlands	LOW	3.5264	0.1916	0.1118	0.0474	3.3007	2.7201	1.6129	2.7201	1.9680	0.5869
	HIGH	5.5882	0.3022	0.1539	0.0875	5.4253	4.7697	3.2997	4.7697	3.7809	1.6458
	WGHTD AVE	3.9961	0.2153	0.1224	0.0575	3.7833	3.1761	2.0658	3.1761	2.4188	0.9403
Hillsborough	LOW	1.2719	0.1144	0.0891	0.0250	1.0606	0.6154	0.3075	0.6154	0.3719	0.1345
	HIGH	4.4126	0.2599	0.1255	0.0798	4.3273	3.7854	2.6506	3.7854	3.0091	1.4089
	WGHTD AVE	3.0211	0.1797	0.1029	0.0493	2.8660	2.3783	1.5377	2.3783	1.8016	0.7153
Holmes	LOW	1.1141	0.1215	0.0638	0.0289	0.9786	0.6302	0.3357	0.6302	0.4054	0.1481
	HIGH	1.3423	0.1521	0.0795	0.0383	1.2128	0.8149	0.4602	0.8149	0.5452	0.2251
	WGHTD AVE	1.2920	0.1450	0.0762	0.0358	1.1534	0.7595	0.4214	0.7595	0.5010	0.2024

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
Personal Residential -- Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Indian River	LOW	4.0832	0.2408	0.1242	0.0675	3.8953	3.2768	2.1421	3.2768	2.5036	1.0106
	HIGH	11.2803	1.6956	0.2860	0.5948	12.8973	11.9389	9.8342	11.9389	10.5172	7.4570
	WGHTD AVE	6.9254	0.6889	0.2016	0.2497	7.2906	6.5201	4.9424	6.5201	5.4513	3.2531
Jackson	LOW	0.7950	0.0853	0.0463	0.0192	0.6701	0.3961	0.1991	0.3961	0.2409	0.0855
	HIGH	1.2461	0.1411	0.0749	0.0354	1.1166	0.7410	0.4178	0.7410	0.4944	0.2057
	WGHTD AVE	0.9731	0.1056	0.0566	0.0243	0.8343	0.5117	0.2658	0.5117	0.3199	0.1183
Jefferson	LOW	0.5348	0.0555	0.0310	0.0121	0.4369	0.2388	0.1166	0.2388	0.1390	0.0518
	HIGH	0.6125	0.0647	0.0355	0.0146	0.5131	0.3000	0.1514	0.3000	0.1824	0.0665
	WGHTD AVE	0.5372	0.0558	0.0313	0.0122	0.4392	0.2429	0.1187	0.2429	0.1427	0.0523
Lafayette	LOW	0.6725	0.0721	0.0375	0.0168	0.5760	0.3540	0.1843	0.3540	0.2223	0.0817
	HIGH	0.7673	0.0829	0.0453	0.0193	0.6509	0.3884	0.2015	0.3884	0.2405	0.0935
	WGHTD AVE	0.7647	0.0825	0.0451	0.0192	0.6488	0.3874	0.2010	0.3874	0.2400	0.0932
Lake	LOW	1.8522	0.1245	0.0721	0.0285	1.6319	1.1705	0.6863	1.1705	0.8193	0.2922
	HIGH	3.9523	0.2166	0.1175	0.0622	3.7925	3.2705	2.1781	3.2705	2.5329	1.0226
	WGHTD AVE	2.7383	0.1508	0.0915	0.0386	2.5505	2.0785	1.3198	2.0785	1.5564	0.5832
Lee	LOW	1.8969	0.1809	0.1474	0.0404	1.6219	0.9692	0.4948	0.9692	0.5925	0.2211
	HIGH	10.6771	1.4256	0.3184	0.5155	11.9964	11.0576	9.0583	11.0576	9.7016	6.7460
	WGHTD AVE	6.6821	0.5013	0.2126	0.1757	6.7265	5.9515	4.4033	5.9515	4.8984	2.7213
Leon	LOW	0.6169	0.0647	0.0371	0.0142	0.5050	0.2770	0.1376	0.2770	0.1629	0.0654
	HIGH	0.9084	0.0983	0.0543	0.0230	0.7798	0.4770	0.2522	0.4770	0.3007	0.1184
	WGHTD AVE	0.6832	0.0720	0.0402	0.0162	0.5693	0.3303	0.1676	0.3303	0.2008	0.0758
Levy	LOW	0.9907	0.1105	0.0605	0.0261	0.8517	0.5154	0.2685	0.5154	0.3196	0.1252
	HIGH	2.3295	0.3434	0.1398	0.1048	2.3665	1.8171	1.2828	1.8171	1.4111	0.8901
	WGHTD AVE	1.3675	0.1546	0.0842	0.0399	1.2236	0.8222	0.4915	0.8222	0.5653	0.2800
Liberty	LOW	0.8548	0.0931	0.0517	0.0209	0.7179	0.4167	0.2091	0.4167	0.2511	0.0925
	HIGH	0.9343	0.1007	0.0555	0.0233	0.7974	0.4825	0.2508	0.4825	0.3005	0.1144
	WGHTD AVE	0.8652	0.0942	0.0525	0.0212	0.7282	0.4251	0.2144	0.4251	0.2573	0.0955
Madison	LOW	0.4224	0.0438	0.0242	0.0095	0.3425	0.1863	0.0897	0.1863	0.1082	0.0387
	HIGH	0.5608	0.0585	0.0325	0.0130	0.4642	0.2650	0.1317	0.2650	0.1589	0.0574
	WGHTD AVE	0.5403	0.0564	0.0306	0.0125	0.4462	0.2537	0.1259	0.2537	0.1519	0.0548
Manatee	LOW	3.0652	0.1800	0.1179	0.0452	2.8908	2.3736	1.4022	2.3736	1.7127	0.5404
	HIGH	7.4497	0.8525	0.2175	0.2969	8.0668	7.3182	5.7170	7.3182	6.2347	3.9397
	WGHTD AVE	4.3730	0.3056	0.1430	0.0955	4.3054	3.7339	2.6234	3.7339	2.9781	1.4627
Marion	LOW	2.2250	0.1181	0.0651	0.0293	2.0371	1.6250	1.0280	1.6250	1.2107	0.4531
	HIGH	3.3226	0.1701	0.0910	0.0466	3.1582	2.6890	1.7922	2.6890	2.0803	0.8465
	WGHTD AVE	2.7472	0.1412	0.0783	0.0364	2.5735	2.1440	1.3914	2.1440	1.6294	0.6268
Martin	LOW	4.2830	0.2468	0.1321	0.0693	4.0657	3.4023	2.1918	3.4023	2.5772	1.0099
	HIGH	9.0951	1.0437	0.2450	0.3657	9.8235	8.9052	6.9329	8.9052	7.5725	4.7834
	WGHTD AVE	7.1289	0.6654	0.2039	0.2332	7.4092	6.5828	4.8812	6.5828	5.4307	3.0843
Miami-Dade	LOW	3.4065	0.3585	0.1786	0.1086	3.3277	2.5595	1.7344	2.5595	1.9484	1.0728
	HIGH	18.4722	3.7008	0.4038	1.3543	22.8143	21.6992	19.0740	21.6992	19.9294	15.9517
	WGHTD AVE	7.9010	0.8909	0.2321	0.3461	8.5830	7.7705	6.1131	7.7705	6.6428	4.2868
Monroe	LOW	9.0963	1.3636	0.3014	0.5077	10.4155	9.5375	7.9367	9.5375	8.4375	6.2067
	HIGH	15.6591	2.8058	0.4099	1.0632	18.8731	17.8136	15.4605	17.8136	16.2232	12.7538
	WGHTD AVE	11.0551	1.7395	0.3407	0.6369	12.8301	11.9062	10.0131	11.9062	10.6177	7.8948
Nassau	LOW	0.5094	0.0529	0.0305	0.0117	0.4157	0.2279	0.1134	0.2279	0.1346	0.0534
	HIGH	1.3273	0.1829	0.0794	0.0531	1.2809	0.9219	0.6242	0.9219	0.6909	0.4219
	WGHTD AVE	1.0905	0.1404	0.0675	0.0373	1.0039	0.6797	0.4404	0.6797	0.4893	0.2911

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
Personal Residential -- Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Okaloosa	LOW	1.3574	0.1588	0.0915	0.0386	1.2124	0.7775	0.4242	0.7775	0.4996	0.2096
	HIGH	4.6232	0.9135	0.2212	0.3007	5.3249	4.5929	3.7422	4.5929	3.9657	3.0089
	WGHTD AVE	2.9516	0.4656	0.1658	0.1470	3.1087	2.5042	1.8770	2.5042	2.0330	1.3881
Okeechobee	LOW	4.3772	0.2512	0.1373	0.0690	4.1550	3.4773	2.2856	3.4773	2.6618	1.0870
	HIGH	5.3865	0.3140	0.1557	0.0910	5.2031	4.4612	3.0014	4.4612	3.4706	1.4848
	WGHTD AVE	4.9836	0.2894	0.1457	0.0823	4.7773	4.0615	2.7104	4.0615	3.1419	1.3228
Orange	LOW	1.2966	0.1151	0.0818	0.0246	1.0620	0.5955	0.2909	0.5955	0.3525	0.1263
	HIGH	4.1913	0.1996	0.1267	0.0567	4.0306	3.5172	2.3928	3.5172	2.7602	1.1470
	WGHTD AVE	2.9774	0.1661	0.0997	0.0434	2.7950	2.2920	1.4651	2.2920	1.7223	0.6552
Osceola	LOW	1.9048	0.1292	0.0942	0.0295	1.6749	1.1934	0.7046	1.1934	0.8381	0.3057
	HIGH	4.5302	0.2710	0.1377	0.0791	4.3638	3.8240	2.6282	3.8240	3.0193	1.3068
	WGHTD AVE	2.6498	0.1602	0.1001	0.0402	2.4512	1.9447	1.2451	1.9447	1.4540	0.5784
Palm Beach	LOW	3.9601	0.3468	0.1676	0.1010	3.8166	3.0435	1.9911	3.0435	2.2976	1.0756
	HIGH	15.1940	2.5117	0.3495	0.9125	17.8584	16.7525	14.1468	16.7525	14.9989	11.1019
	WGHTD AVE	7.6549	0.8638	0.2265	0.2845	8.2054	7.3494	5.6080	7.3494	6.1685	3.7566
Pasco	LOW	1.5012	0.1312	0.0907	0.0298	1.2841	0.7991	0.4302	0.7991	0.5127	0.1985
	HIGH	4.0402	0.2083	0.1093	0.0607	3.9030	3.3978	2.3084	3.3978	2.6635	1.1291
	WGHTD AVE	2.7487	0.1679	0.1003	0.0450	2.5791	2.0962	1.3604	2.0962	1.5848	0.6494
Pinellas	LOW	1.9865	0.1466	0.0971	0.0360	1.7948	1.3143	0.7950	1.3143	0.9375	0.3666
	HIGH	5.5576	0.5541	0.1793	0.1820	5.7941	5.1196	3.7703	5.1196	4.2038	2.3717
	WGHTD AVE	3.5285	0.2252	0.1155	0.0649	3.4074	2.8964	1.9135	2.8964	2.2284	0.9408
Polk	LOW	1.4554	0.1279	0.0984	0.0280	1.2031	0.6861	0.3376	0.6861	0.4093	0.1459
	HIGH	4.4002	0.2469	0.1268	0.0742	4.2792	3.7205	2.5671	3.7205	2.9412	1.3123
	WGHTD AVE	3.2930	0.1892	0.1086	0.0510	3.1479	2.6140	1.6857	2.6140	1.9777	0.7685
Putnam	LOW	1.0198	0.1099	0.0601	0.0262	0.8798	0.5451	0.2841	0.5451	0.3421	0.1265
	HIGH	1.4989	0.1714	0.0858	0.0466	1.3827	0.9643	0.5708	0.9643	0.6684	0.2985
	WGHTD AVE	1.1984	0.1323	0.0701	0.0334	1.0650	0.6983	0.3874	0.6983	0.4601	0.1869
Santa Rosa	LOW	1.5410	0.1829	0.1059	0.0461	1.4036	0.9327	0.5295	0.9327	0.6191	0.2723
	HIGH	6.8378	1.5948	0.2796	0.5354	8.4301	7.6143	6.5775	7.6143	6.8575	5.6107
	WGHTD AVE	3.0015	0.4951	0.1716	0.1527	3.1865	2.5767	1.9748	2.5767	2.1178	1.5158
Sarasota	LOW	1.5612	0.1478	0.1270	0.0327	1.3227	0.7783	0.3921	0.7783	0.4707	0.1736
	HIGH	7.3206	0.9665	0.2039	0.3288	8.1174	7.4160	5.8474	7.4160	6.3576	4.1241
	WGHTD AVE	4.8037	0.3631	0.1500	0.1124	4.8096	4.2069	2.9738	4.2069	3.3709	1.6789
Seminole	LOW	2.5495	0.1406	0.0866	0.0325	2.3350	1.8578	1.0396	1.8578	1.2986	0.3461
	HIGH	3.9620	0.1933	0.1011	0.0547	3.8056	3.3129	2.2421	3.3129	2.5917	1.0719
	WGHTD AVE	3.3384	0.1722	0.0930	0.0463	3.1642	2.6762	1.7554	2.6762	2.0500	0.8066
St. Johns	LOW	0.7866	0.0854	0.0579	0.0185	0.6281	0.3056	0.1467	0.3056	0.1637	0.0885
	HIGH	3.0416	0.5708	0.1519	0.1888	3.3969	2.8420	2.2800	2.8420	2.4183	1.8270
	WGHTD AVE	1.3946	0.1887	0.0874	0.0536	1.3226	0.9310	0.6327	0.9310	0.6945	0.4409
St. Lucie	LOW	4.0795	0.2503	0.1373	0.0687	3.8549	3.1544	2.0445	3.1544	2.3867	0.9618
	HIGH	12.1949	2.0029	0.3113	0.7168	14.2086	13.1923	11.0401	13.1923	11.7323	8.6235
	WGHTD AVE	5.5513	0.3893	0.1630	0.1225	5.4751	4.7340	3.2721	4.7340	3.7421	1.7802
Sumter	LOW	1.3926	0.1109	0.0873	0.0240	1.1701	0.7272	0.3907	0.7272	0.4692	0.1694
	HIGH	3.3645	0.1880	0.1033	0.0513	3.1936	2.6819	1.7458	2.6819	2.0437	0.8098
	WGHTD AVE	1.5998	0.1176	0.0885	0.0271	1.3880	0.9399	0.5378	0.9399	0.6405	0.2370

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
Personal Residential -- Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Suwanee	LOW	0.5813	0.0603	0.0335	0.0133	0.4755	0.2637	0.1301	0.2637	0.1559	0.0584
	HIGH	0.8504	0.0922	0.0505	0.0217	0.7278	0.4423	0.2308	0.4423	0.2762	0.1060
	WGHTD AVE	0.6486	0.0681	0.0378	0.0152	0.5371	0.3066	0.1541	0.3066	0.1846	0.0698
Taylor	LOW	0.6278	0.0670	0.0353	0.0155	0.5308	0.3170	0.1632	0.3170	0.1963	0.0728
	HIGH	0.9774	0.1120	0.0642	0.0272	0.8510	0.5450	0.3017	0.5450	0.3558	0.1495
	WGHTD AVE	0.7557	0.0832	0.0460	0.0195	0.6452	0.3909	0.2069	0.3909	0.2453	0.0993
Union	LOW	0.8026	0.0854	0.0480	0.0196	0.6736	0.3930	0.1993	0.3930	0.2388	0.0900
	HIGH	0.8942	0.0956	0.0522	0.0224	0.7631	0.4631	0.2402	0.4631	0.2884	0.1085
	WGHTD AVE	0.8096	0.0862	0.0483	0.0198	0.6803	0.3983	0.2024	0.3983	0.2425	0.0914
Volusia	LOW	1.1258	0.0990	0.0753	0.0209	0.9138	0.5038	0.2454	0.5038	0.2969	0.1078
	HIGH	8.6086	1.0900	0.2049	0.3858	9.5300	8.8015	7.1148	8.8015	7.6670	5.1491
	WGHTD AVE	4.4731	0.3196	0.1176	0.1009	4.4539	3.9293	2.8408	3.9293	3.1931	1.6523
Wakulla	LOW	0.7271	0.0789	0.0493	0.0173	0.5935	0.3158	0.1564	0.3158	0.1819	0.0802
	HIGH	1.8594	0.2658	0.1105	0.0774	1.8270	1.3427	0.9236	1.3427	1.0189	0.6333
	WGHTD AVE	0.9518	0.1029	0.0631	0.0258	0.8107	0.4960	0.2887	0.4960	0.3273	0.1730
Walton	LOW	1.4441	0.1664	0.0843	0.0434	1.3320	0.9067	0.5192	0.9067	0.6092	0.2644
	HIGH	4.6200	0.9530	0.2471	0.3117	5.3617	4.5929	3.8073	4.5929	3.9931	3.1665
	WGHTD AVE	3.0767	0.5184	0.1904	0.1633	3.2749	2.6136	2.0112	2.6136	2.1447	1.5707
Washington	LOW	1.2093	0.1343	0.0732	0.0320	1.0588	0.6704	0.3597	0.6704	0.4292	0.1683
	HIGH	1.3550	0.1547	0.0851	0.0377	1.2115	0.7964	0.4436	0.7964	0.5254	0.2174
	WGHTD AVE	1.2331	0.1375	0.0751	0.0329	1.0817	0.6867	0.3702	0.6867	0.4409	0.1747
STATEWIDE	LOW	0.4224	0.0438	0.0242	0.0095	0.3425	0.1688	0.0769	0.1688	0.0872	0.0387
	HIGH	18.4722	3.7008	0.4099	1.3543	22.8143	21.6992	19.0740	21.6992	19.9294	15.9517
	WGHTD AVE	3.1205	0.2686	0.1219	0.0826	3.0245	2.5222	1.7831	2.5222	2.0027	1.0791

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL -Owners -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE STRUCTURE	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.8479	0.0861	0.0516	0.0194	0.7005	0.3823	0.1914	0.3823	0.2247	0.0852
	HIGH	1.2353	0.1347	0.0791	0.0355	1.0833	0.6914	0.4027	0.6914	0.4682	0.2127
	WGHTD AVE	0.9369	0.0965	0.0570	0.0226	0.7905	0.4697	0.2448	0.4697	0.2923	0.1130
Baker	LOW	0.5773	0.0573	0.0344	0.0126	0.4686	0.2568	0.1275	0.2568	0.1524	0.0580
	HIGH	0.6792	0.0678	0.0417	0.0151	0.5534	0.3043	0.1533	0.3043	0.1819	0.0725
	WGHTD AVE	0.6688	0.0666	0.0410	0.0148	0.5435	0.2971	0.1491	0.2971	0.1768	0.0706
Bay	LOW	1.2695	0.1373	0.0804	0.0329	1.0980	0.6775	0.3691	0.6775	0.4347	0.1831
	HIGH	3.0899	0.4876	0.1824	0.1555	3.2138	2.5447	1.9153	2.5447	2.0639	1.4321
	WGHTD AVE	2.0823	0.2628	0.1329	0.0751	1.9773	1.4176	0.9385	1.4176	1.0480	0.6057
Bradford	LOW	0.6816	0.0682	0.0401	0.0152	0.5608	0.3179	0.1583	0.3179	0.1909	0.0693
	HIGH	1.0238	0.1080	0.0624	0.0261	0.8753	0.5319	0.2873	0.5319	0.3393	0.1405
	WGHTD AVE	0.8094	0.0824	0.0482	0.0189	0.6751	0.3932	0.2010	0.3932	0.2411	0.0905
Brevard	LOW	1.8313	0.1545	0.1069	0.0366	1.5756	0.9383	0.5233	0.9383	0.5995	0.2904
	HIGH	9.8936	1.5597	0.3047	0.5526	11.3941	10.4784	8.5963	10.4784	9.1982	6.5495
	WGHTD AVE	4.1692	0.3412	0.1506	0.1066	4.1272	3.4921	2.4204	3.4921	2.7545	1.3691
Broward	LOW	1.9899	0.1984	0.1754	0.0492	1.7111	1.0044	0.5551	1.0044	0.6312	0.3120
	HIGH	14.2503	2.4902	0.3661	0.9303	16.9851	15.9349	13.6246	15.9349	14.3705	10.9867
	WGHTD AVE	6.2199	0.6136	0.2167	0.2136	6.4273	5.6383	4.2565	5.6383	4.6841	2.8389
Calhoun	LOW	0.9630	0.1025	0.0594	0.0233	0.8090	0.4714	0.2431	0.4714	0.2895	0.1119
	HIGH	1.1125	0.1197	0.0694	0.0280	0.9519	0.5808	0.3053	0.5808	0.3656	0.1445
	WGHTD AVE	1.0131	0.1074	0.0624	0.0247	0.8565	0.5066	0.2631	0.5066	0.3137	0.1212
Charlotte	LOW	2.4207	0.1680	0.1170	0.0425	2.2188	1.6909	1.0617	1.6909	1.2352	0.5000
	HIGH	5.9502	0.5501	0.2114	0.1871	6.1407	5.3843	3.9538	5.3843	4.4041	2.4277
	WGHTD AVE	4.3160	0.2804	0.1529	0.0835	4.1869	3.5418	2.3812	3.5418	2.7458	1.1910
Citrus	LOW	2.2635	0.1247	0.0739	0.0305	2.0655	1.6088	1.0112	1.6088	1.1874	0.4571
	HIGH	3.2465	0.1655	0.0934	0.0446	3.0875	2.6547	1.7447	2.6547	2.0410	0.7810
	WGHTD AVE	2.5461	0.1372	0.0838	0.0347	2.3612	1.9222	1.2218	1.9222	1.4391	0.5374
Clay	LOW	0.7934	0.0816	0.0519	0.0187	0.6494	0.3544	0.1840	0.3544	0.2131	0.0966
	HIGH	1.0888	0.1197	0.0629	0.0309	0.9547	0.6088	0.3456	0.6088	0.4046	0.1762
	WGHTD AVE	0.8801	0.0936	0.0555	0.0227	0.7441	0.4376	0.2388	0.4376	0.2775	0.1253
Collier	LOW	2.2312	0.2284	0.1534	0.0555	1.9864	1.2360	0.6845	1.2360	0.7888	0.3639
	HIGH	8.4841	0.8355	0.2899	0.2965	8.9657	8.0684	6.1075	8.0684	6.7441	3.8788
	WGHTD AVE	4.9285	0.3471	0.2042	0.1070	4.7800	4.0023	2.7127	4.0023	3.1098	1.4250
Columbia	LOW	0.6544	0.0643	0.0391	0.0139	0.5273	0.2842	0.1388	0.2842	0.1661	0.0627
	HIGH	0.7536	0.0754	0.0484	0.0164	0.6093	0.3343	0.1680	0.3343	0.2019	0.0780
	WGHTD AVE	0.7083	0.0707	0.0431	0.0156	0.5784	0.3204	0.1598	0.3204	0.1909	0.0731
De Soto	LOW	3.8072	0.2322	0.1314	0.0653	3.6167	2.9814	1.9309	2.9814	2.2564	0.8999
	HIGH	4.2700	0.2424	0.1447	0.0698	4.0880	3.4727	2.3223	3.4727	2.6806	1.1340
	WGHTD AVE	4.1396	0.2367	0.1350	0.0663	3.9532	3.3323	2.1849	3.3323	2.5490	1.0188
Dixie	LOW	0.9694	0.1038	0.0593	0.0246	0.8233	0.4849	0.2570	0.4849	0.3014	0.1284
	HIGH	1.6629	0.2298	0.1023	0.0694	1.6174	1.1718	0.8007	1.1718	0.8837	0.5414
	WGHTD AVE	0.9923	0.1068	0.0635	0.0257	0.8523	0.5191	0.2813	0.5191	0.3307	0.1407

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL -Owners -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE STRUCTURE	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Duval	LOW	0.5709	0.0557	0.0317	0.0120	0.4683	0.2552	0.1213	0.2552	0.1396	0.0495
	HIGH	1.9499	0.2426	0.1079	0.0730	1.9271	1.4822	1.0199	1.4822	1.1409	0.6587
	WGHTD AVE	0.8786	0.0897	0.0534	0.0210	0.7508	0.4619	0.2484	0.4619	0.2952	0.1195
Escambia	LOW	1.4600	0.1651	0.0946	0.0426	1.3367	0.9128	0.5258	0.9128	0.6198	0.2608
	HIGH	3.7504	0.6168	0.2159	0.2062	4.0835	3.3792	2.6271	3.3792	2.8165	1.9964
	WGHTD AVE	2.4753	0.3286	0.1565	0.0979	2.4556	1.8632	1.2738	1.8632	1.4199	0.8268
Flagler	LOW	1.7015	0.1249	0.0794	0.0306	1.5224	1.0980	0.6663	1.0980	0.7815	0.3134
	HIGH	4.6161	0.4777	0.1571	0.1620	4.8147	4.2184	3.1384	4.2184	3.4794	2.0258
	WGHTD AVE	2.3058	0.1848	0.1077	0.0525	2.1900	1.7264	1.1425	1.7264	1.3108	0.6152
Franklin	LOW	2.3054	0.3287	0.1284	0.1004	2.3086	1.7285	1.2099	1.7285	1.3312	0.8318
	HIGH	4.7818	0.9087	0.2408	0.3052	5.4541	4.6722	3.8138	4.6722	4.0328	3.0810
	WGHTD AVE	3.3195	0.5272	0.1849	0.1772	3.5494	2.9018	2.2585	2.9018	2.4169	1.7439
Gadsen	LOW	0.5113	0.0492	0.0327	0.0101	0.3979	0.1937	0.0918	0.1937	0.1070	0.0465
	HIGH	0.7909	0.0818	0.0457	0.0187	0.6625	0.3892	0.2014	0.3892	0.2411	0.0909
	WGHTD AVE	0.6600	0.0660	0.0389	0.0144	0.5393	0.3019	0.1509	0.3019	0.1810	0.0671
Gilchrist	LOW	0.9171	0.0974	0.0586	0.0230	0.7771	0.4595	0.2443	0.4595	0.2873	0.1212
	HIGH	1.0023	0.1062	0.0625	0.0253	0.8575	0.5200	0.2768	0.5200	0.3281	0.1326
	WGHTD AVE	0.9757	0.1033	0.0608	0.0245	0.8312	0.5003	0.2662	0.5003	0.3148	0.1289
Glades	LOW	5.0904	0.3253	0.1666	0.0969	4.9235	4.1619	2.8061	4.1619	3.2334	1.4199
	HIGH	5.3467	0.3350	0.1746	0.1022	5.2065	4.4643	3.0696	4.4643	3.5129	1.5877
	WGHTD AVE	5.0960	0.3255	0.1744	0.0970	4.9298	4.1686	2.8119	4.1686	3.2396	1.4236
Gulf	LOW	1.2868	0.1438	0.0823	0.0350	1.1233	0.7004	0.3856	0.7004	0.4528	0.1928
	HIGH	1.9756	0.2517	0.1224	0.0705	1.8661	1.3139	0.8373	1.3139	0.9481	0.5096
	WGHTD AVE	1.7934	0.2188	0.1118	0.0594	1.6586	1.1422	0.7107	1.1422	0.8093	0.4208
Hamilton	LOW	0.4856	0.0476	0.0286	0.0102	0.3885	0.2047	0.0994	0.2047	0.1182	0.0460
	HIGH	0.5263	0.0521	0.0306	0.0115	0.4260	0.2328	0.1165	0.2328	0.1389	0.0534
	WGHTD AVE	0.5108	0.0503	0.0298	0.0109	0.4107	0.2207	0.1093	0.2207	0.1303	0.0503
Hardee	LOW	3.5318	0.1923	0.1114	0.0512	3.3441	2.7671	1.8024	2.7671	2.1012	0.8239
	HIGH	3.9305	0.2183	0.1269	0.0596	3.7284	3.1235	2.0358	3.1235	2.3795	0.9362
	WGHTD AVE	3.7215	0.2001	0.1157	0.0540	3.5238	2.9583	1.9145	2.9583	2.2464	0.8610
Hendry	LOW	3.3359	0.2170	0.1503	0.0556	3.0782	2.3995	1.5200	2.3995	1.7770	0.7094
	HIGH	6.1428	0.4797	0.1923	0.1588	6.1879	5.4042	3.8579	5.4042	4.3520	2.2186
	WGHTD AVE	5.1162	0.3522	0.1684	0.1052	4.9822	4.2505	2.9242	4.2505	3.3421	1.5589
Hernando	LOW	1.5941	0.1163	0.0742	0.0264	1.3831	0.9415	0.5471	0.9415	0.6459	0.2457
	HIGH	3.5697	0.2100	0.1078	0.0609	3.4313	2.9158	1.9304	2.9158	2.2462	0.9209
	WGHTD AVE	2.6442	0.1478	0.0882	0.0387	2.4661	2.0147	1.2958	2.0147	1.5182	0.5892
Highlands	LOW	3.2985	0.1813	0.1118	0.0458	3.0451	2.4440	1.5231	2.4440	1.8052	0.6516
	HIGH	4.8370	0.2830	0.1539	0.0810	4.6361	3.9195	2.5991	3.9195	3.0182	1.2492
	WGHTD AVE	3.7851	0.2053	0.1222	0.0540	3.5592	2.9539	1.8944	2.9539	2.2282	0.8406
Hillsborough	LOW	1.2712	0.1168	0.0891	0.0255	1.0518	0.5884	0.2970	0.5884	0.3511	0.1420
	HIGH	4.6516	0.3002	0.1393	0.0984	4.6340	4.0940	2.8732	4.0940	3.2727	1.5199
	WGHTD AVE	2.8666	0.1690	0.1036	0.0452	2.6905	2.2003	1.4006	2.2003	1.6490	0.6320
Holmes	LOW	1.1056	0.1235	0.0638	0.0314	0.9744	0.6260	0.3574	0.6260	0.4181	0.1826
	HIGH	1.2727	0.1418	0.0795	0.0357	1.1307	0.7333	0.4162	0.7333	0.4878	0.2127
	WGHTD AVE	1.2467	0.1362	0.0761	0.0336	1.0968	0.7028	0.3908	0.7028	0.4617	0.1922

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL -Owners -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE STRUCTURE	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Indian River	LOW	2.6771	0.1827	0.1242	0.0457	2.4280	1.7356	1.1019	1.7356	1.2570	0.5143
	HIGH	8.6334	1.1886	0.2860	0.4196	9.5822	8.6380	6.8877	8.6380	7.4379	5.0169
	WGHTD AVE	5.1454	0.5111	0.2073	0.1838	5.2589	4.4963	3.3223	4.4963	3.6775	2.1600
Jackson	LOW	0.7836	0.0804	0.0463	0.0178	0.6519	0.3772	0.1899	0.3772	0.2291	0.0825
	HIGH	1.2252	0.1324	0.0749	0.0328	1.0616	0.6818	0.3835	0.6818	0.4519	0.1916
	WGHTD AVE	0.9370	0.0978	0.0557	0.0224	0.7915	0.4720	0.2449	0.4720	0.2936	0.1106
Jefferson	LOW	0.5260	0.0518	0.0310	0.0111	0.4229	0.2229	0.1104	0.2229	0.1299	0.0500
	HIGH	0.5755	0.0577	0.0355	0.0127	0.4695	0.2604	0.1310	0.2604	0.1564	0.0626
	WGHTD AVE	0.5275	0.0520	0.0313	0.0112	0.4244	0.2277	0.1115	0.2277	0.1333	0.0506
Lafayette	LOW	0.6607	0.0684	0.0375	0.0160	0.5593	0.3371	0.1772	0.3371	0.2123	0.0809
	HIGH	0.7547	0.0783	0.0453	0.0181	0.6321	0.3690	0.1928	0.3690	0.2288	0.0916
	WGHTD AVE	0.7538	0.0782	0.0452	0.0181	0.6314	0.3687	0.1926	0.3687	0.2286	0.0915
Lake	LOW	1.2028	0.1065	0.0721	0.0223	0.9682	0.5168	0.2508	0.5168	0.2991	0.1160
	HIGH	3.1628	0.1948	0.1175	0.0548	3.0007	2.4812	1.6242	2.4812	1.8899	0.7826
	WGHTD AVE	2.4009	0.1429	0.0954	0.0352	2.1939	1.7108	1.0629	1.7108	1.2559	0.4667
Lee	LOW	2.7701	0.2098	0.1474	0.0520	2.5147	1.8125	1.1006	1.8125	1.2883	0.5168
	HIGH	8.9897	1.1673	0.3184	0.4279	9.9731	9.0443	7.2159	9.0443	7.7920	5.1847
	WGHTD AVE	4.2038	0.2913	0.1767	0.0852	4.0479	3.3331	2.2168	3.3331	2.5546	1.1230
Leon	LOW	0.5921	0.0586	0.0371	0.0125	0.4721	0.2439	0.1202	0.2439	0.1404	0.0602
	HIGH	0.9045	0.0984	0.0520	0.0252	0.7848	0.4919	0.2817	0.4919	0.3269	0.1499
	WGHTD AVE	0.6693	0.0673	0.0404	0.0150	0.5486	0.3085	0.1573	0.3085	0.1869	0.0736
Levy	LOW	0.9645	0.1032	0.0605	0.0241	0.8157	0.4789	0.2497	0.4789	0.2954	0.1191
	HIGH	2.2630	0.3168	0.1398	0.0985	2.2659	1.7152	1.1965	1.7152	1.3211	0.8110
	WGHTD AVE	1.1574	0.1253	0.0760	0.0307	1.0003	0.6163	0.3410	0.6163	0.3975	0.1777
Liberty	LOW	0.8354	0.0870	0.0517	0.0193	0.6902	0.3886	0.1956	0.3886	0.2332	0.0890
	HIGH	0.9037	0.0934	0.0555	0.0213	0.7572	0.4421	0.2290	0.4421	0.2726	0.1071
	WGHTD AVE	0.8431	0.0881	0.0524	0.0197	0.6981	0.3945	0.2001	0.3945	0.2379	0.0925
Madison	LOW	0.4148	0.0407	0.0242	0.0086	0.3305	0.1739	0.0840	0.1739	0.1006	0.0374
	HIGH	0.5454	0.0551	0.0325	0.0124	0.4483	0.2540	0.1292	0.2540	0.1547	0.0584
	WGHTD AVE	0.5288	0.0525	0.0308	0.0115	0.4286	0.2348	0.1168	0.2348	0.1397	0.0530
Manatee	LOW	2.2567	0.1703	0.1175	0.0452	2.0787	1.5295	0.9564	1.5295	1.1060	0.4836
	HIGH	6.6715	0.6743	0.2175	0.2370	7.0692	6.3572	4.7850	6.3572	5.2968	3.0744
	WGHTD AVE	3.2600	0.2266	0.1363	0.0656	3.1122	2.5635	1.7065	2.5635	1.9672	0.8741
Marion	LOW	1.7964	0.1067	0.0651	0.0254	1.6011	1.1952	0.7311	1.1952	0.8619	0.3231
	HIGH	3.0144	0.1598	0.0910	0.0431	2.8417	2.4096	1.5707	2.4096	1.8406	0.7243
	WGHTD AVE	2.2481	0.1255	0.0784	0.0308	2.0600	1.6365	1.0322	1.6365	1.2149	0.4555
Martin	LOW	3.7229	0.2201	0.1321	0.0600	3.4755	2.8181	1.7539	2.8181	2.0841	0.7677
	HIGH	8.4634	0.8507	0.2450	0.3083	8.9561	8.0558	6.0730	8.0558	6.7188	3.9269
	WGHTD AVE	5.2816	0.4522	0.2035	0.1533	5.2791	4.4663	3.1365	4.4663	3.5469	1.8378
Miami-Dade	LOW	2.2061	0.2289	0.1786	0.0591	1.9590	1.2077	0.6904	1.2077	0.7811	0.3959
	HIGH	14.1702	2.4477	0.4038	0.9171	16.8725	15.8463	13.5518	15.8463	14.2942	10.9079
	WGHTD AVE	6.9292	0.6901	0.2265	0.2553	7.2945	6.4943	4.9343	6.4943	5.4284	3.2731
Monroe	LOW	8.6997	1.0519	0.3014	0.4046	9.5946	8.7244	6.8569	8.7244	7.4605	4.8582
	HIGH	12.7345	1.9914	0.4099	0.7775	14.8920	13.8897	11.6396	13.8897	12.3699	9.1349
	WGHTD AVE	10.1579	1.3601	0.3546	0.5349	11.4623	10.4994	8.5166	10.4994	9.1510	6.3791
Nassau	LOW	0.5015	0.0494	0.0305	0.0108	0.4029	0.2147	0.1072	0.2147	0.1265	0.0519
	HIGH	1.3971	0.1981	0.0794	0.0614	1.3724	1.0117	0.7097	1.0117	0.7798	0.4908
	WGHTD AVE	0.9739	0.1153	0.0627	0.0302	0.8684	0.5627	0.3538	0.5627	0.3951	0.2266

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL -Owners -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE STRUCTURE	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Okaloosa	LOW	1.3378	0.1543	0.0915	0.0378	1.1827	0.7369	0.4110	0.7369	0.4747	0.2189
	HIGH	5.3322	1.0995	0.2239	0.3909	6.3138	5.5826	4.6602	5.5826	4.9137	3.7891
	WGHTD AVE	2.8299	0.4259	0.1686	0.1375	2.9379	2.3266	1.7218	2.3266	1.8701	1.2486
Okeechobee	LOW	4.0849	0.2369	0.1373	0.0640	3.8466	3.1721	2.0449	3.1721	2.3963	0.9412
	HIGH	4.5706	0.2744	0.1557	0.0765	4.3406	3.6061	2.3569	3.6061	2.7477	1.1189
	WGHTD AVE	4.3910	0.2617	0.1492	0.0724	4.1652	3.4520	2.2462	3.4520	2.6230	1.0559
Orange	LOW	1.2570	0.1122	0.0815	0.0236	1.0140	0.5416	0.2639	0.5416	0.3138	0.1231
	HIGH	3.9009	0.1901	0.1267	0.0520	3.7341	3.2382	2.1679	3.2382	2.5173	1.0043
	WGHTD AVE	2.8618	0.1574	0.0977	0.0402	2.6573	2.1588	1.3640	2.1588	1.6103	0.5947
Osceola	LOW	2.0116	0.1362	0.0942	0.0325	1.7549	1.1641	0.6815	1.1641	0.7927	0.3367
	HIGH	3.7675	0.2341	0.1377	0.0651	3.5990	3.0679	2.0610	3.0679	2.3813	0.9914
	WGHTD AVE	2.7418	0.1604	0.1016	0.0410	2.5415	2.0298	1.2992	2.0298	1.5192	0.5936
Palm Beach	LOW	3.7679	0.2788	0.1676	0.0809	3.5359	2.7739	1.8112	2.7739	2.0997	0.9227
	HIGH	11.1306	1.5735	0.3495	0.5779	12.5393	11.4484	9.2678	11.4484	9.9627	6.9135
	WGHTD AVE	5.9057	0.5488	0.2194	0.1854	6.0239	5.1932	3.7568	5.1932	4.2054	2.3200
Pasco	LOW	1.4199	0.1255	0.0907	0.0280	1.1973	0.7144	0.3818	0.7144	0.4493	0.1839
	HIGH	3.8148	0.2149	0.1093	0.0644	3.6972	3.2013	2.1468	3.2013	2.4903	1.0316
	WGHTD AVE	2.6928	0.1626	0.1005	0.0430	2.4995	2.0172	1.2914	2.0172	1.5123	0.5985
Pinellas	LOW	1.8622	0.1391	0.0971	0.0336	1.6625	1.1841	0.7050	1.1841	0.8315	0.3222
	HIGH	5.2098	0.4528	0.1793	0.1491	5.3129	4.6392	3.3007	4.6392	3.7300	1.9397
	WGHTD AVE	3.3410	0.2030	0.1146	0.0574	3.1951	2.6865	1.7303	2.6865	2.0360	0.8020
Polk	LOW	1.3901	0.1252	0.0984	0.0265	1.1332	0.6180	0.3029	0.6180	0.3609	0.1399
	HIGH	4.2072	0.2232	0.1268	0.0616	4.0112	3.4240	2.2198	3.4240	2.6101	1.0193
	WGHTD AVE	2.9478	0.1726	0.1084	0.0451	2.7666	2.2365	1.4137	2.2365	1.6665	0.6284
Putnam	LOW	0.9628	0.1006	0.0601	0.0237	0.8114	0.4771	0.2500	0.4771	0.2959	0.1199
	HIGH	1.4159	0.1574	0.0858	0.0424	1.2819	0.8638	0.5063	0.8638	0.5913	0.2661
	WGHTD AVE	1.1503	0.1234	0.0701	0.0310	1.0063	0.6401	0.3556	0.6401	0.4195	0.1761
Santa Rosa	LOW	1.4935	0.1729	0.1059	0.0436	1.3433	0.8722	0.4957	0.8722	0.5766	0.2593
	HIGH	6.0956	1.2558	0.2796	0.4350	7.2487	6.4332	5.4454	6.4332	5.7087	4.5235
	WGHTD AVE	2.9092	0.4545	0.1798	0.1420	3.0357	2.4090	1.8329	2.4090	1.9640	1.3976
Sarasota	LOW	1.5307	0.1445	0.1270	0.0319	1.2909	0.7493	0.3907	0.7493	0.4560	0.1887
	HIGH	6.3720	0.7528	0.2039	0.2572	6.8881	6.1916	4.7373	6.1916	5.2046	3.1956
	WGHTD AVE	3.7605	0.2690	0.1478	0.0801	3.6497	3.0543	2.0507	3.0543	2.3610	1.0631
Seminole	LOW	2.2786	0.1411	0.0866	0.0346	2.0656	1.5840	0.9847	1.5840	1.1582	0.4149
	HIGH	3.8979	0.1879	0.1011	0.0532	3.7364	3.2419	2.1745	3.2419	2.5230	1.0148
	WGHTD AVE	3.0465	0.1603	0.0927	0.0421	2.8548	2.3691	1.5260	2.3691	1.7923	0.6815
St. Johns	LOW	0.8086	0.0836	0.0590	0.0183	0.6466	0.3227	0.1609	0.3227	0.1807	0.0948
	HIGH	2.5220	0.4090	0.1519	0.1359	2.6656	2.1136	1.6332	2.1136	1.7408	1.2683
	WGHTD AVE	1.5287	0.2045	0.0995	0.0610	1.4610	1.0366	0.7178	1.0366	0.7836	0.5066
St. Lucie	LOW	2.0035	0.1701	0.1373	0.0390	1.6886	1.0238	0.5597	1.0238	0.6539	0.2696
	HIGH	9.9848	1.3737	0.3113	0.4999	11.1582	10.1479	8.1396	10.1479	8.7788	5.9932
	WGHTD AVE	3.4871	0.2628	0.1587	0.0755	3.2662	2.5573	1.6593	2.5573	1.9171	0.8627
Sumter	LOW	1.3074	0.1063	0.0873	0.0226	1.0809	0.6398	0.3394	0.6398	0.4033	0.1530
	HIGH	3.1016	0.1718	0.1033	0.0457	2.9169	2.4402	1.5387	2.4402	1.8275	0.6877
	WGHTD AVE	1.6977	0.1189	0.0895	0.0279	1.4857	1.0340	0.6065	1.0340	0.7179	0.2703

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL -Owners -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE STRUCTURE	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Suwanee	LOW	0.5698	0.0563	0.0335	0.0122	0.4585	0.2463	0.1223	0.2463	0.1453	0.0570
	HIGH	0.8222	0.0852	0.0505	0.0197	0.6903	0.4045	0.2102	0.4045	0.2501	0.0987
	WGHTD AVE	0.6332	0.0635	0.0378	0.0140	0.5160	0.2852	0.1437	0.2852	0.1709	0.0671
Taylor	LOW	0.6202	0.0650	0.0353	0.0155	0.5208	0.3067	0.1650	0.3067	0.1943	0.0803
	HIGH	1.0031	0.1124	0.0642	0.0280	0.8765	0.5466	0.3069	0.5466	0.3572	0.1606
	WGHTD AVE	0.7084	0.0750	0.0437	0.0174	0.5957	0.3495	0.1840	0.3495	0.2176	0.0884
Union	LOW	0.7817	0.0791	0.0480	0.0175	0.6382	0.3464	0.1738	0.3464	0.2048	0.0841
	HIGH	0.9143	0.0900	0.0522	0.0209	0.7741	0.4733	0.2347	0.4733	0.2906	0.1042
	WGHTD AVE	0.7885	0.0800	0.0483	0.0181	0.6508	0.3681	0.1870	0.3681	0.2226	0.0870
Volusia	LOW	1.4923	0.1187	0.0753	0.0288	1.2882	0.7725	0.4324	0.7725	0.4957	0.2392
	HIGH	7.8483	0.9614	0.2049	0.3445	8.6249	7.8978	6.2338	7.8978	6.7774	4.3386
	WGHTD AVE	3.6635	0.2660	0.1140	0.0792	3.5774	3.0659	2.1516	3.0659	2.4401	1.1988
Wakulla	LOW	0.7367	0.0762	0.0493	0.0167	0.5987	0.3200	0.1611	0.3200	0.1877	0.0818
	HIGH	1.8935	0.2601	0.1105	0.0782	1.8538	1.3669	0.9408	1.3669	1.0416	0.6323
	WGHTD AVE	0.9072	0.0946	0.0595	0.0230	0.7629	0.4555	0.2594	0.4555	0.2964	0.1487
Walton	LOW	1.3786	0.1555	0.0843	0.0404	1.2526	0.8424	0.4830	0.8424	0.5638	0.2498
	HIGH	4.0291	0.7198	0.2471	0.2437	4.4837	3.7873	2.9919	3.7873	3.2046	2.3031
	WGHTD AVE	2.6106	0.3882	0.1831	0.1191	2.6454	2.0028	1.4740	2.0028	1.5831	1.1079
Washington	LOW	1.1909	0.1284	0.0732	0.0307	1.0326	0.6435	0.3487	0.6435	0.4136	0.1669
	HIGH	1.3566	0.1528	0.0851	0.0390	1.2135	0.7976	0.4588	0.7976	0.5368	0.2376
	WGHTD AVE	1.2185	0.1324	0.0754	0.0319	1.0593	0.6625	0.3615	0.6625	0.4277	0.1753
STATEWIDE	LOW	0.4148	0.0407	0.0242	0.0086	0.3305	0.1739	0.0840	0.1739	0.1006	0.0374
	HIGH	14.2503	2.4902	0.4099	0.9303	16.9851	15.9349	13.6246	15.9349	14.3705	10.9867
	WGHTD AVE	4.1846	0.3293	0.1536	0.1032	4.0987	3.4773	2.4478	3.4773	2.7656	1.4252

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - MOBILE HOMES

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.8715	0.0918	0.0516	0.0165	0.4044	0.2392	0.0866	0.4044	0.2392	0.0866
	HIGH	5.9979	0.6738	0.0791	0.2626	6.0882	5.4190	3.9223	6.0882	5.4190	3.9223
	WGHTD AVE	3.0681	0.2790	0.0584	0.0982	2.8215	2.4316	1.6225	2.8215	2.4316	1.6225
Baker	LOW	1.4294	0.1080	0.0344	0.0321	1.1664	0.9572	0.5638	1.1664	0.9572	0.5638
	HIGH	2.1073	0.1677	0.0417	0.0556	1.8527	1.5626	0.9760	1.8527	1.5626	0.9760
	WGHTD AVE	1.8950	0.1497	0.0399	0.0482	1.6326	1.3678	0.8442	1.6326	1.3678	0.8442
Bay	LOW	3.8462	0.4130	0.0804	0.1448	3.6129	3.1469	2.2113	3.6129	3.1469	2.2113
	HIGH	14.8360	3.0221	0.1824	1.1640	17.6853	16.7030	14.4294	17.6853	16.7030	14.4294
	WGHTD AVE	7.4021	1.1478	0.1246	0.4434	8.0045	7.3326	5.8898	8.0045	7.3326	5.8898
Bradford	LOW	1.9251	0.1455	0.0401	0.0462	1.6520	1.3801	0.8364	1.6520	1.3801	0.8364
	HIGH	3.3937	0.3340	0.0624	0.1204	3.1927	2.7773	1.9079	3.1927	2.7773	1.9079
	WGHTD AVE	2.4039	0.1956	0.0477	0.0660	2.1334	1.8088	1.1456	2.1334	1.8088	1.1456
Brevard	LOW	7.6019	1.0698	0.1069	0.4291	8.1706	7.4585	5.8484	8.1706	7.4585	5.8484
	HIGH	27.5999	6.6806	0.3047	2.6804	35.2841	33.9581	30.7758	35.2841	33.9581	30.7758
	WGHTD AVE	14.0140	2.5072	0.1540	1.0408	16.3983	15.3739	12.9202	16.3983	15.3739	12.9202
Broward	LOW	2.3421	0.2540	0.1784	0.0588	1.4042	0.9424	0.4386	1.4042	0.9424	0.4386
	HIGH	41.6219	10.1162	0.3023	4.2418	54.3352	52.5496	47.9043	54.3352	52.5496	47.9043
	WGHTD AVE	21.9810	4.4503	0.2114	1.8307	26.8496	25.5480	22.3537	26.8496	25.5480	22.3537
Calhoun	LOW	2.5254	0.2426	0.0594	0.0783	2.1406	1.7965	1.1801	2.1406	1.7965	1.1801
	HIGH	3.2480	0.3111	0.0694	0.1060	2.9643	2.5472	1.7075	2.9643	2.5472	1.7075
	WGHTD AVE	2.9736	0.2771	0.0642	0.0926	2.6679	2.2776	1.5032	2.6679	2.2776	1.5032
Charlotte	LOW	7.4383	1.0574	0.1170	0.4202	7.7932	7.0717	5.5875	7.7932	7.0717	5.5875
	HIGH	25.0409	5.1441	0.2114	2.1385	30.9710	29.5761	25.9974	30.9710	29.5761	25.9974
	WGHTD AVE	10.7789	1.7137	0.1537	0.6956	12.0420	11.1585	9.1529	12.0420	11.1585	9.1529
Citrus	LOW	4.2082	0.4289	0.0740	0.1618	4.0483	3.5543	2.5093	4.0483	3.5543	2.5093
	HIGH	7.1658	0.8495	0.0934	0.3436	7.5278	6.8159	5.1363	7.5278	6.8159	5.1363
	WGHTD AVE	5.3216	0.6203	0.0867	0.2417	5.3736	4.8035	3.5610	5.3736	4.8035	3.5610
Clay	LOW	1.9673	0.1942	0.0519	0.0626	1.6603	1.3996	0.9285	1.6603	1.3996	0.9285
	HIGH	4.7849	0.4445	0.0629	0.1698	4.7246	4.1659	2.8752	4.7246	4.1659	2.8752
	WGHTD AVE	2.7101	0.2525	0.0554	0.0879	2.4627	2.1142	1.4114	2.4627	2.1142	1.4114
Collier	LOW	5.7251	0.8418	0.1534	0.3126	5.6318	4.9789	3.8612	5.6318	4.9789	3.8612
	HIGH	35.8831	8.4183	0.2899	3.4579	46.1785	44.5338	40.2909	46.1785	44.5338	40.2909
	WGHTD AVE	17.6532	3.0536	0.1932	1.2640	20.6360	19.3934	16.3493	20.6360	19.3934	16.3493
Columbia	LOW	1.7829	0.1317	0.0391	0.0401	1.4884	1.2321	0.7311	1.4884	1.2321	0.7311
	HIGH	2.3042	0.1762	0.0484	0.0588	2.0505	1.7339	1.0704	2.0505	1.7339	1.0704
	WGHTD AVE	2.0927	0.1683	0.0443	0.0544	1.8100	1.5196	0.9445	1.8100	1.5196	0.9445
De Soto	LOW	5.1680	0.6701	0.1314	0.2520	5.0324	4.4516	3.3594	5.0324	4.4516	3.3594
	HIGH	10.3557	1.4029	0.1447	0.5795	11.2354	10.3157	8.1401	11.2354	10.3157	8.1401
	WGHTD AVE	8.1219	1.0937	0.1334	0.4404	8.5662	7.7897	6.0867	8.5662	7.7897	6.0867
Dixie	LOW	3.2307	0.3337	0.0593	0.1197	3.0435	2.6526	1.8524	3.0435	2.6526	1.8524
	HIGH	8.4969	1.4001	0.1023	0.5502	9.6012	8.9033	7.2704	9.6012	8.9033	7.2704
	WGHTD AVE	3.4484	0.3651	0.0650	0.1305	3.2945	2.8882	2.0423	3.2945	2.8882	2.0423

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - MOBILE HOMES

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Duval	LOW	0.6621	0.0687	0.0364	0.0123	0.2960	0.1743	0.0660	0.2960	0.1743	0.0660
	HIGH	7.4962	1.3929	0.1079	0.5432	8.6115	8.0397	6.7723	8.6115	8.0397	6.7723
	WGHTD AVE	2.7315	0.2936	0.0500	0.1025	2.5870	2.2603	1.5887	2.5870	2.2603	1.5887
Escambia	LOW	2.0617	0.2299	0.0946	0.0487	1.2826	0.8720	0.3915	1.2826	0.8720	0.3915
	HIGH	17.9180	3.7359	0.2165	1.4387	21.4358	20.2613	17.2730	21.4358	20.2613	17.2730
	WGHTD AVE	9.4066	1.6191	0.1388	0.6085	10.5961	9.8534	8.2011	10.5961	9.8534	8.2011
Flagler	LOW	4.2903	0.5166	0.0794	0.1980	4.2764	3.8083	2.8315	4.2764	3.8083	2.8315
	HIGH	16.4436	3.5237	0.1571	1.4193	20.3189	19.3623	17.0144	20.3189	19.3623	17.0144
	WGHTD AVE	7.0701	1.2996	0.1097	0.5104	8.0185	7.4323	6.1797	8.0185	7.4323	6.1797
Franklin	LOW	6.8536	1.1827	0.1284	0.4414	7.4273	6.8004	5.5611	7.4273	6.8004	5.5611
	HIGH	16.0652	3.6108	0.2408	1.3846	19.6849	18.6844	16.4947	19.6849	18.6844	16.4947
	WGHTD AVE	10.6176	2.0686	0.1663	0.8208	12.3685	11.5878	9.9055	12.3685	11.5878	9.9055
Gadsen	LOW	1.4553	0.1027	0.0327	0.0300	1.1953	0.9802	0.5638	1.1953	0.9802	0.5638
	HIGH	2.8545	0.2270	0.0457	0.0784	2.6290	2.2509	1.4308	2.6290	2.2509	1.4308
	WGHTD AVE	1.8938	0.1409	0.0382	0.0444	1.6261	1.3586	0.8207	1.6261	1.3586	0.8207
Gilchrist	LOW	2.7691	0.2674	0.0586	0.0926	2.5270	2.1758	1.4703	2.5270	2.1758	1.4703
	HIGH	3.1240	0.3024	0.0625	0.1064	2.8933	2.5039	1.7062	2.8933	2.5039	1.7062
	WGHTD AVE	3.0086	0.2909	0.0611	0.1018	2.7732	2.3963	1.6288	2.7732	2.3963	1.6288
Glades	LOW	11.9071	1.8681	0.1666	0.7634	13.1940	12.1909	9.9449	13.1940	12.1909	9.9449
	HIGH	15.0285	2.3154	0.1746	0.9656	16.9710	15.7755	12.8879	16.9710	15.7755	12.8879
	WGHTD AVE	11.9989	1.8813	0.1743	0.7688	13.3046	12.2959	10.0311	13.3046	12.2959	10.0311
Gulf	LOW	4.6644	0.5126	0.0823	0.1874	4.5622	4.0268	2.8853	4.5622	4.0268	2.8853
	HIGH	8.1241	1.1967	0.1224	0.4572	8.7427	7.9865	6.3027	8.7427	7.9865	6.3027
	WGHTD AVE	5.8330	0.7294	0.0998	0.2807	5.9691	5.3594	4.0355	5.9691	5.3594	4.0355
Hamilton	LOW	1.2399	0.0904	0.0286	0.0263	1.0072	0.8231	0.4744	1.0072	0.8231	0.4744
	HIGH	1.3430	0.0952	0.0306	0.0278	1.0959	0.8931	0.5002	1.0959	0.8931	0.5002
	WGHTD AVE	1.2799	0.0926	0.0296	0.0269	1.0380	0.8476	0.4868	1.0380	0.8476	0.4868
Hardee	LOW	7.1633	0.8542	0.1114	0.3428	7.4319	6.6960	5.0493	7.4319	6.6960	5.0493
	HIGH	7.3476	0.9586	0.1269	0.3857	7.6681	6.9554	5.3890	7.6681	6.9554	5.3890
	WGHTD AVE	7.2874	0.9078	0.1194	0.3639	7.5362	6.8059	5.2010	7.5362	6.8059	5.2010
Hendry	LOW	9.4512	1.2962	0.1503	0.5255	10.0479	9.1669	7.2255	10.0479	9.1669	7.2255
	HIGH	13.9515	2.5180	0.1923	1.0274	16.1336	15.0929	12.7430	16.1336	15.0929	12.7430
	WGHTD AVE	12.6120	2.0369	0.1731	0.8395	14.1894	13.1721	10.8492	14.1894	13.1721	10.8492
Hernando	LOW	1.3164	0.1406	0.0742	0.0274	0.6888	0.4276	0.1612	0.6888	0.4276	0.1612
	HIGH	8.4451	1.1994	0.1078	0.4890	9.2079	8.4513	6.6933	9.2079	8.4513	6.6933
	WGHTD AVE	6.4434	0.7526	0.0862	0.3047	6.6887	6.0276	4.5068	6.6887	6.0276	4.5068
Highlands	LOW	6.7494	0.7655	0.1118	0.3013	6.7790	6.0577	4.4910	6.7790	6.0577	4.4910
	HIGH	12.6732	1.7946	0.1539	0.7414	13.9153	12.8152	10.2111	13.9153	12.8152	10.2111
	WGHTD AVE	8.7026	1.0185	0.1199	0.4113	9.0397	8.1761	6.1813	9.0397	8.1761	6.1813
Hillsborough	LOW	1.2737	0.1353	0.0891	0.0262	0.6684	0.4125	0.1488	0.6684	0.4125	0.1488
	HIGH	13.8069	2.2686	0.1255	0.9582	16.0618	15.0718	12.5637	16.0618	15.0718	12.5637
	WGHTD AVE	8.1167	1.1530	0.1110	0.4718	8.8227	8.0968	6.4320	8.8227	8.0968	6.4320
Holmes	LOW	3.7102	0.4010	0.0638	0.1417	3.5441	3.1025	2.1904	3.5441	3.1025	2.1904
	HIGH	5.6755	0.5422	0.0795	0.2069	5.7382	5.0970	3.5654	5.7382	5.0970	3.5654
	WGHTD AVE	3.7446	0.4088	0.0767	0.1449	3.5580	3.1139	2.2119	3.5580	3.1139	2.2119

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - MOBILE HOMES

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Indian River	LOW	9.4213	1.2994	0.1242	0.5259	10.3354	9.4296	7.3313	10.3354	9.4296	7.3313
	HIGH	29.2047	6.8440	0.2860	2.7582	37.1760	35.6993	32.0806	37.1760	35.6993	32.0806
	WGHTD AVE	12.6111	1.9852	0.1473	0.8150	14.1929	13.1568	10.7074	14.1929	13.1568	10.7074
Jackson	LOW	2.1977	0.1737	0.0463	0.0548	1.9021	1.5950	0.9808	1.9021	1.5950	0.9808
	HIGH	4.0202	0.4409	0.0749	0.1596	3.9102	3.4421	2.4543	3.9102	3.4421	2.4543
	WGHTD AVE	2.8677	0.2531	0.0571	0.0847	2.5864	2.2093	1.4395	2.5864	2.2093	1.4395
Jefferson	LOW	1.4765	0.1053	0.0310	0.0318	1.2373	1.0229	0.5998	1.2373	1.0229	0.5998
	HIGH	2.3488	0.1804	0.0355	0.0630	2.1750	1.8624	1.1759	2.1750	1.8624	1.1759
	WGHTD AVE	1.5029	0.1088	0.0314	0.0332	1.2656	1.0488	0.6197	1.2656	1.0488	0.6197
Lafayette	LOW	2.1510	0.1915	0.0375	0.0639	1.9040	1.6188	1.0491	1.9040	1.6188	1.0491
	HIGH	2.4456	0.2117	0.0453	0.0754	2.3005	1.9854	1.2953	2.3005	1.9854	1.2953
	WGHTD AVE	2.1536	0.1917	0.0453	0.0640	1.9079	1.6225	1.0515	1.9079	1.6225	1.0515
Lake	LOW	1.2884	0.1360	0.0721	0.0260	0.6551	0.3998	0.1434	0.6551	0.3998	0.1434
	HIGH	8.9560	1.2443	0.1175	0.5100	9.6149	8.8069	6.9775	9.6149	8.8069	6.9775
	WGHTD AVE	6.5904	0.7308	0.0895	0.2939	6.7678	6.0788	4.4909	6.7678	6.0788	4.4909
Lee	LOW	8.0163	1.2158	0.1474	0.4859	8.5595	7.8053	6.3524	8.5595	7.8053	6.3524
	HIGH	27.2703	6.1356	0.2638	2.5139	34.4424	33.0471	29.5834	34.4424	33.0471	29.5834
	WGHTD AVE	15.8771	2.5193	0.1680	1.0523	18.1706	16.9811	14.0487	18.1706	16.9811	14.0487
Leon	LOW	0.6713	0.0703	0.0371	0.0123	0.2989	0.1750	0.0648	0.2989	0.1750	0.0648
	HIGH	4.5594	0.4414	0.0543	0.1690	4.5915	4.0602	2.8160	4.5915	4.0602	2.8160
	WGHTD AVE	2.3205	0.1962	0.0421	0.0673	2.1062	1.7989	1.1597	2.1062	1.7989	1.1597
Levy	LOW	3.2868	0.3103	0.0605	0.1101	3.0653	2.6565	1.8024	3.0653	2.6565	1.8024
	HIGH	8.0167	1.4151	0.1398	0.5479	8.9771	8.3113	6.9015	8.9771	8.3113	6.9015
	WGHTD AVE	3.8094	0.4103	0.0753	0.1505	3.6460	3.1993	2.2787	3.6460	3.1993	2.2787
Liberty	LOW	2.4209	0.2011	0.0517	0.0648	2.1112	1.7805	1.1231	2.1112	1.7805	1.1231
	HIGH	3.1735	0.2841	0.0555	0.0997	2.9508	2.5486	1.6930	2.9508	2.5486	1.6930
	WGHTD AVE	2.5383	0.2175	0.0525	0.0720	2.2439	1.9039	1.2224	2.2439	1.9039	1.2224
Madison	LOW	1.0942	0.0722	0.0242	0.0203	0.8856	0.7175	0.3934	0.8856	0.7175	0.3934
	HIGH	1.6230	0.1189	0.0325	0.0378	1.4037	1.1726	0.7007	1.4037	1.1726	0.7007
	WGHTD AVE	1.3960	0.1045	0.0308	0.0316	1.1598	0.9565	0.5647	1.1598	0.9565	0.5647
Manatee	LOW	1.5338	0.1649	0.1175	0.0320	0.8478	0.5221	0.1791	0.8478	0.5221	0.1791
	HIGH	26.0117	5.7437	0.2175	2.3749	32.8783	31.5509	28.1270	32.8783	31.5509	28.1270
	WGHTD AVE	11.5741	1.8512	0.1268	0.7712	13.2303	12.3550	10.2228	13.2303	12.3550	10.2228
Marion	LOW	3.8673	0.3708	0.0651	0.1376	3.6806	3.2125	2.2135	3.6806	3.2125	2.2135
	HIGH	6.1297	0.6587	0.0910	0.2613	6.2110	5.5564	4.0476	6.2110	5.5564	4.0476
	WGHTD AVE	5.0115	0.5146	0.0785	0.1992	4.9526	4.3861	3.1313	4.9526	4.3861	3.1313
Martin	LOW	11.9829	1.5503	0.1321	0.6553	12.9686	11.8605	9.1986	12.9686	11.8605	9.1986
	HIGH	31.0360	6.5816	0.2450	2.7681	38.7537	37.0490	32.6819	38.7537	37.0490	32.6819
	WGHTD AVE	19.8917	3.7076	0.1931	1.5075	23.6652	22.3308	19.0628	23.6652	22.3308	19.0628
Miami-Dade	LOW	2.6265	0.2878	0.1786	0.0712	1.6979	1.1868	0.5915	1.6979	1.1868	0.5915
	HIGH	45.7127	11.7452	0.3654	4.8810	60.6160	58.8529	54.3276	60.6160	58.8529	54.3276
	WGHTD AVE	17.4490	3.4486	0.2056	1.4245	21.0781	19.9339	17.2160	21.0781	19.9339	17.2160
Monroe	LOW	7.7292	1.2423	0.3014	0.5142	7.9909	7.1748	5.8648	7.9909	7.1748	5.8648
	HIGH	58.9939	16.0430	0.4099	6.7637	80.1870	78.3031	73.2640	80.1870	78.3031	73.2640
	WGHTD AVE	44.3169	11.3424	0.3448	4.8305	58.9107	57.2440	52.9411	58.9107	57.2440	52.9411
Nassau	LOW	1.3671	0.1096	0.0305	0.0342	1.1511	0.9552	0.5798	1.1511	0.9552	0.5798
	HIGH	8.2761	1.3539	0.0794	0.5397	9.4686	8.7932	7.1536	9.4686	8.7932	7.1536
	WGHTD AVE	2.4040	0.2673	0.0458	0.0971	2.2910	2.0039	1.4209	2.2910	2.0039	1.4209

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - MOBILE HOMES

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Okaloosa	LOW	4.9152	0.6116	0.0915	0.2274	4.9822	4.4690	3.3862	4.9822	4.4690	3.3862
	HIGH	19.3739	4.3556	0.2205	1.6924	24.1464	23.0470	20.4254	24.1464	23.0470	20.4254
	WGHTD AVE	7.6490	1.2584	0.1184	0.5067	8.4991	7.8441	6.3969	8.4991	7.8441	6.3969
Okeechobee	LOW	8.9992	1.1621	0.1373	0.4656	9.4111	8.5217	6.5455	9.4111	8.5217	6.5455
	HIGH	12.2320	1.7167	0.1557	0.7028	13.3209	12.2270	9.6751	13.3209	12.2270	9.6751
	WGHTD AVE	11.5534	1.6057	0.1517	0.6585	12.5178	11.4659	9.0322	12.5178	11.4659	9.0322
Orange	LOW	1.4309	0.1510	0.0818	0.0291	0.7401	0.4554	0.1648	0.7401	0.4554	0.1648
	HIGH	11.2680	1.5147	0.1182	0.6340	12.3700	11.3918	8.9906	12.3700	11.3918	8.9906
	WGHTD AVE	6.5538	0.7130	0.0921	0.2866	6.6862	5.9896	4.3953	6.6862	5.9896	4.3953
Osceola	LOW	6.4224	0.7442	0.0942	0.2975	6.5146	5.8410	4.3893	6.5146	5.8410	4.3893
	HIGH	10.2178	1.3618	0.1377	0.5541	10.9705	10.0112	7.6454	10.9705	10.0112	7.6454
	WGHTD AVE	7.4737	0.8815	0.1072	0.3559	7.7402	6.9858	5.2650	7.7402	6.9858	5.2650
Palm Beach	LOW	2.3552	0.2522	0.1676	0.0565	1.3813	0.9129	0.4065	1.3813	0.9129	0.4065
	HIGH	47.6766	11.5486	0.3495	4.8230	62.1739	60.1183	54.7399	62.1739	60.1183	54.7399
	WGHTD AVE	18.9418	3.6295	0.2081	1.5381	22.6532	21.3976	18.4055	22.6532	21.3976	18.4055
Pasco	LOW	2.0249	0.2429	0.0907	0.0696	1.4785	1.1491	0.7327	1.4785	1.1491	0.7327
	HIGH	10.4646	1.4635	0.1093	0.6102	11.6255	10.7334	8.5292	11.6255	10.7334	8.5292
	WGHTD AVE	7.0509	0.8916	0.0965	0.3578	7.4324	6.7456	5.1734	7.4324	6.7456	5.1734
Pinellas	LOW	1.3655	0.1470	0.0971	0.0287	0.7168	0.4389	0.1604	0.7168	0.4389	0.1604
	HIGH	16.1360	3.1485	0.1689	1.2978	19.4732	18.4455	15.9302	19.4732	18.4455	15.9302
	WGHTD AVE	10.1126	1.4734	0.1053	0.6077	11.2894	10.4502	8.4025	11.2894	10.4502	8.4025
Polk	LOW	1.5389	0.1635	0.0984	0.0319	0.8176	0.5076	0.1851	0.8176	0.5076	0.1851
	HIGH	11.5411	1.5067	0.1268	0.6323	12.6374	11.6197	9.1044	12.6374	11.6197	9.1044
	WGHTD AVE	7.8599	0.9997	0.1108	0.4066	8.2936	7.5332	5.8014	8.2936	7.5332	5.8014
Putnam	LOW	1.0270	0.1091	0.0601	0.0201	0.5008	0.3015	0.1091	0.5008	0.3015	0.1091
	HIGH	5.5050	0.6899	0.0858	0.2693	5.6762	5.1129	3.8756	5.6762	5.1129	3.8756
	WGHTD AVE	4.0409	0.4421	0.0717	0.1647	3.9489	3.4871	2.5074	3.9489	3.4871	2.5074
Santa Rosa	LOW	6.2592	0.8286	0.1059	0.3156	6.5194	5.9045	4.5606	6.5194	5.9045	4.5606
	HIGH	30.2653	7.7028	0.2796	2.9661	39.4733	38.1198	34.7635	39.4733	38.1198	34.7635
	WGHTD AVE	9.5164	1.6786	0.1432	0.6676	10.8320	10.0794	8.3999	10.8320	10.0794	8.3999
Sarasota	LOW	9.3302	1.4867	0.1283	0.6054	10.3288	9.5441	7.8298	10.3288	9.5441	7.8298
	HIGH	19.7274	3.5749	0.2039	1.4921	23.5653	22.2907	19.0207	23.5653	22.2907	19.0207
	WGHTD AVE	14.3781	2.3538	0.1439	0.9856	16.6535	15.6143	13.0159	16.6535	15.6143	13.0159
Seminole	LOW	5.4097	0.5921	0.0866	0.2304	5.3700	4.7725	3.4785	5.3700	4.7725	3.4785
	HIGH	8.9874	1.0533	0.1011	0.4348	9.5724	8.7023	6.5754	9.5724	8.7023	6.5754
	WGHTD AVE	7.1193	0.7995	0.0938	0.3218	7.3484	6.6129	4.9065	7.3484	6.6129	4.9065
St. Johns	LOW	2.4931	0.2827	0.0590	0.0968	2.2300	1.9143	1.3471	2.2300	1.9143	1.3471
	HIGH	12.8687	2.7521	0.1519	1.0862	15.6898	14.8790	13.0088	15.6898	14.8790	13.0088
	WGHTD AVE	4.9578	0.7556	0.0834	0.2644	5.2367	4.7695	3.7923	5.2367	4.7695	3.7923
St. Lucie	LOW	3.9386	0.4837	0.1373	0.1680	3.4173	2.8937	2.0620	3.4173	2.8937	2.0620
	HIGH	27.9160	6.4744	0.3113	2.6740	35.3676	33.9282	30.5186	35.3676	33.9282	30.5186
	WGHTD AVE	15.4642	2.5868	0.1754	1.0913	17.7617	16.5828	13.7846	17.7617	16.5828	13.7846
Sumter	LOW	4.4458	0.4853	0.0873	0.1838	4.2910	3.7805	2.7292	4.2910	3.7805	2.7292
	HIGH	7.2390	0.8884	0.1033	0.3598	7.5965	6.8781	5.2214	7.5965	6.8781	5.2214
	WGHTD AVE	6.4223	0.7441	0.0925	0.2977	6.5981	5.9306	4.4207	6.5981	5.9306	4.4207

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - MOBILE HOMES

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE APPURTENANT STRUCTURE	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Suwanee	LOW	1.5228	0.1148	0.0335	0.0348	1.2657	1.0435	0.6161	1.2657	1.0435	0.6161
	HIGH	2.3678	0.2128	0.0505	0.0715	2.1093	1.7962	1.1725	2.1093	1.7962	1.1725
	WGHTD AVE	1.7582	0.1403	0.0379	0.0442	1.4974	1.2491	0.7645	1.4974	1.2491	0.7645
Taylor	LOW	1.3890	0.1162	0.0353	0.0351	1.1349	0.9368	0.5736	1.1349	0.9368	0.5736
	HIGH	3.4770	0.3982	0.0642	0.1462	3.3961	2.9996	2.1694	3.3961	2.9996	2.1694
	WGHTD AVE	2.3298	0.2251	0.0484	0.0772	2.1372	1.8449	1.2529	2.1372	1.8449	1.2529
Union	LOW	0.8203	0.0859	0.0480	0.0154	0.3755	0.2217	0.0812	0.3755	0.2217	0.0812
	HIGH	3.0547	0.2527	0.0522	0.0895	2.8303	2.4336	1.5774	2.8303	2.4336	1.5774
	WGHTD AVE	2.4228	0.2025	0.0485	0.0680	2.1506	1.8256	1.1652	2.1506	1.8256	1.1652
Volusia	LOW	1.2918	0.1371	0.0753	0.0263	0.6614	0.4051	0.1471	0.6614	0.4051	0.1471
	HIGH	26.4656	6.0286	0.2049	2.4418	33.6495	32.2955	28.8228	33.6495	32.2955	28.8228
	WGHTD AVE	8.7916	1.3934	0.1100	0.5488	9.7967	9.0626	7.3665	9.7967	9.0626	7.3665
Wakulla	LOW	2.6101	0.2377	0.0493	0.0821	2.3944	2.0575	1.3618	2.3944	2.0575	1.3618
	HIGH	8.1394	1.3695	0.1105	0.5296	9.1256	8.4395	6.8969	9.1256	8.4395	6.8969
	WGHTD AVE	2.9183	0.2926	0.0523	0.1058	2.7588	2.3999	1.6496	2.7588	2.3999	1.6496
Walton	LOW	4.1257	0.5147	0.0843	0.1842	3.9993	3.5310	2.6157	3.9993	3.5310	2.6157
	HIGH	22.6775	4.8327	0.2471	1.8838	28.1124	26.7885	23.4177	28.1124	26.7885	23.4177
	WGHTD AVE	6.9641	1.1390	0.1307	0.4522	7.6211	6.9978	5.6850	7.6211	6.9978	5.6850
Washington	LOW	3.5912	0.3651	0.0732	0.1271	3.3493	2.9077	2.0089	3.3493	2.9077	2.0089
	HIGH	4.3834	0.4815	0.0851	0.1727	4.2134	3.6985	2.6197	4.2134	3.6985	2.6197
	WGHTD AVE	3.7680	0.3949	0.0758	0.1387	3.5489	3.0929	2.1623	3.5489	3.0929	2.1623
STATEWIDE	LOW	0.6621	0.0687	0.0242	0.0123	0.2960	0.1743	0.0648	0.2960	0.1743	0.0648
	HIGH	58.9939	16.0430	0.4099	6.7637	80.1870	78.3031	73.2640	80.1870	78.3031	73.2640
	WGHTD AVE	8.9704	1.3547	0.1150	0.5198	9.9224	9.1570	7.3800	9.9224	9.1570	7.3800

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.1784	0.0391	0.0467	0.0421	0.0404	0.0504	0.0467	0.0414
	HIGH	0.3060	0.0813	0.1371	0.1236	0.1122	0.1472	0.1371	0.1201
	WGHTD AVE	0.1990	0.0462	0.0607	0.0544	0.0512	0.0658	0.0607	0.0531
Baker	LOW	0.1291	0.0295	0.0376	0.0337	0.0319	0.0408	0.0376	0.0330
	HIGH	0.1524	0.0351	0.0456	0.0409	0.0385	0.0494	0.0456	0.0399
	WGHTD AVE	0.1472	0.0343	0.0437	0.0392	0.0370	0.0473	0.0437	0.0383
Bay	LOW	0.3317	0.0816	0.1231	0.1098	0.1010	0.1334	0.1231	0.1067
	HIGH	1.1682	0.3680	1.0167	0.9520	0.8569	1.0589	1.0167	0.9295
	WGHTD AVE	0.6336	0.1678	0.4038	0.3721	0.3359	0.4259	0.4038	0.3625
Bradford	LOW	0.1569	0.0369	0.0466	0.0419	0.0405	0.0505	0.0466	0.0412
	HIGH	0.2442	0.0604	0.0881	0.0787	0.0728	0.0954	0.0881	0.0767
	WGHTD AVE	0.1805	0.0426	0.0561	0.0502	0.0471	0.0608	0.0561	0.0490
Brevard	LOW	0.2677	0.0598	0.0715	0.0654	0.0626	0.0765	0.0715	0.0643
	HIGH	3.6042	1.2611	4.0592	3.8753	3.5232	4.1689	4.0592	3.8013
	WGHTD AVE	0.6978	0.1931	0.4913	0.4577	0.4141	0.5141	0.4913	0.4469
Broward	LOW	0.4961	0.1347	0.2108	0.1914	0.1759	0.2253	0.2108	0.1865
	HIGH	5.0976	1.8428	6.0451	5.8126	5.3385	6.1812	6.0451	5.7163
	WGHTD AVE	2.4246	0.5888	2.5758	2.4519	2.2299	2.6517	2.5758	2.4039
Calhoun	LOW	0.2257	0.0526	0.0709	0.0632	0.0591	0.0770	0.0709	0.0616
	HIGH	0.2545	0.0603	0.0839	0.0748	0.0696	0.0911	0.0839	0.0729
	WGHTD AVE	0.2333	0.0552	0.0746	0.0665	0.0621	0.0810	0.0746	0.0648
Charlotte	LOW	0.4614	0.1275	0.2137	0.1940	0.1767	0.2282	0.2137	0.1889
	HIGH	1.1803	0.3971	1.0095	0.9406	0.8420	1.0547	1.0095	0.9168
	WGHTD AVE	0.7242	0.2073	0.4796	0.4415	0.3967	0.5059	0.4796	0.4297
Citrus	LOW	0.2429	0.0591	0.0805	0.0733	0.0689	0.0863	0.0805	0.0717
	HIGH	0.3587	0.0995	0.1653	0.1501	0.1369	0.1765	0.1653	0.1462
	WGHTD AVE	0.3091	0.0820	0.1253	0.1138	0.1049	0.1341	0.1253	0.1110
Clay	LOW	0.1764	0.0413	0.0566	0.0511	0.0478	0.0610	0.0566	0.0499
	HIGH	0.2317	0.0574	0.0834	0.0746	0.0689	0.0902	0.0834	0.0726
	WGHTD AVE	0.2005	0.0487	0.0707	0.0636	0.0589	0.0761	0.0707	0.0620
Collier	LOW	0.5317	0.1452	0.2315	0.2091	0.1923	0.2486	0.2315	0.2037
	HIGH	1.5050	0.5259	1.3223	1.2314	1.1022	1.3819	1.3223	1.2001
	WGHTD AVE	0.9220	0.2682	0.6428	0.5935	0.5343	0.6767	0.6428	0.5782
Columbia	LOW	0.1382	0.0296	0.0344	0.0312	0.0302	0.0372	0.0344	0.0307
	HIGH	0.1713	0.0387	0.0489	0.0439	0.0417	0.0530	0.0489	0.0430
	WGHTD AVE	0.1523	0.0341	0.0433	0.0389	0.0369	0.0469	0.0433	0.0381
De Soto	LOW	0.4384	0.1122	0.1555	0.1390	0.1308	0.1687	0.1555	0.1357
	HIGH	0.5521	0.1595	0.2798	0.2536	0.2307	0.2991	0.2798	0.2468
	WGHTD AVE	0.5087	0.1452	0.2488	0.2253	0.2050	0.2662	0.2488	0.2192
Dixie	LOW	0.2381	0.0601	0.0906	0.0811	0.0744	0.0980	0.0906	0.0788
	HIGH	0.5950	0.1882	0.4429	0.4067	0.3606	0.4673	0.4429	0.3949
	WGHTD AVE	0.2667	0.0671	0.1170	0.1052	0.0957	0.1259	0.1170	0.1022

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Duval	LOW	0.1310	0.0269	0.0300	0.0277	0.0270	0.0319	0.0300	0.0273
	HIGH	0.7502	0.2279	0.6485	0.6164	0.5709	0.6701	0.6485	0.6058
	WGHTD AVE	0.2168	0.0507	0.0881	0.0806	0.0754	0.0938	0.0881	0.0789
Escambia	LOW	0.3597	0.0928	0.1375	0.1222	0.1119	0.1494	0.1375	0.1186
	HIGH	1.6202	0.5308	1.5439	1.4492	1.3040	1.6046	1.5439	1.4153
	WGHTD AVE	0.7422	0.2096	0.5056	0.4639	0.4163	0.5346	0.5056	0.4512
Flagler	LOW	0.2586	0.0633	0.0920	0.0840	0.0784	0.0983	0.0920	0.0821
	HIGH	1.1204	0.3692	1.0592	1.0027	0.9119	1.0952	1.0592	0.9822
	WGHTD AVE	0.4923	0.1184	0.3308	0.3090	0.2809	0.3457	0.3308	0.3020
Franklin	LOW	0.7847	0.2411	0.5906	0.5464	0.4891	0.6204	0.5906	0.5320
	HIGH	2.2063	0.7199	2.2608	2.1496	1.9573	2.3299	2.2608	2.1076
	WGHTD AVE	1.5593	0.3686	1.4574	1.3790	1.2525	1.5074	1.4574	1.3504
Gadsen	LOW	0.1203	0.0264	0.0322	0.0290	0.0276	0.0348	0.0322	0.0284
	HIGH	0.1691	0.0382	0.0496	0.0442	0.0416	0.0539	0.0496	0.0432
	WGHTD AVE	0.1502	0.0330	0.0427	0.0381	0.0361	0.0463	0.0427	0.0373
Gilchrist	LOW	0.2257	0.0564	0.0843	0.0753	0.0692	0.0912	0.0843	0.0732
	HIGH	0.2398	0.0591	0.0857	0.0764	0.0706	0.0930	0.0857	0.0743
	WGHTD AVE	0.2375	0.0585	0.0855	0.0762	0.0704	0.0926	0.0855	0.0741
Glades	LOW	0.8502	0.2738	0.5787	0.5298	0.4731	0.6125	0.5787	0.5147
	HIGH	0.8502	0.2738	0.5787	0.5298	0.4731	0.6125	0.5787	0.5147
	WGHTD AVE	0.8502	0.2738	0.5787	0.5298	0.4731	0.6125	0.5787	0.5147
Gulf	LOW	0.3231	0.0811	0.1249	0.1113	0.1020	0.1353	0.1249	0.1082
	HIGH	0.5536	0.1546	0.3219	0.2948	0.2668	0.3412	0.3219	0.2871
	WGHTD AVE	0.5032	0.1295	0.2752	0.2514	0.2278	0.2925	0.2752	0.2447
Hamilton	LOW	0.1035	0.0223	0.0262	0.0238	0.0229	0.0282	0.0262	0.0234
	HIGH	0.1146	0.0258	0.0327	0.0294	0.0279	0.0354	0.0327	0.0288
	WGHTD AVE	0.1120	0.0248	0.0312	0.0281	0.0267	0.0337	0.0312	0.0275
Hardee	LOW	0.4168	0.1144	0.1803	0.1629	0.1494	0.1935	0.1803	0.1586
	HIGH	0.5175	0.1539	0.2790	0.2532	0.2286	0.2977	0.2790	0.2460
	WGHTD AVE	0.4370	0.1217	0.1991	0.1800	0.1644	0.2134	0.1991	0.1752
Hendry	LOW	0.5562	0.1579	0.2713	0.2460	0.2238	0.2899	0.2713	0.2393
	HIGH	1.1434	0.3790	0.9416	0.8779	0.7909	0.9841	0.9416	0.8566
	WGHTD AVE	0.7199	0.2144	0.4547	0.4188	0.3789	0.4799	0.4547	0.4082
Hernando	LOW	0.2907	0.0744	0.1120	0.1020	0.0944	0.1195	0.1120	0.0996
	HIGH	0.3786	0.1039	0.1813	0.1660	0.1517	0.1925	0.1813	0.1619
	WGHTD AVE	0.3092	0.0821	0.1294	0.1175	0.1082	0.1383	0.1294	0.1146
Highlands	LOW	0.3653	0.0925	0.1185	0.1062	0.1014	0.1286	0.1185	0.1040
	HIGH	0.5787	0.1603	0.2670	0.2415	0.2219	0.2863	0.2670	0.2352
	WGHTD AVE	0.4229	0.1121	0.1678	0.1518	0.1405	0.1801	0.1678	0.1481
Hillsborough	LOW	0.2836	0.0708	0.0992	0.0900	0.0839	0.1063	0.0992	0.0880
	HIGH	0.5978	0.1865	0.3855	0.3513	0.3236	0.4092	0.3855	0.3430
	WGHTD AVE	0.3502	0.0929	0.1525	0.1385	0.1273	0.1631	0.1525	0.1350
Holmes	LOW	0.2903	0.0716	0.1081	0.0962	0.0885	0.1172	0.1081	0.0935
	HIGH	0.3221	0.0839	0.1376	0.1228	0.1113	0.1488	0.1376	0.1191
	WGHTD AVE	0.2978	0.0741	0.1149	0.1024	0.0938	0.1245	0.1149	0.0995

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Indian River	LOW	0.4879	0.1362	0.2402	0.2200	0.2010	0.2550	0.2402	0.2146
	HIGH	2.8684	0.9985	3.0905	2.9388	2.6618	3.1827	3.0905	2.8792
	WGHTD AVE	1.7499	0.2877	1.6279	1.5403	1.3931	1.6828	1.6279	1.5075
Jackson	LOW	0.1783	0.0403	0.0510	0.0454	0.0430	0.0556	0.0510	0.0444
	HIGH	0.2938	0.0753	0.1220	0.1090	0.0992	0.1318	0.1220	0.1058
	WGHTD AVE	0.2142	0.0487	0.0680	0.0606	0.0566	0.0738	0.0680	0.0591
Jefferson	LOW	0.1164	0.0258	0.0312	0.0280	0.0270	0.0338	0.0312	0.0275
	HIGH	0.1243	0.0285	0.0372	0.0332	0.0311	0.0404	0.0372	0.0324
	WGHTD AVE	0.1166	0.0258	0.0319	0.0286	0.0272	0.0346	0.0319	0.0280
Lafayette	LOW	0.1735	0.0413	0.0575	0.0515	0.0480	0.0622	0.0575	0.0502
	HIGH	0.1735	0.0413	0.0575	0.0515	0.0480	0.0622	0.0575	0.0502
	WGHTD AVE	0.1735	0.0413	0.0575	0.0515	0.0480	0.0622	0.0575	0.0502
Lake	LOW	0.2018	0.0426	0.0469	0.0436	0.0427	0.0498	0.0469	0.0431
	HIGH	0.4962	0.1501	0.2954	0.2703	0.2439	0.3132	0.2954	0.2630
	WGHTD AVE	0.3050	0.0773	0.1118	0.1015	0.0945	0.1197	0.1118	0.0991
Lee	LOW	0.4311	0.1060	0.1463	0.1329	0.1248	0.1569	0.1463	0.1301
	HIGH	3.1586	1.1448	3.4028	3.2048	2.8699	3.5254	3.4028	3.1294
	WGHTD AVE	1.0074	0.2510	0.7701	0.7152	0.6415	0.8068	0.7701	0.6970
Leon	LOW	0.1192	0.0253	0.0302	0.0275	0.0264	0.0325	0.0302	0.0271
	HIGH	0.1775	0.0434	0.0637	0.0568	0.0523	0.0690	0.0637	0.0553
	WGHTD AVE	0.1443	0.0326	0.0423	0.0380	0.0358	0.0457	0.0423	0.0371
Levy	LOW	0.1963	0.0411	0.0460	0.0422	0.0412	0.0491	0.0460	0.0417
	HIGH	0.7457	0.2282	0.5513	0.5112	0.4626	0.5789	0.5513	0.4987
	WGHTD AVE	0.3539	0.0789	0.1753	0.1603	0.1467	0.1863	0.1753	0.1563
Liberty	LOW	0.1857	0.0413	0.0514	0.0460	0.0438	0.0558	0.0514	0.0450
	HIGH	0.2163	0.0526	0.0758	0.0675	0.0623	0.0823	0.0758	0.0656
	WGHTD AVE	0.1909	0.0433	0.0556	0.0497	0.0469	0.0603	0.0556	0.0486
Madison	LOW	0.1181	0.0268	0.0343	0.0307	0.0291	0.0372	0.0343	0.0301
	HIGH	0.1235	0.0289	0.0390	0.0349	0.0326	0.0422	0.0390	0.0340
	WGHTD AVE	0.1191	0.0269	0.0345	0.0309	0.0292	0.0373	0.0345	0.0302
Manatee	LOW	0.3846	0.1048	0.1705	0.1544	0.1407	0.1825	0.1705	0.1502
	HIGH	1.4938	0.5216	1.4369	1.3468	1.2165	1.4943	1.4369	1.3158
	WGHTD AVE	0.6564	0.1619	0.4445	0.4117	0.3719	0.4672	0.4445	0.4014
Marion	LOW	0.2264	0.0515	0.0625	0.0572	0.0549	0.0669	0.0625	0.0563
	HIGH	0.3805	0.1088	0.1851	0.1675	0.1520	0.1980	0.1851	0.1629
	WGHTD AVE	0.2644	0.0664	0.0957	0.0870	0.0810	0.1024	0.0957	0.0851
Martin	LOW	0.4880	0.1348	0.2251	0.2063	0.1911	0.2392	0.2251	0.2017
	HIGH	2.2109	0.8027	2.2886	2.1559	1.9301	2.3709	2.2886	2.1054
	WGHTD AVE	1.5621	0.4377	1.4584	1.3768	1.2478	1.5106	1.4584	1.3474
Miami-Dade	LOW	0.5161	0.1404	0.2179	0.1974	0.1814	0.2333	0.2179	0.1922
	HIGH	6.4895	2.3604	7.8193	7.5149	6.8870	7.9964	7.8193	7.3876
	WGHTD AVE	2.7855	0.6806	3.0188	2.8670	2.5951	3.1116	3.0188	2.8079
Monroe	LOW	3.0119	1.1460	3.3429	3.1503	2.8142	3.4607	3.3429	3.0755
	HIGH	5.1740	1.9589	6.1267	5.8537	5.3298	6.2893	6.1267	5.7432
	WGHTD AVE	3.4891	1.3440	3.9666	3.7714	3.4172	4.0850	3.9666	3.6946
Nassau	LOW	0.1154	0.0264	0.0343	0.0308	0.0291	0.0371	0.0343	0.0301
	HIGH	0.3626	0.1044	0.2299	0.2125	0.1923	0.2420	0.2299	0.2073
	WGHTD AVE	0.3292	0.0884	0.2000	0.1847	0.1673	0.2107	0.2000	0.1801

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Okaloosa	LOW	0.3351	0.0827	0.1215	0.1069	0.0988	0.1329	0.1215	0.1038
	HIGH	2.1193	0.7326	2.1535	2.0123	1.7838	2.2419	2.1535	1.9596
	WGHTD AVE	0.9603	0.2920	0.7752	0.7205	0.6468	0.8116	0.7752	0.7023
Okeechobee	LOW	0.4939	0.1347	0.2230	0.2029	0.1856	0.2380	0.2230	0.1977
	HIGH	0.6595	0.1963	0.3722	0.3394	0.3059	0.3956	0.3722	0.3300
	WGHTD AVE	0.5764	0.1696	0.2994	0.2728	0.2472	0.3187	0.2994	0.2654
Orange	LOW	0.2233	0.0476	0.0527	0.0488	0.0478	0.0560	0.0527	0.0483
	HIGH	0.3933	0.1115	0.1849	0.1672	0.1523	0.1981	0.1849	0.1626
	WGHTD AVE	0.3230	0.0804	0.1181	0.1071	0.0997	0.1266	0.1181	0.1046
Osceola	LOW	0.2635	0.0607	0.0748	0.0685	0.0654	0.0800	0.0748	0.0673
	HIGH	0.6610	0.2071	0.4148	0.3784	0.3385	0.4404	0.4148	0.3675
	WGHTD AVE	0.3096	0.0782	0.1111	0.1011	0.0942	0.1189	0.1111	0.0988
Palm Beach	LOW	0.7051	0.2140	0.4480	0.4166	0.3805	0.4701	0.4480	0.4072
	HIGH	4.6185	1.6660	5.3154	5.0942	4.6650	5.4475	5.3154	5.0051
	WGHTD AVE	3.0994	0.7524	3.3824	3.2321	2.9549	3.4739	3.3824	3.1733
Pasco	LOW	0.2920	0.0715	0.1006	0.0919	0.0859	0.1074	0.1006	0.0899
	HIGH	0.4322	0.1286	0.2426	0.2212	0.1990	0.2578	0.2426	0.2150
	WGHTD AVE	0.3470	0.0933	0.1550	0.1411	0.1292	0.1653	0.1550	0.1375
Pinellas	LOW	0.2976	0.0749	0.1100	0.1001	0.0935	0.1177	0.1100	0.0979
	HIGH	1.1213	0.3815	0.9934	0.9275	0.8351	1.0366	0.9934	0.9048
	WGHTD AVE	0.4477	0.1180	0.2454	0.2257	0.2063	0.2597	0.2454	0.2202
Polk	LOW	0.2757	0.0634	0.0785	0.0718	0.0686	0.0839	0.0785	0.0706
	HIGH	0.5319	0.1640	0.3113	0.2825	0.2533	0.3318	0.3113	0.2742
	WGHTD AVE	0.3699	0.0989	0.1512	0.1369	0.1264	0.1620	0.1512	0.1335
Putnam	LOW	0.2215	0.0511	0.0631	0.0559	0.0532	0.0690	0.0631	0.0546
	HIGH	0.3424	0.0926	0.1592	0.1431	0.1292	0.1711	0.1592	0.1388
	WGHTD AVE	0.2664	0.0670	0.1022	0.0913	0.0839	0.1106	0.1022	0.0888
Santa Rosa	LOW	0.3849	0.0990	0.1573	0.1395	0.1270	0.1708	0.1573	0.1352
	HIGH	3.1844	1.0664	3.4660	3.2933	2.9825	3.5714	3.4660	3.2259
	WGHTD AVE	1.1598	0.3141	0.9978	0.9350	0.8428	1.0387	0.9978	0.9132
Sarasota	LOW	0.4235	0.1091	0.1679	0.1527	0.1407	0.1793	0.1679	0.1490
	HIGH	1.8857	0.6408	1.9550	1.8637	1.7042	2.0119	1.9550	1.8291
	WGHTD AVE	0.7417	0.1933	0.5392	0.5025	0.4560	0.5643	0.5392	0.4908
Seminole	LOW	0.2242	0.0479	0.0533	0.0494	0.0482	0.0567	0.0533	0.0488
	HIGH	0.3972	0.1149	0.2016	0.1830	0.1659	0.2152	0.2016	0.1780
	WGHTD AVE	0.3213	0.0836	0.1259	0.1143	0.1058	0.1347	0.1259	0.1116
St. Johns	LOW	0.1722	0.0372	0.0445	0.0406	0.0391	0.0478	0.0445	0.0399
	HIGH	1.0831	0.3587	1.0144	0.9533	0.8572	1.0533	1.0144	0.9312
	WGHTD AVE	0.4456	0.1143	0.2953	0.2734	0.2468	0.3104	0.2953	0.2666
St. Lucie	LOW	0.4853	0.1348	0.2243	0.2052	0.1885	0.2386	0.2243	0.2002
	HIGH	4.0551	1.4493	4.6284	4.4335	4.0583	4.7451	4.6284	4.3554
	WGHTD AVE	0.9145	0.2425	0.6765	0.6335	0.5764	0.7055	0.6765	0.6196
Sumter	LOW	0.2499	0.0581	0.0715	0.0657	0.0635	0.0764	0.0715	0.0647
	HIGH	0.3692	0.1022	0.1681	0.1525	0.1394	0.1798	0.1681	0.1485
	WGHTD AVE	0.2738	0.0673	0.0910	0.0829	0.0780	0.0974	0.0910	0.0812

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Suwanee	LOW	0.1277	0.0288	0.0342	0.0309	0.0299	0.0369	0.0342	0.0304
	HIGH	0.1887	0.0449	0.0625	0.0560	0.0522	0.0676	0.0625	0.0546
	WGHTD AVE	0.1321	0.0296	0.0381	0.0342	0.0324	0.0412	0.0381	0.0335
Taylor	LOW	0.1276	0.0291	0.0385	0.0346	0.0325	0.0415	0.0385	0.0338
	HIGH	0.2738	0.0736	0.1266	0.1136	0.1026	0.1362	0.1266	0.1102
	WGHTD AVE	0.1577	0.0369	0.0517	0.0464	0.0433	0.0559	0.0517	0.0452
Union	LOW	0.1874	0.0448	0.0611	0.0545	0.0508	0.0663	0.0611	0.0531
	HIGH	0.1999	0.0473	0.0638	0.0570	0.0534	0.0692	0.0638	0.0556
	WGHTD AVE	0.1913	0.0455	0.0619	0.0552	0.0516	0.0672	0.0619	0.0539
Volusia	LOW	0.2820	0.0732	0.1096	0.0995	0.0920	0.1173	0.1096	0.0971
	HIGH	2.0406	0.7196	2.1515	2.0308	1.8180	2.2253	2.1515	1.9839
	WGHTD AVE	0.6206	0.1810	0.4579	0.4246	0.3799	0.4801	0.4579	0.4135
Wakulla	LOW	0.1620	0.0360	0.0464	0.0418	0.0396	0.0500	0.0464	0.0409
	HIGH	0.5744	0.1678	0.3972	0.3690	0.3351	0.4167	0.3972	0.3604
	WGHTD AVE	0.2156	0.0427	0.0844	0.0771	0.0714	0.0899	0.0844	0.0753
Walton	LOW	0.3530	0.0863	0.1250	0.1100	0.1023	0.1369	0.1250	0.1069
	HIGH	1.9520	0.6425	1.9450	1.8353	1.6527	2.0137	1.9450	1.7942
	WGHTD AVE	1.2088	0.3318	1.0495	0.9836	0.8850	1.0922	1.0495	0.9605
Washington	LOW	0.2844	0.0694	0.1020	0.0906	0.0836	0.1108	0.1020	0.0881
	HIGH	0.3543	0.0945	0.1629	0.1457	0.1315	0.1756	0.1629	0.1412
	WGHTD AVE	0.2907	0.0708	0.1056	0.0939	0.0865	0.1147	0.1056	0.0913
STATEWIDE	LOW	0.1035	0.0223	0.0262	0.0238	0.0229	0.0282	0.0262	0.0234
	HIGH	6.4894	2.3604	7.8193	7.5149	6.8870	7.9964	7.8193	7.3876
	WGHTD AVE	0.8734	0.1278	0.7038	0.6642	0.6045	0.7296	0.7038	0.6505

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.1633	0.0328	0.0360	0.0335	0.0329	0.0381	0.0360	0.0331
	HIGH	0.2926	0.0766	0.1263	0.1142	0.1039	0.1353	0.1263	0.1110
	WGHTD AVE	0.1861	0.0425	0.0562	0.0507	0.0476	0.0605	0.0562	0.0496
Baker	LOW	0.1210	0.0271	0.0316	0.0289	0.0280	0.0340	0.0316	0.0284
	HIGH	0.1433	0.0328	0.0434	0.0392	0.0368	0.0467	0.0434	0.0383
	WGHTD AVE	0.1403	0.0320	0.0416	0.0376	0.0354	0.0448	0.0416	0.0368
Bay	LOW	0.2764	0.0678	0.0876	0.0771	0.0723	0.0961	0.0876	0.0750
	HIGH	0.9301	0.2939	0.7331	0.6769	0.6010	0.7704	0.7331	0.6579
	WGHTD AVE	0.5819	0.1591	0.3590	0.3278	0.2923	0.3806	0.3590	0.3182
Bradford	LOW	0.1362	0.0302	0.0370	0.0335	0.0319	0.0399	0.0370	0.0328
	HIGH	0.2188	0.0521	0.0714	0.0641	0.0597	0.0772	0.0714	0.0625
	WGHTD AVE	0.1604	0.0359	0.0463	0.0418	0.0396	0.0499	0.0463	0.0409
Brevard	LOW	0.3402	0.0859	0.1315	0.1201	0.1108	0.1400	0.1315	0.1173
	HIGH	3.2263	1.1386	3.5609	3.3867	3.0652	3.6661	3.5609	3.3176
	WGHTD AVE	0.7113	0.1890	0.4993	0.4637	0.4167	0.5233	0.4993	0.4520
Broward	LOW	0.6079	0.1765	0.3180	0.2943	0.2731	0.3355	0.3180	0.2881
	HIGH	4.5701	1.7006	5.2978	5.0397	4.5484	5.4514	5.2978	4.9351
	WGHTD AVE	1.6372	0.4490	1.5614	1.4660	1.3114	1.6213	1.5614	1.4306
Calhoun	LOW	0.2025	0.0455	0.0587	0.0527	0.0496	0.0636	0.0587	0.0515
	HIGH	0.2476	0.0592	0.0842	0.0751	0.0695	0.0911	0.0842	0.0731
	WGHTD AVE	0.2219	0.0527	0.0701	0.0627	0.0585	0.0759	0.0701	0.0612
Charlotte	LOW	0.4598	0.1272	0.2129	0.1931	0.1754	0.2275	0.2129	0.1878
	HIGH	1.0419	0.3523	0.8597	0.7949	0.7035	0.9020	0.8597	0.7725
	WGHTD AVE	0.5586	0.1662	0.3096	0.2813	0.2526	0.3296	0.3096	0.2732
Citrus	LOW	0.2330	0.0529	0.0655	0.0599	0.0571	0.0700	0.0655	0.0588
	HIGH	0.3700	0.1051	0.1801	0.1631	0.1475	0.1925	0.1801	0.1585
	WGHTD AVE	0.2848	0.0738	0.1087	0.0986	0.0910	0.1163	0.1087	0.0962
Clay	LOW	0.1611	0.0365	0.0425	0.0385	0.0373	0.0459	0.0425	0.0379
	HIGH	0.2204	0.0547	0.0898	0.0810	0.0735	0.0963	0.0898	0.0787
	WGHTD AVE	0.1898	0.0459	0.0681	0.0616	0.0568	0.0730	0.0681	0.0600
Collier	LOW	0.4620	0.1133	0.1533	0.1358	0.1270	0.1657	0.1533	0.1319
	HIGH	1.3247	0.4603	1.1224	1.0353	0.9142	1.1796	1.1224	1.0053
	WGHTD AVE	0.7231	0.1996	0.4242	0.3869	0.3468	0.4504	0.4242	0.3758
Columbia	LOW	0.1332	0.0282	0.0334	0.0305	0.0293	0.0359	0.0334	0.0300
	HIGH	0.1691	0.0380	0.0476	0.0428	0.0406	0.0515	0.0476	0.0419
	WGHTD AVE	0.1409	0.0313	0.0396	0.0359	0.0340	0.0427	0.0396	0.0351
De Soto	LOW	0.2957	0.0640	0.0729	0.0671	0.0650	0.0778	0.0729	0.0661
	HIGH	0.5846	0.1811	0.3455	0.3130	0.2795	0.3684	0.3455	0.3035
	WGHTD AVE	0.4888	0.1386	0.2337	0.2110	0.1913	0.2503	0.2337	0.2050
Dixie	LOW	0.1841	0.0407	0.0522	0.0474	0.0449	0.0560	0.0522	0.0465
	HIGH	0.2184	0.0552	0.0864	0.0776	0.0708	0.0930	0.0864	0.0754
	WGHTD AVE	0.2152	0.0533	0.0831	0.0746	0.0682	0.0894	0.0831	0.0726

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Duval	LOW	0.1115	0.0241	0.0277	0.0250	0.0242	0.0299	0.0277	0.0246
	HIGH	0.4763	0.1430	0.3097	0.2843	0.2581	0.3276	0.3097	0.2769
	WGHTD AVE	0.1924	0.0446	0.0669	0.0604	0.0563	0.0721	0.0669	0.0589
Escambia	LOW	0.3242	0.0834	0.1327	0.1178	0.1067	0.1438	0.1327	0.1141
	HIGH	1.3584	0.4595	1.2311	1.1395	1.0063	1.2903	1.2311	1.1070
	WGHTD AVE	0.6803	0.1976	0.4477	0.4066	0.3599	0.4761	0.4477	0.3939
Flagler	LOW	0.2458	0.0605	0.0848	0.0768	0.0716	0.0909	0.0848	0.0750
	HIGH	1.0060	0.3438	0.9169	0.8557	0.7617	0.9560	0.9169	0.8336
	WGHTD AVE	0.3772	0.0978	0.2104	0.1932	0.1740	0.2224	0.2104	0.1880
Franklin	LOW	0.4822	0.1281	0.2220	0.2014	0.1850	0.2375	0.2220	0.1962
	HIGH	2.5157	0.8754	2.6661	2.5010	2.2104	2.7666	2.6661	2.4363
	WGHTD AVE	0.8252	0.1966	0.6194	0.5744	0.5130	0.6492	0.6194	0.5593
Gadsen	LOW	0.1104	0.0239	0.0295	0.0268	0.0255	0.0317	0.0295	0.0263
	HIGH	0.1553	0.0351	0.0462	0.0415	0.0390	0.0499	0.0462	0.0406
	WGHTD AVE	0.1379	0.0303	0.0390	0.0351	0.0332	0.0420	0.0390	0.0344
Gilchrist	LOW	0.2047	0.0499	0.0736	0.0662	0.0610	0.0792	0.0736	0.0644
	HIGH	0.2263	0.0554	0.0805	0.0721	0.0665	0.0870	0.0805	0.0701
	WGHTD AVE	0.2184	0.0527	0.0778	0.0698	0.0643	0.0840	0.0778	0.0679
Glades	LOW	0.6936	0.2118	0.4066	0.3692	0.3303	0.4331	0.4066	0.3582
	HIGH	0.6936	0.2118	0.4066	0.3692	0.3303	0.4331	0.4066	0.3582
	WGHTD AVE	0.6936	0.2118	0.4066	0.3692	0.3303	0.4331	0.4066	0.3582
Gulf	LOW	0.2993	0.0738	0.1103	0.0984	0.0902	0.1195	0.1103	0.0956
	HIGH	0.5172	0.1463	0.2952	0.2690	0.2406	0.3137	0.2952	0.2612
	WGHTD AVE	0.4585	0.1196	0.2421	0.2200	0.1974	0.2579	0.2421	0.2137
Hamilton	LOW	0.1001	0.0212	0.0244	0.0221	0.0213	0.0263	0.0244	0.0217
	HIGH	0.1069	0.0235	0.0295	0.0267	0.0254	0.0318	0.0295	0.0262
	WGHTD AVE	0.1061	0.0233	0.0288	0.0261	0.0248	0.0310	0.0288	0.0256
Hardee	LOW	0.3916	0.1050	0.1601	0.1442	0.1323	0.1721	0.1601	0.1403
	HIGH	0.4768	0.1352	0.2428	0.2204	0.1984	0.2589	0.2428	0.2140
	WGHTD AVE	0.4214	0.1164	0.1882	0.1697	0.1545	0.2020	0.1882	0.1650
Hendry	LOW	0.4569	0.1111	0.1368	0.1237	0.1184	0.1476	0.1368	0.1214
	HIGH	1.0141	0.3397	0.7925	0.7314	0.6508	0.8333	0.7925	0.7111
	WGHTD AVE	0.8357	0.2469	0.5808	0.5344	0.4772	0.6124	0.5808	0.5195
Hernando	LOW	0.2480	0.0587	0.0806	0.0737	0.0692	0.0859	0.0806	0.0722
	HIGH	0.3973	0.1170	0.2127	0.1931	0.1736	0.2267	0.2127	0.1875
	WGHTD AVE	0.2895	0.0746	0.1155	0.1050	0.0966	0.1234	0.1155	0.1024
Highlands	LOW	0.3851	0.1004	0.1478	0.1336	0.1235	0.1587	0.1478	0.1302
	HIGH	0.6027	0.1767	0.3167	0.2869	0.2584	0.3382	0.3167	0.2786
	WGHTD AVE	0.4119	0.1085	0.1640	0.1481	0.1364	0.1760	0.1640	0.1443
Hillsborough	LOW	0.2280	0.0492	0.0560	0.0516	0.0500	0.0596	0.0560	0.0509
	HIGH	0.6062	0.1974	0.4118	0.3755	0.3333	0.4368	0.4118	0.3642
	WGHTD AVE	0.3404	0.0901	0.1442	0.1304	0.1193	0.1546	0.1442	0.1269
Holmes	LOW	0.2581	0.0610	0.0857	0.0765	0.0709	0.0929	0.0857	0.0745
	HIGH	0.2581	0.0610	0.0857	0.0765	0.0709	0.0929	0.0857	0.0745
	WGHTD AVE	0.2581	0.0610	0.0857	0.0765	0.0709	0.0929	0.0857	0.0745

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Indian River	LOW	0.4673	0.1273	0.2214	0.2024	0.1838	0.2352	0.2214	0.1971
	HIGH	2.5005	0.8851	2.6213	2.4729	2.2126	2.7121	2.6213	2.4153
	WGHTD AVE	1.3708	0.2112	1.1729	1.1009	0.9857	1.2185	1.1729	1.0744
Jackson	LOW	0.1574	0.0355	0.0476	0.0430	0.0403	0.0512	0.0476	0.0420
	HIGH	0.2747	0.0702	0.1140	0.1022	0.0926	0.1229	0.1140	0.0992
	WGHTD AVE	0.1984	0.0464	0.0627	0.0563	0.0525	0.0677	0.0627	0.0550
Jefferson	LOW	0.1074	0.0233	0.0288	0.0261	0.0248	0.0310	0.0288	0.0256
	HIGH	0.1181	0.0260	0.0349	0.0315	0.0295	0.0375	0.0349	0.0308
	WGHTD AVE	0.1079	0.0235	0.0292	0.0264	0.0251	0.0314	0.0292	0.0259
Lafayette	LOW	0.1461	0.0316	0.0373	0.0337	0.0324	0.0402	0.0373	0.0331
	HIGH	0.1461	0.0316	0.0373	0.0337	0.0324	0.0402	0.0373	0.0331
	WGHTD AVE	0.1461	0.0316	0.0373	0.0337	0.0324	0.0402	0.0373	0.0331
Lake	LOW	0.2269	0.0506	0.0610	0.0560	0.0538	0.0650	0.0610	0.0552
	HIGH	0.4233	0.1242	0.2317	0.2114	0.1902	0.2462	0.2317	0.2055
	WGHTD AVE	0.2899	0.0724	0.1025	0.0931	0.0867	0.1098	0.1025	0.0909
Lee	LOW	0.3464	0.0757	0.0873	0.0799	0.0772	0.0933	0.0873	0.0787
	HIGH	2.4767	0.9156	2.5752	2.4019	2.1154	2.6826	2.5752	2.3359
	WGHTD AVE	0.6018	0.1622	0.3193	0.2907	0.2617	0.3397	0.3193	0.2825
Leon	LOW	0.1060	0.0205	0.0224	0.0209	0.0206	0.0237	0.0224	0.0207
	HIGH	0.2032	0.0521	0.0859	0.0774	0.0701	0.0921	0.0859	0.0751
	WGHTD AVE	0.1359	0.0302	0.0396	0.0358	0.0337	0.0426	0.0396	0.0351
Levy	LOW	0.2195	0.0528	0.0749	0.0670	0.0621	0.0809	0.0749	0.0653
	HIGH	0.3209	0.0876	0.1532	0.1383	0.1244	0.1640	0.1532	0.1342
	WGHTD AVE	0.2610	0.0670	0.1001	0.0899	0.0824	0.1078	0.1001	0.0874
Liberty	LOW	0.1802	0.0392	0.0460	0.0411	0.0395	0.0501	0.0460	0.0403
	HIGH	0.1959	0.0469	0.0687	0.0618	0.0569	0.0740	0.0687	0.0601
	WGHTD AVE	0.1836	0.0398	0.0501	0.0449	0.0426	0.0544	0.0501	0.0439
Madison	LOW	0.0824	0.0171	0.0192	0.0176	0.0171	0.0206	0.0192	0.0173
	HIGH	0.1141	0.0255	0.0349	0.0316	0.0294	0.0376	0.0349	0.0308
	WGHTD AVE	0.1056	0.0233	0.0285	0.0258	0.0246	0.0306	0.0285	0.0253
Manatee	LOW	0.2714	0.0610	0.0727	0.0662	0.0633	0.0780	0.0727	0.0650
	HIGH	1.2897	0.4495	1.1791	1.0987	0.9784	1.2307	1.1791	1.0700
	WGHTD AVE	0.5779	0.1371	0.3614	0.3320	0.2978	0.3817	0.3614	0.3229
Marion	LOW	0.2103	0.0440	0.0489	0.0454	0.0444	0.0520	0.0489	0.0449
	HIGH	0.3321	0.0923	0.1548	0.1402	0.1273	0.1656	0.1548	0.1363
	WGHTD AVE	0.2487	0.0608	0.0863	0.0786	0.0733	0.0923	0.0863	0.0769
Martin	LOW	0.5073	0.1478	0.2542	0.2313	0.2098	0.2708	0.2542	0.2250
	HIGH	1.9170	0.7048	1.9223	1.7984	1.5931	1.9994	1.9223	1.7515
	WGHTD AVE	1.0667	0.2826	0.8422	0.7833	0.7014	0.8810	0.8422	0.7632
Miami-Dade	LOW	0.4479	0.1135	0.1562	0.1409	0.1305	0.1679	0.1562	0.1373
	HIGH	5.2718	2.0413	6.2068	5.8468	5.1817	6.4214	6.2068	5.7013
	WGHTD AVE	2.2212	0.5468	2.2562	2.1230	1.8989	2.3387	2.2562	2.0724
Monroe	LOW	1.8403	0.6932	1.8530	1.7335	1.5449	1.9284	1.8530	1.6894
	HIGH	4.7542	1.8679	5.5800	5.2576	4.6544	5.7713	5.5800	5.1264
	WGHTD AVE	2.7976	1.1002	3.0545	2.8683	2.5492	3.1687	3.0545	2.7963
Nassau	LOW	0.0983	0.0217	0.0284	0.0259	0.0244	0.0304	0.0284	0.0254
	HIGH	0.3227	0.0928	0.1909	0.1748	0.1566	0.2020	0.1909	0.1699
	WGHTD AVE	0.2895	0.0731	0.1626	0.1488	0.1336	0.1722	0.1626	0.1447

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Okaloosa	LOW	0.3033	0.0690	0.0834	0.0740	0.0704	0.0912	0.0834	0.0723
	HIGH	1.7443	0.6073	1.7034	1.5813	1.3917	1.7805	1.7034	1.5364
	WGHTD AVE	0.8595	0.2716	0.6661	0.6127	0.5422	0.7016	0.6661	0.5948
Okeechobee	LOW	0.5010	0.1382	0.2282	0.2066	0.1880	0.2441	0.2282	0.2009
	HIGH	0.5860	0.1686	0.3025	0.2749	0.2479	0.3223	0.3025	0.2671
	WGHTD AVE	0.5537	0.1580	0.2748	0.2495	0.2256	0.2932	0.2748	0.2425
Orange	LOW	0.2401	0.0528	0.0628	0.0579	0.0557	0.0668	0.0628	0.0570
	HIGH	0.3555	0.0968	0.1584	0.1436	0.1307	0.1694	0.1584	0.1397
	WGHTD AVE	0.3137	0.0785	0.1145	0.1038	0.0963	0.1228	0.1145	0.1013
Osceola	LOW	0.2615	0.0607	0.0776	0.0710	0.0674	0.0828	0.0776	0.0697
	HIGH	0.4045	0.1156	0.1939	0.1751	0.1586	0.2077	0.1939	0.1701
	WGHTD AVE	0.3119	0.0794	0.1156	0.1051	0.0974	0.1236	0.1156	0.1026
Palm Beach	LOW	0.5977	0.1788	0.3380	0.3104	0.2803	0.3574	0.3380	0.3022
	HIGH	3.9330	1.4837	4.3966	4.1434	3.6834	4.5490	4.3966	4.0426
	WGHTD AVE	1.6206	0.4082	1.5005	1.4090	1.2653	1.5587	1.5005	1.3757
Pasco	LOW	0.2312	0.0494	0.0557	0.0514	0.0500	0.0592	0.0557	0.0508
	HIGH	0.4313	0.1296	0.2386	0.2165	0.1942	0.2543	0.2386	0.2101
	WGHTD AVE	0.3353	0.0898	0.1485	0.1351	0.1232	0.1584	0.1485	0.1315
Pinellas	LOW	0.2960	0.0731	0.1049	0.0952	0.0889	0.1124	0.1049	0.0930
	HIGH	0.8861	0.2904	0.6949	0.6449	0.5805	0.7286	0.6949	0.6285
	WGHTD AVE	0.4230	0.1099	0.2162	0.1966	0.1783	0.2303	0.2162	0.1913
Polk	LOW	0.2644	0.0610	0.0765	0.0700	0.0666	0.0817	0.0765	0.0688
	HIGH	0.4828	0.1433	0.2538	0.2288	0.2058	0.2718	0.2538	0.2220
	WGHTD AVE	0.3516	0.0918	0.1378	0.1245	0.1148	0.1478	0.1378	0.1214
Putnam	LOW	0.2202	0.0506	0.0606	0.0539	0.0514	0.0661	0.0606	0.0527
	HIGH	0.3069	0.0826	0.1405	0.1261	0.1134	0.1510	0.1405	0.1222
	WGHTD AVE	0.2463	0.0617	0.0926	0.0831	0.0762	0.0998	0.0926	0.0808
Santa Rosa	LOW	0.3707	0.0941	0.1231	0.1060	0.0977	0.1367	0.1231	0.1024
	HIGH	2.4807	0.8609	2.6011	2.4383	2.1599	2.7011	2.6011	2.3754
	WGHTD AVE	1.2390	0.3568	1.1060	1.0288	0.9113	1.1553	1.1060	1.0009
Sarasota	LOW	0.3237	0.0758	0.0987	0.0898	0.0843	0.1057	0.0987	0.0878
	HIGH	1.5254	0.5229	1.4973	1.4137	1.2771	1.5500	1.4973	1.3828
	WGHTD AVE	0.5999	0.1700	0.3816	0.3505	0.3148	0.4032	0.3816	0.3410
Seminole	LOW	0.2397	0.0525	0.0587	0.0541	0.0528	0.0626	0.0587	0.0534
	HIGH	0.3940	0.1142	0.2022	0.1834	0.1655	0.2157	0.2022	0.1782
	WGHTD AVE	0.3151	0.0819	0.1239	0.1124	0.1036	0.1326	0.1239	0.1096
St. Johns	LOW	0.1623	0.0349	0.0433	0.0397	0.0379	0.0462	0.0433	0.0390
	HIGH	0.8201	0.2719	0.6989	0.6488	0.5762	0.7314	0.6989	0.6312
	WGHTD AVE	0.4022	0.1128	0.2547	0.2339	0.2088	0.2691	0.2547	0.2273
St. Lucie	LOW	0.3745	0.0913	0.1239	0.1133	0.1063	0.1322	0.1239	0.1109
	HIGH	2.6161	0.9472	2.7639	2.6135	2.3534	2.8565	2.7639	2.5558
	WGHTD AVE	0.7086	0.1847	0.4637	0.4306	0.3888	0.4861	0.4637	0.4200
Sumter	LOW	0.2674	0.0654	0.0910	0.0828	0.0773	0.0974	0.0910	0.0809
	HIGH	0.3540	0.0980	0.1590	0.1437	0.1308	0.1704	0.1590	0.1397
	WGHTD AVE	0.2922	0.0766	0.1084	0.0983	0.0911	0.1161	0.1084	0.0960

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Renters -- MASONRY

COUNTY	LOSS COSTS	0% DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Suwanee	LOW	0.1165	0.0254	0.0313	0.0284	0.0270	0.0336	0.0313	0.0278
	HIGH	0.1719	0.0388	0.0564	0.0508	0.0468	0.0606	0.0564	0.0495
	WGHTD AVE	0.1241	0.0272	0.0346	0.0314	0.0297	0.0373	0.0346	0.0307
Taylor	LOW	0.1432	0.0327	0.0435	0.0392	0.0368	0.0469	0.0435	0.0383
	HIGH	0.1480	0.0347	0.0490	0.0442	0.0411	0.0527	0.0490	0.0431
	WGHTD AVE	0.1456	0.0337	0.0462	0.0416	0.0389	0.0498	0.0462	0.0406
Union	LOW	0.1258	0.0247	0.0269	0.0252	0.0248	0.0285	0.0269	0.0250
	HIGH	0.1866	0.0444	0.0624	0.0563	0.0523	0.0672	0.0624	0.0549
	WGHTD AVE	0.1730	0.0410	0.0561	0.0506	0.0472	0.0605	0.0561	0.0494
Volusia	LOW	0.2541	0.0641	0.0975	0.0889	0.0820	0.1039	0.0975	0.0867
	HIGH	1.6423	0.5821	1.6636	1.5593	1.3819	1.7279	1.6636	1.5193
	WGHTD AVE	0.6669	0.1585	0.5027	0.4668	0.4154	0.5262	0.5027	0.4544
Wakulla	LOW	0.1617	0.0361	0.0465	0.0419	0.0395	0.0501	0.0465	0.0410
	HIGH	0.5028	0.1487	0.3276	0.3011	0.2688	0.3457	0.3276	0.2927
	WGHTD AVE	0.2199	0.0490	0.0916	0.0834	0.0762	0.0976	0.0916	0.0812
Walton	LOW	0.3261	0.0868	0.1449	0.1289	0.1164	0.1569	0.1449	0.1248
	HIGH	1.8167	0.6123	1.7834	1.6698	1.4860	1.8546	1.7834	1.6275
	WGHTD AVE	1.1148	0.2973	0.9503	0.8840	0.7862	0.9931	0.9503	0.8606
Washington	LOW	0.2637	0.0640	0.0952	0.0852	0.0783	0.1029	0.0952	0.0829
	HIGH	0.3420	0.0934	0.1701	0.1531	0.1369	0.1824	0.1701	0.1483
	WGHTD AVE	0.2703	0.0651	0.0974	0.0871	0.0800	0.1052	0.0974	0.0847
STATEWIDE	LOW	0.0824	0.0171	0.0192	0.0176	0.0171	0.0206	0.0192	0.0173
	HIGH	5.2717	2.0413	6.2068	5.8468	5.1817	6.4214	6.2068	5.7013
	WGHTD AVE	0.9701	0.1879	0.7794	0.7287	0.6538	0.8123	0.7794	0.7109

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.0726	0.1533	0.0314	0.0824	0.0365	0.0322	0.0824	0.0365	0.0322
	HIGH	0.1092	0.2452	0.0625	0.1742	0.1028	0.0860	0.1742	0.1028	0.0860
	WGHTD AVE	0.0941	0.2022	0.0474	0.1287	0.0674	0.0570	0.1287	0.0674	0.0570
Baker	LOW	0.0561	0.1125	0.0226	0.0609	0.0262	0.0232	0.0609	0.0262	0.0232
	HIGH	0.0561	0.1125	0.0226	0.0609	0.0262	0.0232	0.0609	0.0262	0.0232
	WGHTD AVE	0.0561	0.1125	0.0226	0.0609	0.0262	0.0232	0.0609	0.0262	0.0232
Bay	LOW	0.1536	0.3572	0.0869	0.2454	0.1425	0.1195	0.2454	0.1425	0.1195
	HIGH	0.3842	1.3449	0.4483	1.5789	1.3675	1.2070	1.5789	1.3675	1.2070
	WGHTD AVE	0.3308	1.1927	0.3629	1.3242	1.1374	1.0196	1.3242	1.1374	1.0196
Bradford	LOW	0.0889	0.1797	0.0396	0.1068	0.0495	0.0424	0.1068	0.0495	0.0424
	HIGH	0.0889	0.1797	0.0396	0.1068	0.0495	0.0424	0.1068	0.0495	0.0424
	WGHTD AVE	0.0889	0.0000	0.0000	0.1068	0.0495	0.0424	0.1068	0.0495	0.0424
Brevard	LOW	0.1589	0.2948	0.0655	0.1801	0.0840	0.0720	0.1801	0.0840	0.0720
	HIGH	1.2093	4.2955	1.5033	6.0132	5.5533	5.1459	6.0132	5.5533	5.1459
	WGHTD AVE	0.5161	0.9155	0.2883	1.1238	0.8806	0.7799	1.1238	0.8806	0.7799
Broward	LOW	0.2141	0.4246	0.1087	0.3007	0.1727	0.1471	0.3007	0.1727	0.1471
	HIGH	1.7015	6.7169	2.4852	9.7569	9.1741	8.4988	9.7569	9.1741	8.4988
	WGHTD AVE	0.7918	2.1946	0.7938	2.8558	2.5120	2.2734	2.8558	2.5120	2.2734
Charlotte	LOW	0.1846	0.3509	0.0787	0.2118	0.0985	0.0847	0.2118	0.0985	0.0847
	HIGH	0.7407	1.3786	0.4758	1.8039	1.4547	1.2658	1.8039	1.4547	1.2658
	WGHTD AVE	0.5337	1.0559	0.3130	1.1534	0.8623	0.7373	1.1534	0.8623	0.7373
Citrus	LOW	0.1193	0.2117	0.0446	0.1239	0.0528	0.0461	0.1239	0.0528	0.0461
	HIGH	0.3554	0.3556	0.0978	0.3692	0.1999	0.1566	0.3692	0.1999	0.1566
	WGHTD AVE	0.3220	0.3295	0.0878	0.3278	0.1716	0.1354	0.3278	0.1716	0.1354
Clay	LOW	0.0734	0.1558	0.0337	0.0881	0.0393	0.0346	0.0881	0.0393	0.0346
	HIGH	0.1047	0.2382	0.0624	0.1778	0.1103	0.0929	0.1778	0.1103	0.0929
	WGHTD AVE	0.0844	0.1865	0.0438	0.1200	0.0655	0.0559	0.1200	0.0655	0.0559
Collier	LOW	0.3127	0.4981	0.1286	0.4046	0.2210	0.1851	0.4046	0.2210	0.1851
	HIGH	0.8597	1.6281	0.5543	2.0954	1.6978	1.4860	2.0954	1.6978	1.4860
	WGHTD AVE	0.5946	0.9161	0.2843	1.0336	0.7271	0.6177	1.0336	0.7271	0.6177
Columbia	LOW	0.0681	0.1447	0.0320	0.0871	0.0430	0.0370	0.0871	0.0430	0.0370
	HIGH	0.0758	0.1583	0.0363	0.0992	0.0500	0.0424	0.0992	0.0500	0.0424
	WGHTD AVE	0.0747	0.1563	0.0358	0.0976	0.0491	0.0417	0.0976	0.0491	0.0417
De Soto	LOW	0.3922	0.4689	0.1288	0.4670	0.2488	0.2023	0.4670	0.2488	0.2023
	HIGH	0.4230	0.4887	0.1368	0.4847	0.2736	0.2248	0.4847	0.2736	0.2248
	WGHTD AVE	0.4013	0.4802	0.1334	0.4781	0.2644	0.2164	0.4781	0.2644	0.2164
Dixie	LOW	0.0865	0.1935	0.0417	0.1098	0.0539	0.0468	0.1098	0.0539	0.0468
	HIGH	0.1385	0.3587	0.0954	0.2898	0.2025	0.1759	0.2898	0.2025	0.1759
	WGHTD AVE	0.1188	0.3006	0.0806	0.2244	0.1485	0.1290	0.2244	0.1485	0.1290
Duval	LOW	0.0553	0.1123	0.0228	0.0611	0.0267	0.0236	0.0611	0.0267	0.0236
	HIGH	0.1942	0.6036	0.1795	0.6363	0.5274	0.4787	0.6363	0.5274	0.4787
	WGHTD AVE	0.0911	0.2092	0.0492	0.1516	0.0945	0.0829	0.1516	0.0945	0.0829

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Escambia	LOW	0.1876	0.4094	0.1048	0.3090	0.1872	0.1531	0.3090	0.1872	0.1531
	HIGH	0.4462	1.6954	0.5596	2.0684	1.8407	1.6541	2.0684	1.8407	1.6541
	WGHTD AVE	0.3305	1.2257	0.3674	1.3065	1.1137	0.9871	1.3065	1.1137	0.9871
Flagler	LOW	0.2930	0.3550	0.1008	0.3682	0.2195	0.1808	0.3682	0.2195	0.1808
	HIGH	0.5808	1.3828	0.4599	1.8084	1.5583	1.4178	1.8084	1.5583	1.4178
	WGHTD AVE	0.3919	0.7680	0.2312	0.8808	0.6877	0.6011	0.8808	0.6877	0.6011
Franklin	LOW	0.1591	0.4218	0.1125	0.3400	0.2390	0.2068	0.3400	0.2390	0.2068
	HIGH	0.6288	2.9551	0.9715	3.8055	3.5261	3.2683	3.8055	3.5261	3.2683
	WGHTD AVE	0.2157	1.1373	0.3250	1.0173	0.8808	0.8047	1.0173	0.8808	0.8047
Gulf	LOW	0.1713	0.4436	0.1158	0.3494	0.2397	0.2079	0.3494	0.2397	0.2079
	HIGH	0.1713	0.4436	0.1158	0.3494	0.2397	0.2079	0.3494	0.2397	0.2079
	WGHTD AVE	0.1713	0.4436	0.1158	0.3494	0.2397	0.2079	0.3494	0.2397	0.2079
Hendry	LOW	0.5731	0.6289	0.1876	0.7014	0.4205	0.3358	0.7014	0.4205	0.3358
	HIGH	0.6908	1.1325	0.3731	1.4135	1.0865	0.9433	1.4135	1.0865	0.9433
	WGHTD AVE	0.6427	0.9776	0.2879	1.1474	0.8377	0.7163	1.1474	0.8377	0.7163
Hernando	LOW	0.2177	0.2391	0.0547	0.1846	0.0700	0.0617	0.1846	0.0700	0.0617
	HIGH	0.3647	0.3890	0.1085	0.4013	0.2268	0.1863	0.4013	0.2268	0.1863
	WGHTD AVE	0.3168	0.3209	0.0845	0.3235	0.1726	0.1394	0.3235	0.1726	0.1394
Highlands	LOW	0.3934	0.4095	0.1082	0.3945	0.1959	0.1557	0.3945	0.1959	0.1557
	HIGH	0.5048	0.5214	0.1490	0.5625	0.3172	0.2496	0.5625	0.3172	0.2496
	WGHTD AVE	0.4563	0.4565	0.1256	0.4759	0.2537	0.1998	0.4759	0.2537	0.1998
Hillsborough	LOW	0.1445	0.2624	0.0584	0.1596	0.0728	0.0626	0.1596	0.0728	0.0626
	HIGH	0.4279	0.4996	0.1497	0.5385	0.3356	0.2765	0.5385	0.3356	0.2765
	WGHTD AVE	0.2930	0.3539	0.0960	0.3372	0.1835	0.1506	0.3372	0.1835	0.1506
Holmes	LOW	0.1169	0.2695	0.0689	0.1968	0.1198	0.0999	0.1968	0.1198	0.0999
	HIGH	0.1169	0.2695	0.0689	0.1968	0.1198	0.0999	0.1968	0.1198	0.0999
	WGHTD AVE	0.1169	0.2695	0.0689	0.1968	0.1198	0.0999	0.1968	0.1198	0.0999
Indian River	LOW	0.4410	0.5315	0.1525	0.5560	0.3353	0.2771	0.5560	0.3353	0.2771
	HIGH	1.1487	3.4764	1.2191	4.8298	4.3686	4.0033	4.8298	4.3686	4.0033
	WGHTD AVE	0.7078	1.7552	0.5513	2.1565	1.8291	1.6458	2.1565	1.8291	1.6458
Jackson	LOW	0.0942	0.2108	0.0504	0.1394	0.0769	0.0645	0.1394	0.0769	0.0645
	HIGH	0.0942	0.2108	0.0504	0.1394	0.0769	0.0645	0.1394	0.0769	0.0645
	WGHTD AVE	0.0942	0.2108	0.0504	0.1394	0.0769	0.0645	0.1394	0.0769	0.0645
Lake	LOW	0.1117	0.1958	0.0412	0.1145	0.0486	0.0426	0.1145	0.0486	0.0426
	HIGH	0.3621	0.3994	0.1061	0.3880	0.2075	0.1690	0.3880	0.2075	0.1690
	WGHTD AVE	0.3405	0.3605	0.0968	0.3545	0.1848	0.1479	0.3545	0.1848	0.1479
Lee	LOW	0.2108	0.3967	0.0905	0.2457	0.1165	0.0991	0.2457	0.1165	0.0991
	HIGH	1.2453	3.4075	1.2395	4.8101	4.2907	3.8385	4.8101	4.2907	3.8385
	WGHTD AVE	0.5506	1.3289	0.3573	1.3362	1.0284	0.8913	1.3362	1.0284	0.8913
Leon	LOW	0.0526	0.1066	0.0215	0.0583	0.0254	0.0224	0.0583	0.0254	0.0224
	HIGH	0.0792	0.1765	0.0435	0.1224	0.0709	0.0597	0.1224	0.0709	0.0597
	WGHTD AVE	0.0639	0.1347	0.0292	0.0801	0.0391	0.0336	0.0801	0.0391	0.0336
Levy	LOW	0.0856	0.1877	0.0390	0.1009	0.0458	0.0403	0.1009	0.0458	0.0403
	HIGH	0.2128	0.6177	0.1852	0.5978	0.4681	0.4087	0.5978	0.4681	0.4087
	WGHTD AVE	0.1973	0.6150	0.1823	0.5900	0.4615	0.4029	0.5900	0.4615	0.4029

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Manatee	LOW	0.1635	0.3123	0.0734	0.1996	0.0994	0.0838	0.1996	0.0994	0.0838
	HIGH	0.7748	1.7722	0.6195	2.3859	2.0370	1.8160	2.3859	2.0370	1.8160
	WGHTD AVE	0.4841	1.1421	0.3462	1.2524	0.9959	0.8748	1.2524	0.9959	0.8748
Marion	LOW	0.1746	0.2313	0.0538	0.1757	0.0833	0.0680	0.1757	0.0833	0.0680
	HIGH	0.3564	0.3470	0.0957	0.3668	0.2008	0.1573	0.3668	0.2008	0.1573
	WGHTD AVE	0.2800	0.2816	0.0728	0.2718	0.1363	0.1056	0.2718	0.1363	0.1056
Martin	LOW	0.5336	0.5747	0.1752	0.6501	0.4014	0.3239	0.6501	0.4014	0.3239
	HIGH	1.0118	2.2162	0.8049	3.0902	2.6696	2.3790	3.0902	2.6696	2.3790
	WGHTD AVE	0.7939	1.6737	0.5875	2.2100	1.8586	1.6683	2.2100	1.8586	1.6683
Miami-Dade	LOW	0.2405	0.4866	0.1268	0.3481	0.2018	0.1700	0.3481	0.2018	0.1700
	HIGH	1.4333	5.5117	2.0270	7.9012	7.3879	6.8290	7.9012	7.3879	6.8290
	WGHTD AVE	0.8928	2.9870	1.1348	3.8214	3.4414	3.1396	3.8214	3.4414	3.1396
Monroe	LOW	0.9614	3.1978	1.1490	4.4351	4.0626	3.7704	4.4351	4.0626	3.7704
	HIGH	1.7357	5.9749	2.2842	8.8020	8.2057	7.5133	8.8020	8.2057	7.5133
	WGHTD AVE	1.2043	3.4366	1.2921	4.9388	4.4845	4.0843	4.9388	4.4845	4.0843
Nassau	LOW	0.0423	0.0826	0.0164	0.0449	0.0190	0.0168	0.0449	0.0190	0.0168
	HIGH	0.1528	0.4564	0.1432	0.4724	0.3818	0.3342	0.4724	0.3818	0.3342
	WGHTD AVE	0.1375	0.3836	0.1120	0.3660	0.2833	0.2494	0.3660	0.2833	0.2494
Okaloosa	LOW	0.1029	0.2460	0.0516	0.1313	0.0618	0.0537	0.1313	0.0618	0.0537
	HIGH	0.4893	1.9639	0.6533	2.4433	2.2023	1.9939	2.4433	2.2023	1.9939
	WGHTD AVE	0.3845	1.6408	0.4850	1.8473	1.6349	1.4751	1.8473	1.6349	1.4751
Okeechobee	LOW	0.5475	0.6322	0.1839	0.6797	0.4119	0.3349	0.6797	0.4119	0.3349
	HIGH	0.5475	0.6322	0.1839	0.6797	0.4119	0.3349	0.6797	0.4119	0.3349
	WGHTD AVE	0.5475	0.6322	0.1839	0.6797	0.4119	0.3349	0.6797	0.4119	0.3349
Orange	LOW	0.1219	0.2167	0.0463	0.1278	0.0554	0.0483	0.1278	0.0554	0.0483
	HIGH	0.4109	0.3883	0.1094	0.4208	0.2284	0.1747	0.4208	0.2284	0.1747
	WGHTD AVE	0.2856	0.3210	0.0819	0.2876	0.1393	0.1121	0.2876	0.1393	0.1121
Osceola	LOW	0.1704	0.2819	0.0680	0.1891	0.0865	0.0743	0.1891	0.0865	0.0743
	HIGH	0.3507	0.3718	0.1006	0.3632	0.1992	0.1583	0.3632	0.1992	0.1583
	WGHTD AVE	0.2790	0.3166	0.0801	0.2844	0.1408	0.1124	0.2844	0.1408	0.1124
Palm Beach	LOW	0.2576	0.4638	0.1185	0.3473	0.1948	0.1664	0.3473	0.1948	0.1664
	HIGH	1.5469	5.0174	1.8310	7.1637	6.5816	6.0655	7.1637	6.5816	6.0655
	WGHTD AVE	0.7979	2.0322	0.6930	2.5812	2.2227	2.0161	2.5812	2.2227	2.0161
Pasco	LOW	0.1401	0.2546	0.0565	0.1553	0.0711	0.0610	0.1553	0.0711	0.0610
	HIGH	0.3966	0.4529	0.1356	0.5037	0.3157	0.2592	0.5037	0.3157	0.2592
	WGHTD AVE	0.3404	0.3867	0.1093	0.4009	0.2321	0.1876	0.4009	0.2321	0.1876
Pinellas	LOW	0.2548	0.3333	0.0878	0.2982	0.1608	0.1341	0.2982	0.1608	0.1341
	HIGH	0.5459	1.0311	0.3432	1.2888	1.0218	0.8963	1.2888	1.0218	0.8963
	WGHTD AVE	0.3590	0.6182	0.1770	0.6265	0.4345	0.3758	0.6265	0.4345	0.3758
Polk	LOW	0.1448	0.2442	0.0531	0.1508	0.0647	0.0563	0.1508	0.0647	0.0563
	HIGH	0.4896	0.5024	0.1515	0.5786	0.3472	0.2704	0.5786	0.3472	0.2704
	WGHTD AVE	0.3068	0.3680	0.0985	0.3368	0.1730	0.1401	0.3368	0.1730	0.1401
Putnam	LOW	0.1179	0.2404	0.0558	0.1523	0.0763	0.0640	0.1523	0.0763	0.0640
	HIGH	0.1571	0.3542	0.0971	0.2834	0.1836	0.1535	0.2834	0.1836	0.1535
	WGHTD AVE	0.1348	0.3006	0.0800	0.2327	0.1470	0.1234	0.2327	0.1470	0.1234
Santa Rosa	LOW	0.1166	0.2811	0.0593	0.1504	0.0718	0.0621	0.1504	0.0718	0.0621
	HIGH	0.7495	3.6119	1.2133	4.7756	4.4593	4.1095	4.7756	4.4593	4.1095
	WGHTD AVE	0.6462	2.9334	1.0406	3.8549	3.5703	3.2792	3.8549	3.5703	3.2792

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- FRAME

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Sarasota	LOW	0.1998	0.3193	0.0731	0.2133	0.0974	0.0842	0.2133	0.0974	0.0842
	HIGH	0.7489	1.9677	0.6712	2.6472	2.3208	2.1256	2.6472	2.3208	2.1256
	WGHTD AVE	0.4648	0.9353	0.2731	1.0200	0.7776	0.6842	1.0200	0.7776	0.6842
Seminole	LOW	0.1285	0.2288	0.0489	0.1348	0.0582	0.0509	0.1348	0.0582	0.0509
	HIGH	0.4076	0.4026	0.1158	0.4442	0.2542	0.1975	0.4442	0.2542	0.1975
	WGHTD AVE	0.3212	0.3351	0.0890	0.3261	0.1673	0.1318	0.3261	0.1673	0.1318
St. Johns	LOW	0.0741	0.1575	0.0331	0.0878	0.0407	0.0355	0.0878	0.0407	0.0355
	HIGH	0.3138	1.1873	0.3950	1.4377	1.2790	1.1587	1.4377	1.2790	1.1587
	WGHTD AVE	0.1854	0.5649	0.1699	0.5915	0.4852	0.4318	0.5915	0.4852	0.4318
St. Lucie	LOW	0.1775	0.3260	0.0727	0.1946	0.0889	0.0771	0.1946	0.0889	0.0771
	HIGH	1.1922	4.0159	1.4287	5.6039	5.1452	4.7764	5.6039	5.1452	4.7764
	WGHTD AVE	0.6894	1.6666	0.5575	2.0398	1.7224	1.5617	2.0398	1.7224	1.5617
Sumter	LOW	0.2663	0.2919	0.0700	0.2389	0.0972	0.0832	0.2389	0.0972	0.0832
	HIGH	0.3352	0.3404	0.0913	0.3369	0.1824	0.1459	0.3369	0.1824	0.1459
	WGHTD AVE	0.3236	0.3386	0.0905	0.3317	0.1721	0.1370	0.3317	0.1721	0.1370
Suwanee	LOW	0.0627	0.1310	0.0297	0.0815	0.0407	0.0346	0.0815	0.0407	0.0346
	HIGH	0.0627	0.1310	0.0297	0.0815	0.0407	0.0346	0.0815	0.0407	0.0346
	WGHTD AVE	0.0627	0.1310	0.0297	0.0815	0.0407	0.0346	0.0815	0.0407	0.0346
Taylor	LOW	0.0541	0.1127	0.0228	0.0606	0.0265	0.0234	0.0606	0.0265	0.0234
	HIGH	0.0908	0.2091	0.0494	0.1362	0.0761	0.0648	0.1362	0.0761	0.0648
	WGHTD AVE	0.0663	0.1964	0.0454	0.0977	0.0508	0.0437	0.0977	0.0508	0.0437
Union	LOW	0.0634	0.1301	0.0263	0.0702	0.0305	0.0270	0.0702	0.0305	0.0270
	HIGH	0.0634	0.1301	0.0263	0.0702	0.0305	0.0270	0.0702	0.0305	0.0270
	WGHTD AVE	0.0634	0.1301	0.0263	0.0702	0.0305	0.0270	0.0702	0.0305	0.0270
Volusia	LOW	0.2108	0.2516	0.0619	0.2121	0.1058	0.0840	0.2121	0.1058	0.0840
	HIGH	0.8857	2.2691	0.8060	3.1686	2.8044	2.5229	3.1686	2.8044	2.5229
	WGHTD AVE	0.5076	1.1569	0.3459	1.3670	1.1217	0.9880	1.3670	1.1217	0.9880
Wakulla	LOW	0.0864	0.1843	0.0421	0.1158	0.0590	0.0497	0.1158	0.0590	0.0497
	HIGH	0.1981	0.5675	0.1656	0.5536	0.4345	0.3837	0.5536	0.4345	0.3837
	WGHTD AVE	0.1441	0.3672	0.1059	0.3304	0.2430	0.2134	0.3304	0.2430	0.2134
Walton	LOW	0.1810	0.4585	0.1333	0.4063	0.2904	0.2434	0.4063	0.2904	0.2434
	HIGH	0.5609	2.4735	0.8202	3.1513	2.8914	2.6497	3.1513	2.8914	2.6497
	WGHTD AVE	0.4839	1.8632	0.6397	2.3550	2.1257	1.9372	2.3550	2.1257	1.9372
Washington	LOW	0.1374	0.3161	0.0744	0.2082	0.1107	0.0916	0.2082	0.1107	0.0916
	HIGH	0.1489	0.3305	0.0843	0.2385	0.1457	0.1216	0.2385	0.1457	0.1216
	WGHTD AVE	0.1411	0.3205	0.0744	0.2191	0.1232	0.1023	0.2191	0.1232	0.1023
STATEWIDE	LOW	0.0423	0.0826	0.0164	0.0449	0.0190	0.0168	0.0449	0.0190	0.0168
	HIGH	1.7357	6.7169	2.4852	9.7569	9.1741	8.4988	9.7569	9.1741	8.4988
	WGHTD AVE	0.4132	1.0634	0.3189	1.1694	0.9580	0.8556	1.1694	0.9580	0.8556

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- MASONRY

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Alachua	LOW	0.0765	0.1515	0.0320	0.0881	0.0415	0.0357	0.0881	0.0415	0.0357
	HIGH	0.1135	0.2505	0.0653	0.1867	0.1144	0.0966	0.1867	0.1144	0.0966
	WGHTD AVE	0.0909	0.1876	0.0434	0.1199	0.0621	0.0530	0.1199	0.0621	0.0530
Baker	LOW	0.0726	0.1509	0.0360	0.1016	0.0554	0.0472	0.1016	0.0554	0.0472
	HIGH	0.0726	0.1509	0.0360	0.1016	0.0554	0.0472	0.1016	0.0554	0.0472
	WGHTD AVE	0.0726	0.1509	0.0000	0.1016	0.0554	0.0472	0.1016	0.0554	0.0472
Bay	LOW	0.1314	0.2965	0.0683	0.1900	0.1039	0.0883	0.1900	0.1039	0.0883
	HIGH	0.3245	0.9999	0.3208	1.0998	0.9169	0.8047	1.0998	0.9169	0.8047
	WGHTD AVE	0.2593	0.7727	0.2316	0.7798	0.6255	0.5458	0.7798	0.6255	0.5458
Bradford	LOW	0.0900	0.1766	0.0392	0.1065	0.0490	0.0417	0.1065	0.0490	0.0417
	HIGH	0.0900	0.1766	0.0392	0.1065	0.0490	0.0417	0.1065	0.0490	0.0417
	WGHTD AVE	0.0900	0.1766	0.0392	0.1065	0.0490	0.0417	0.1065	0.0490	0.0417
Brevard	LOW	0.2074	0.2939	0.0686	0.2145	0.0963	0.0825	0.2145	0.0963	0.0825
	HIGH	1.0542	3.3343	1.1820	4.6053	4.1734	3.8202	4.6053	4.1734	3.8202
	WGHTD AVE	0.5558	1.1522	0.3777	1.4022	1.1358	1.0064	1.4022	1.1358	1.0064
Broward	LOW	0.2289	0.4833	0.1327	0.3692	0.2316	0.1940	0.3692	0.2316	0.1940
	HIGH	1.4521	4.9985	1.8671	7.1657	6.6234	6.0710	7.1657	6.6234	6.0710
	WGHTD AVE	0.7818	2.0396	0.7310	2.6737	2.3195	2.0746	2.6737	2.3195	2.0746
Charlotte	LOW	0.3538	0.3934	0.0961	0.3206	0.1324	0.1131	0.3206	0.1324	0.1131
	HIGH	0.5724	0.9714	0.3225	1.1502	0.8909	0.7686	1.1502	0.8909	0.7686
	WGHTD AVE	0.4440	0.5818	0.1734	0.6148	0.3888	0.3215	0.6148	0.3888	0.3215
Citrus	LOW	0.1744	0.2168	0.0476	0.1563	0.0596	0.0522	0.1563	0.0596	0.0522
	HIGH	0.3765	0.3700	0.1051	0.4007	0.2278	0.1761	0.4007	0.2278	0.1761
	WGHTD AVE	0.3185	0.3223	0.0865	0.3208	0.1689	0.1323	0.3208	0.1689	0.1323
Clay	LOW	0.0679	0.1328	0.0271	0.0746	0.0339	0.0293	0.0746	0.0339	0.0293
	HIGH	0.1088	0.2391	0.0617	0.1764	0.1071	0.0906	0.1764	0.1071	0.0906
	WGHTD AVE	0.0790	0.1656	0.0378	0.1057	0.0566	0.0484	0.1057	0.0566	0.0484
Collier	LOW	0.3024	0.4274	0.1084	0.3504	0.1858	0.1533	0.3504	0.1858	0.1533
	HIGH	0.8319	1.7581	0.6268	2.2883	1.8885	1.6408	2.2883	1.8885	1.6408
	WGHTD AVE	0.5610	0.8883	0.2740	0.9662	0.6684	0.5646	0.9662	0.6684	0.5646
Columbia	LOW	0.0731	0.1477	0.0334	0.0925	0.0453	0.0388	0.0925	0.0453	0.0388
	HIGH	0.0739	0.1484	0.0337	0.0938	0.0472	0.0404	0.0938	0.0472	0.0404
	WGHTD AVE	0.0735	0.1480	0.0336	0.0932	0.0463	0.0396	0.0932	0.0463	0.0396
De Soto	LOW	0.1589	0.2957	0.0640	0.1741	0.0784	0.0677	0.1741	0.0784	0.0677
	HIGH	0.5365	0.5729	0.1768	0.6634	0.4106	0.3230	0.6634	0.4106	0.3230
	WGHTD AVE	0.3855	0.4673	0.1296	0.4536	0.2480	0.2037	0.4536	0.2480	0.2037
Dixie	LOW	0.0875	0.1801	0.0373	0.1001	0.0457	0.0394	0.1001	0.0457	0.0394
	HIGH	0.1335	0.3385	0.0918	0.2790	0.1965	0.1697	0.2790	0.1965	0.1697
	WGHTD AVE	0.1224	0.2737	0.0809	0.2274	0.1530	0.1321	0.2274	0.1530	0.1321
Duval	LOW	0.0539	0.1036	0.0205	0.0568	0.0245	0.0211	0.0568	0.0245	0.0211
	HIGH	0.1725	0.4091	0.1192	0.3769	0.2722	0.2325	0.3769	0.2722	0.2325
	WGHTD AVE	0.0960	0.2288	0.0535	0.1620	0.1000	0.0854	0.1620	0.1000	0.0854

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- MASONRY

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Escambia	LOW	0.1193	0.2726	0.0564	0.1466	0.0690	0.0594	0.1466	0.0690	0.0594
	HIGH	0.4036	1.4778	0.5139	1.8008	1.5875	1.3984	1.8008	1.5875	1.3984
	WGHTD AVE	0.3466	1.1228	0.3684	1.2720	1.0757	0.9389	1.2720	1.0757	0.9389
Flagler	LOW	0.1145	0.1928	0.0417	0.1205	0.0547	0.0465	0.1205	0.0547	0.0465
	HIGH	0.4723	0.9781	0.3325	1.2376	1.0147	0.8939	1.2376	1.0147	0.8939
	WGHTD AVE	0.2267	0.4303	0.1260	0.4204	0.2977	0.2565	0.4204	0.2977	0.2565
Franklin	LOW	0.2016	0.5693	0.1705	0.5574	0.4371	0.3821	0.5574	0.4371	0.3821
	HIGH	0.5095	1.9677	0.6638	2.4518	2.1990	1.9837	2.4518	2.1990	1.9837
	WGHTD AVE	0.3739	1.7206	0.5275	1.9739	1.7545	1.5793	1.9739	1.7545	1.5793
Gilchrist	LOW	0.1009	0.2072	0.0488	0.1350	0.0700	0.0588	0.1350	0.0700	0.0588
	HIGH	0.1009	0.2072	0.0488	0.1350	0.0700	0.0588	0.1350	0.0700	0.0588
	WGHTD AVE	0.1009	0.2072	0.0488	0.1350	0.0700	0.0588	0.1350	0.0700	0.0588
Gulf	LOW	0.1695	0.4430	0.1207	0.3711	0.2587	0.2215	0.3711	0.2587	0.2215
	HIGH	0.1893	0.4625	0.1248	0.3788	0.2650	0.2293	0.3788	0.2650	0.2293
	WGHTD AVE	0.1842	0.4606	0.1245	0.3775	0.2597	0.2227	0.3775	0.2597	0.2227
Hamilton	LOW	0.0431	0.0770	0.0148	0.0422	0.0175	0.0151	0.0422	0.0175	0.0151
	HIGH	0.0431	0.0770	0.0148	0.0422	0.0175	0.0151	0.0422	0.0175	0.0151
	WGHTD AVE	0.0431	0.0770	0.0148	0.0422	0.0175	0.0151	0.0422	0.0175	0.0151
Hendry	LOW	0.4705	0.5128	0.1334	0.4539	0.2001	0.1636	0.4539	0.2001	0.1636
	HIGH	0.6137	0.9496	0.3129	1.1376	0.8396	0.7154	1.1376	0.8396	0.7154
	WGHTD AVE	0.5925	0.8878	0.2763	1.0337	0.7437	0.6314	1.0337	0.7437	0.6314
Hernando	LOW	0.3094	0.2950	0.0797	0.3055	0.1600	0.1214	0.3055	0.1600	0.1214
	HIGH	0.3644	0.4241	0.1233	0.4502	0.2717	0.2227	0.4502	0.2717	0.2227
	WGHTD AVE	0.3403	0.3526	0.0991	0.3695	0.2076	0.1647	0.3695	0.2076	0.1647
Highlands	LOW	0.3176	0.3380	0.0782	0.2634	0.0978	0.0860	0.2634	0.0978	0.0860
	HIGH	0.4529	0.4879	0.1313	0.4810	0.2575	0.2052	0.4810	0.2575	0.2052
	WGHTD AVE	0.4160	0.4324	0.1165	0.4262	0.2210	0.1759	0.4262	0.2210	0.1759
Hillsborough	LOW	0.1402	0.2500	0.0586	0.1631	0.0772	0.0658	0.1631	0.0772	0.0658
	HIGH	0.4921	0.6057	0.1981	0.7388	0.5093	0.4138	0.7388	0.5093	0.4138
	WGHTD AVE	0.2962	0.3536	0.0966	0.3366	0.1827	0.1493	0.3366	0.1827	0.1493
Indian River	LOW	0.3200	0.4537	0.1213	0.4055	0.2366	0.1977	0.4055	0.2366	0.1977
	HIGH	1.0161	2.8091	0.9988	3.8418	3.4091	3.0833	3.8418	3.4091	3.0833
	WGHTD AVE	0.7450	1.9823	0.6681	2.4560	2.1053	1.8871	2.4560	2.1053	1.8871
Jackson	LOW	0.0775	0.1545	0.0326	0.0890	0.0390	0.0339	0.0890	0.0390	0.0339
	HIGH	0.1067	0.2345	0.0579	0.1664	0.0974	0.0823	0.1664	0.0974	0.0823
	WGHTD AVE	0.0932	0.1848	0.0421	0.1197	0.0603	0.0513	0.1197	0.0603	0.0513
Lake	LOW	0.1178	0.2090	0.0438	0.1215	0.0523	0.0454	0.1215	0.0523	0.0454
	HIGH	0.3909	0.3913	0.1135	0.4320	0.2514	0.1957	0.4320	0.2514	0.1957
	WGHTD AVE	0.3130	0.3321	0.0877	0.3172	0.1615	0.1289	0.3172	0.1615	0.1289
Lee	LOW	0.2801	0.4378	0.1125	0.3531	0.1906	0.1601	0.3531	0.1906	0.1601
	HIGH	1.0739	2.7874	1.0317	3.8540	3.3759	2.9862	3.8540	3.3759	2.9862
	WGHTD AVE	0.4775	0.8082	0.2266	0.8060	0.5484	0.4631	0.8060	0.5484	0.4631
Leon	LOW	0.0513	0.0963	0.0186	0.0522	0.0220	0.0190	0.0522	0.0220	0.0190
	HIGH	0.0761	0.1602	0.0390	0.1123	0.0647	0.0550	0.1123	0.0647	0.0550
	WGHTD AVE	0.0651	0.1301	0.0283	0.0799	0.0393	0.0337	0.0799	0.0393	0.0337

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- MASONRY

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Levy	LOW	0.1874	0.4679	0.1321	0.4008	0.2839	0.2416	0.4008	0.2839	0.2416
	HIGH	0.1874	0.4679	0.1321	0.4008	0.2839	0.2416	0.4008	0.2839	0.2416
	WGHTD AVE	0.1874	0.4679	0.1321	0.4008	0.2839	0.2416	0.4008	0.2839	0.2416
Manatee	LOW	0.1955	0.3412	0.0867	0.2582	0.1453	0.1213	0.2582	0.1453	0.1213
	HIGH	0.6872	1.4416	0.5082	1.8844	1.5583	1.3702	1.8844	1.5583	1.3702
	WGHTD AVE	0.4708	1.0042	0.3129	1.1177	0.8664	0.7529	1.1177	0.8664	0.7529
Marion	LOW	0.1659	0.2295	0.0531	0.1699	0.0772	0.0665	0.1699	0.0772	0.0665
	HIGH	0.3784	0.3734	0.1066	0.4058	0.2299	0.1780	0.4058	0.2299	0.1780
	WGHTD AVE	0.2427	0.2544	0.0634	0.2319	0.1130	0.0889	0.2319	0.1130	0.0889
Martin	LOW	0.4365	0.5200	0.1384	0.4617	0.2330	0.1988	0.4617	0.2330	0.1988
	HIGH	0.8974	1.8759	0.6912	2.5394	2.1430	1.8873	2.5394	2.1430	1.8873
	WGHTD AVE	0.6826	1.1997	0.4150	1.4954	1.1706	1.0215	1.4954	1.1706	1.0215
Miami-Dade	LOW	0.2065	0.4234	0.1083	0.2931	0.1677	0.1411	0.2931	0.1677	0.1411
	HIGH	1.5731	5.2235	2.0274	7.6560	7.0427	6.3276	7.6560	7.0427	6.3276
	WGHTD AVE	0.8973	2.6773	0.9955	3.6273	3.2302	2.9087	3.6273	3.2302	2.9087
Monroe	LOW	0.8924	2.1168	0.7772	2.9042	2.5164	2.2622	2.9042	2.5164	2.2622
	HIGH	1.4204	4.7299	1.8596	6.8648	6.3268	5.7182	6.8648	6.3268	5.7182
	WGHTD AVE	1.0402	2.9427	1.1515	4.1398	3.6948	3.3087	4.1398	3.6948	3.3087
Nassau	LOW	0.0584	0.1138	0.0228	0.0624	0.0275	0.0237	0.0624	0.0275	0.0237
	HIGH	0.1247	0.3211	0.0925	0.2907	0.2145	0.1860	0.2907	0.2145	0.1860
	WGHTD AVE	0.1245	0.3209	0.0925	0.2902	0.2142	0.1857	0.2902	0.2142	0.1857
Okaloosa	LOW	0.2104	0.5571	0.1623	0.5018	0.3680	0.3130	0.5018	0.3680	0.3130
	HIGH	0.4095	1.4621	0.4911	1.7486	1.5289	1.3561	1.7486	1.5289	1.3561
	WGHTD AVE	0.3613	1.2522	0.4158	1.4442	1.2442	1.0991	1.4442	1.2442	1.0991
Okeechobee	LOW	0.2490	0.3574	0.0829	0.2653	0.1201	0.1028	0.2653	0.1201	0.1028
	HIGH	0.5340	0.6078	0.1757	0.6377	0.3746	0.3037	0.6377	0.3746	0.3037
	WGHTD AVE	0.5283	0.6043	0.1753	0.6319	0.3707	0.3006	0.6319	0.3707	0.3006
Orange	LOW	0.1244	0.2228	0.0469	0.1295	0.0562	0.0488	0.1295	0.0562	0.0488
	HIGH	0.3957	0.3925	0.1134	0.4300	0.2458	0.1912	0.4300	0.2458	0.1912
	WGHTD AVE	0.2783	0.3160	0.0805	0.2799	0.1366	0.1099	0.2799	0.1366	0.1099
Osceola	LOW	0.1409	0.2538	0.0544	0.1495	0.0657	0.0570	0.1495	0.0657	0.0570
	HIGH	0.3963	0.3931	0.1099	0.4028	0.2277	0.1797	0.4028	0.2277	0.1797
	WGHTD AVE	0.2272	0.2859	0.0712	0.2337	0.1131	0.0917	0.2337	0.1131	0.0917
Palm Beach	LOW	0.3210	0.5332	0.1495	0.4730	0.3014	0.2559	0.4730	0.3014	0.2559
	HIGH	1.2368	3.5108	1.2939	4.8953	4.3814	3.9838	4.8953	4.3814	3.9838
	WGHTD AVE	0.7353	1.6979	0.5997	2.1109	1.7575	1.5634	2.1109	1.7575	1.5634
Pasco	LOW	0.1208	0.2220	0.0474	0.1304	0.0584	0.0503	0.1304	0.0584	0.0503
	HIGH	0.4142	0.4289	0.1300	0.4894	0.3029	0.2395	0.4894	0.3029	0.2395
	WGHTD AVE	0.3223	0.3763	0.1061	0.3800	0.2191	0.1781	0.3800	0.2191	0.1781
Pinellas	LOW	0.2708	0.3063	0.0760	0.2555	0.1092	0.0915	0.2555	0.1092	0.0915
	HIGH	0.5403	0.9076	0.3025	1.1089	0.8474	0.7274	1.1089	0.8474	0.7274
	WGHTD AVE	0.3746	0.5539	0.1615	0.5823	0.3871	0.3282	0.5823	0.3871	0.3282
Polk	LOW	0.1477	0.2407	0.0527	0.1531	0.0682	0.0585	0.1531	0.0682	0.0585
	HIGH	0.4909	0.5069	0.1522	0.5741	0.3440	0.2687	0.5741	0.3440	0.2687
	WGHTD AVE	0.3233	0.3700	0.0992	0.3462	0.1789	0.1443	0.3462	0.1789	0.1443
Putnam	LOW	0.0801	0.1613	0.0326	0.0872	0.0387	0.0335	0.0872	0.0387	0.0335
	HIGH	0.1514	0.3679	0.1084	0.3255	0.2311	0.1958	0.3255	0.2311	0.1958
	WGHTD AVE	0.1113	0.2366	0.0582	0.1605	0.0894	0.0757	0.1605	0.0894	0.0757

*Includes contents and A.L.E.

LOSS COSTS PER $1,000
PERSONAL RESIDENTIAL - Condo Owners -- MASONRY

COUNTY	LOSS COSTS	$0 DEDUCTIBLE STRUCTURE	$0 DEDUCTIBLE CONTENTS	$0 DEDUCTIBLE ADDITIONAL LIVING EXPENSE	$500 DEDUCTIBLE TOTAL*	$1,000 DEDUCTIBLE TOTAL*	$2,500 DEDUCTIBLE TOTAL*	1% DEDUCTIBLE TOTAL*	2% DEDUCTIBLE TOTAL*	5% DEDUCTIBLE TOTAL*
Santa Rosa	LOW	0.1678	0.3481	0.0837	0.2294	0.1182	0.0949	0.2294	0.1182	0.0949
	HIGH	0.4844	1.8480	0.6299	2.2953	2.0520	1.8326	2.2953	2.0520	1.8326
	WGHTD AVE	0.4292	1.5276	0.5327	1.8734	1.6527	1.4699	1.8734	1.6527	1.4699
Sarasota	LOW	0.1580	0.3057	0.0702	0.2002	0.0976	0.0830	0.2002	0.0976	0.0830
	HIGH	0.6795	1.5996	0.5489	2.1072	1.7988	1.6279	2.1072	1.7988	1.6279
	WGHTD AVE	0.4464	0.7711	0.2320	0.8650	0.6370	0.5541	0.8650	0.6370	0.5541
Seminole	LOW	0.1958	0.2587	0.0612	0.1993	0.0965	0.0790	0.1993	0.0965	0.0790
	HIGH	0.3895	0.3729	0.1053	0.4005	0.2201	0.1693	0.4005	0.2201	0.1693
	WGHTD AVE	0.3033	0.3206	0.0841	0.3048	0.1555	0.1230	0.3048	0.1555	0.1230
St. Johns	LOW	0.0819	0.1656	0.0353	0.0970	0.0469	0.0403	0.0970	0.0469	0.0403
	HIGH	0.2832	0.9517	0.3218	1.1196	0.9677	0.8585	1.1196	0.9677	0.8585
	WGHTD AVE	0.2018	0.6001	0.1789	0.6461	0.5326	0.4690	0.6461	0.5326	0.4690
St. Lucie	LOW	0.2475	0.3731	0.0910	0.2758	0.1413	0.1191	0.2758	0.1413	0.1191
	HIGH	0.9912	2.7238	0.9901	3.7211	3.2967	2.9875	3.7211	3.2967	2.9875
	WGHTD AVE	0.7438	1.7038	0.6028	2.2357	1.8981	1.7039	2.2357	1.8981	1.7039
Sumter	LOW	0.1482	0.2430	0.0534	0.1553	0.0703	0.0598	0.1553	0.0703	0.0598
	HIGH	0.3955	0.4024	0.1180	0.4454	0.2622	0.2048	0.4454	0.2622	0.2048
	WGHTD AVE	0.1951	0.2774	0.0654	0.2097	0.1009	0.0828	0.2097	0.1009	0.0828
Taylor	LOW	0.0870	0.1888	0.0432	0.1203	0.0643	0.0550	0.1203	0.0643	0.0550
	HIGH	0.0870	0.1888	0.0432	0.1203	0.0643	0.0550	0.1203	0.0643	0.0550
	WGHTD AVE	0.0870	0.1888	0.0432	0.1203	0.0643	0.0550	0.1203	0.0643	0.0550
Union	LOW	0.0835	0.1767	0.0430	0.1212	0.0680	0.0578	0.1212	0.0680	0.0578
	HIGH	0.0835	0.1767	0.0430	0.1212	0.0680	0.0578	0.1212	0.0680	0.0578
	WGHTD AVE	0.0835	0.1767	0.0430	0.1212	0.0680	0.0578	0.1212	0.0680	0.0578
Volusia	LOW	0.1169	0.2078	0.0436	0.1210	0.0522	0.0453	0.1210	0.0522	0.0453
	HIGH	0.8000	1.9742	0.7094	2.7068	2.3643	2.1069	2.7068	2.3643	2.1069
	WGHTD AVE	0.5941	1.3875	0.4661	1.8073	1.5381	1.3641	1.8073	1.5381	1.3641
Wakulla	LOW	0.0794	0.1608	0.0345	0.0936	0.0421	0.0363	0.0936	0.0421	0.0363
	HIGH	0.1904	0.5246	0.1579	0.5117	0.3960	0.3439	0.5117	0.3960	0.3439
	WGHTD AVE	0.1904	0.4689	0.1389	0.4612	0.3533	0.3068	0.4612	0.3533	0.3068
Walton	LOW	0.1091	0.2377	0.0486	0.1287	0.0594	0.0510	0.1287	0.0594	0.0510
	HIGH	0.4074	1.5079	0.5014	1.8086	1.5969	1.4274	1.8086	1.5969	1.4274
	WGHTD AVE	0.3763	1.3057	0.4232	1.5431	1.3459	1.1995	1.5431	1.3459	1.1995
STATEWIDE	LOW	0.0431	0.0770	0.0148	0.0422	0.0175	0.0151	0.0422	0.0175	0.0151
	HIGH	1.5731	5.2235	2.0274	7.6560	7.0427	6.3276	7.6560	7.0427	6.3276
	WGHTD AVE	0.5683	1.4146	0.4726	1.6537	1.3653	1.2103	1.6537	1.3653	1.2103

*Includes contents and A.L.E.

Form A7: Percentage Change In Output Ranges

		$0 Deductible									
		Structure	Contents	Appurtenant Structure	Additional Living Expense	$500 Deductible Total	$1,000 Deductible Total	$2,500 Deductible Total	1% Deductible Total	2% Deductible Total	5% Deductible Total
Frame Owners	Coastal	6.98%	2.29%	0.41%	-1.00%	6.37%	7.08%	7.38%	7.08%	7.46%	7.42%
	Inland	-6.36%	-11.05%	-16.92%	-13.18%	-6.24%	-4.82%	-3.72%	-4.82%	-3.81%	-3.32%
	North	13.78%	13.63%	-1.99%	4.03%	15.51%	22.17%	22.87%	22.17%	24.40%	18.89%
	Central	-1.41%	-4.59%	-9.17%	-3.94%	-1.36%	-0.64%	0.80%	-0.64%	0.36%	3.53%
	South	6.78%	-7.27%	4.38%	-6.93%	4.54%	4.31%	3.91%	4.31%	4.10%	2.62%
	Statewide	4.18%	0.01%	-3.30%	-2.73%	3.80%	4.83%	5.52%	4.83%	5.49%	6.06%
Masonry Owners	Coastal	5.13%	0.20%	-3.10%	1.88%	4.65%	5.12%	6.64%	5.12%	6.18%	9.24%
	Inland	-5.23%	-12.25%	-18.35%	-10.93%	-5.16%	-3.52%	-0.70%	-3.52%	-1.47%	4.40%
	North	6.81%	0.04%	-6.08%	-7.28%	7.33%	12.92%	12.91%	12.92%	14.92%	6.90%
	Central	-0.41%	-3.54%	-10.92%	-0.38%	-0.15%	1.08%	3.62%	1.08%	2.88%	9.31%
	South	5.99%	-0.25%	-1.90%	1.23%	5.15%	5.38%	6.69%	5.38%	6.27%	8.66%
	Statewide	3.62%	-1.28%	-5.39%	0.56%	3.25%	3.96%	5.77%	3.96%	5.23%	8.81%
Mobile Homes	Coastal	-16.48%	-23.95%	-6.86%	-22.71%	-18.95%	-19.71%	-21.33%	-18.95%	-19.71%	-21.33%
	Inland	-30.46%	-40.36%	-16.47%	-40.37%	-34.07%	-35.35%	-38.17%	-34.07%	-35.35%	-38.17%
	North	-20.44%	-25.04%	-10.92%	-27.22%	-23.15%	-24.24%	-25.93%	-23.15%	-24.24%	-25.93%
	Central	-24.18%	-31.42%	-12.51%	-32.48%	-26.99%	-27.96%	-30.00%	-26.99%	-27.96%	-30.00%
	South	-15.55%	-24.57%	-5.97%	-22.93%	-18.33%	-19.04%	-20.69%	-18.33%	-19.04%	-20.69%
	Statewide	-21.21%	-28.57%	-10.61%	-28.93%	-23.90%	-24.74%	-26.49%	-23.90%	-24.74%	-26.49%
Frame Renters	Coastal	0.00%	8.05%	0.00%	-4.74%	6.75%	7.41%	9.03%	6.44%	6.75%	7.75%
	Inland	0.00%	-11.14%	0.00%	-11.64%	-19.41%	-20.15%	-19.36%	-18.77%	-19.41%	-20.15%
	North	0.00%	12.94%	0.00%	-3.24%	10.49%	10.50%	11.31%	10.59%	10.49%	10.63%
	Central	0.00%	-2.12%	0.00%	-8.08%	-3.91%	-3.77%	-2.80%	-3.89%	-3.91%	-3.61%
	South	0.00%	7.02%	0.00%	-7.92%	6.26%	7.07%	8.88%	5.84%	6.26%	7.45%
	Statewide	0.00%	5.96%	0.00%	-6.17%	5.30%	5.92%	7.45%	5.00%	5.30%	6.23%
Masonry Renters	Coastal	0.00%	21.06%	0.00%	1.18%	27.10%	28.02%	29.42%	26.55%	27.10%	28.35%
	Inland	0.00%	-11.94%	0.00%	-10.82%	-12.30%	-12.73%	-12.67%	-12.03%	-12.30%	-12.85%
	North	0.00%	3.16%	0.00%	-9.55%	0.68%	0.30%	0.21%	0.93%	0.68%	0.19%
	Central	0.00%	1.53%	0.00%	-6.84%	8.05%	8.50%	8.83%	7.72%	8.05%	8.58%
	South	0.00%	23.75%	0.00%	3.41%	29.18%	30.12%	31.67%	28.64%	29.18%	30.48%
	Statewide	0.00%	18.22%	0.00%	-0.51%	25.30%	26.19%	27.45%	24.75%	25.30%	26.49%
Frame Condos	Coastal	8.20%	23.22%	0.00%	13.16%	16.64%	17.28%	18.11%	16.64%	17.28%	18.11%
	Inland	-7.59%	-14.03%	0.00%	-15.75%	-14.27%	-22.02%	-23.48%	-14.27%	-22.02%	-23.48%
	North	30.69%	74.82%	0.00%	52.02%	79.89%	91.31%	95.52%	79.89%	91.31%	95.52%
	Central	2.67%	16.87%	0.00%	14.35%	16.15%	19.51%	21.17%	16.15%	19.51%	21.17%
	South	4.56%	6.67%	0.00%	2.50%	1.29%	-0.09%	0.11%	1.29%	-0.09%	0.11%
	Statewide	5.96%	20.90%	0.00%	11.58%	14.95%	15.81%	16.67%	14.95%	15.81%	16.67%
Masonry Condos	Coastal	11.69%	29.78%	0.00%	30.06%	30.83%	34.40%	35.92%	30.83%	34.40%	35.92%
	Inland	-7.92%	-13.95%	0.00%	-13.11%	-10.37%	-14.18%	-15.07%	-10.37%	-14.18%	-15.07%
	North	42.51%	59.00%	0.00%	49.39%	74.73%	85.67%	87.82%	74.73%	85.67%	87.82%
	Central	10.17%	34.41%	0.00%	36.65%	40.77%	51.85%	55.70%	40.77%	51.85%	55.70%
	South	10.62%	27.44%	0.00%	28.12%	27.67%	30.44%	31.75%	27.67%	30.44%	31.75%
	Statewide	11.01%	29.18%	0.00%	29.52%	30.33%	34.01%	35.55%	30.33%	34.01%	35.55%