Milliman Proposal:
Texas Windstorm Insurance Association

Actuarial Services – Rate Indications

Paul Anderson, FCAS, CSPA, MAAA
Dave Evans, FCAS, MAAA
Eric Krafcheck, FCAS, CSPA, MAAA

JUNE 1, 2020

Milliman

Project Team

Paul Anderson, FCAS, CSPA, MAAA
Principal & Consulting Actuary
Milwaukee
paul.anderson@milliman.com

Education and Qualifications

- Fellow, Casualty Actuarial Society
- Certified Specialist in Predictive Analytics, iCAS
- Member, American Academy of Actuaries
- BS, Actuarial Science, Drake University

Current responsibilities

- Senior consultant for pricing, predictive modeling, and product development engagements
- Leads Milwaukee Casualty's Personal Lines consulting practice

Relevant experience

- More than 26 years of pricing, predictive modeling, and product development experience
- Provided rate level adequacy analyses for various property lines of business
- Assisted companies with catastrophe risk analysis
- Provided expert witness testimony to support property rate filings

Relevant skills

- Ratemaking & class plan development
- Evaluation of modeled hurricane losses to support pricing, reinsurance, and exposure management
- Pricing applications of predictive analytics (using GLMs)
- Filing and implementation support
- Expert witness support for rate filings and potential litigation

Project Team

Dave Evans, FCAS, MAAA
Consulting Actuary
San Francisco
david.d.evans@milliman.com

Education and Qualifications

- Fellow, Casualty Actuarial Society
- Member, American Academy of Actuaries
- BS, Statistics, California Polytechnic State University

Current responsibilities

- Senior consultant for catastrophic risk and severe weather engagements
- Leads research and development initiatives to leverage catastrophe models in innovative ways

Relevant experience

- 10 years of ratemaking, predictive modeling, and product development experience in homeowners and other property lines
- Developed by-peril rating plans in catastrophe-exposed areas using multiple hurricane models
- Led a variety of catastrophe-related analyses for insurers, reinsurers, government agencies, and other entities

Relevant skills

- Catastrophe model evaluation
- Evaluation of modeled hurricane losses to support pricing, reinsurance, and exposure management
- Ratemaking for catastrophe-exposed property
- Rate filing expert witness support

Project Team

Eric Krafcheck, FCAS, CSPA, MAAA
Consulting Actuary
Milwaukee
eric.krafcheck@milliman.com

Education and Qualifications

- Fellow, Casualty Actuarial Society
- Certified Specialist in Predictive Analytics, iCAS
- Member, American Academy of Actuaries
- BS, Actuarial Science & Applied Statistics, Purdue University

Current responsibilities

- Project manager for pricing and predictive modeling engagements
- Day-to-day liaison between clients and project team

Relevant experience

- Nearly 10 years of pricing, predictive modeling, and product development experience
- Developed rate indications for homeowners, commercial property, and mobile homeowners, including in coastal states
- Developed by-peril rating plans, including rating variables applicable to modeled hurricane losses

Relevant skills

- Ratemaking & class plan development for property lines of business
- Pricing applications of predictive analytics (using GLMs)
- Evaluation of modeled hurricane losses to support pricing and reinsurance analyses
- Filing and implementation support

Why Milliman?

Related Experience

Pricing Experts

- Rate indications for both commercial and residential property
- Rating plan development across multiple lines of business, including property
- Filing support including expert witness testimony

Expertise in Catastrophe Modeling

- Detailed model reviews and comparisons
- Incorporation of catastrophe model output into rate indications and other analyses
- Rating plan development in catastrophe exposed areas

Industry Leaders

In Core Aspects of Project

Current TWIA Business Partner

- Annual independent reserve reviews
- Rate indications for both commercial and residential property
- Analysis of territory definitions and relativities
- Already familiar with TWIA's data, historical experience, and catastrophe exposure

Experience with Similar Entities

- Texas FAIR Plan Association
- North Carolina Rate Bureau
- NCJUA / NCIUA
- Florida Department of Financial Services
- Federal Emergency Management Agency
- Property insurers with major coastal exposure

Questions?

Milliman

Thank you

Paul Anderson
paul.anderson@milliman.com

Dave Evans
david.d.evans@milliman.com

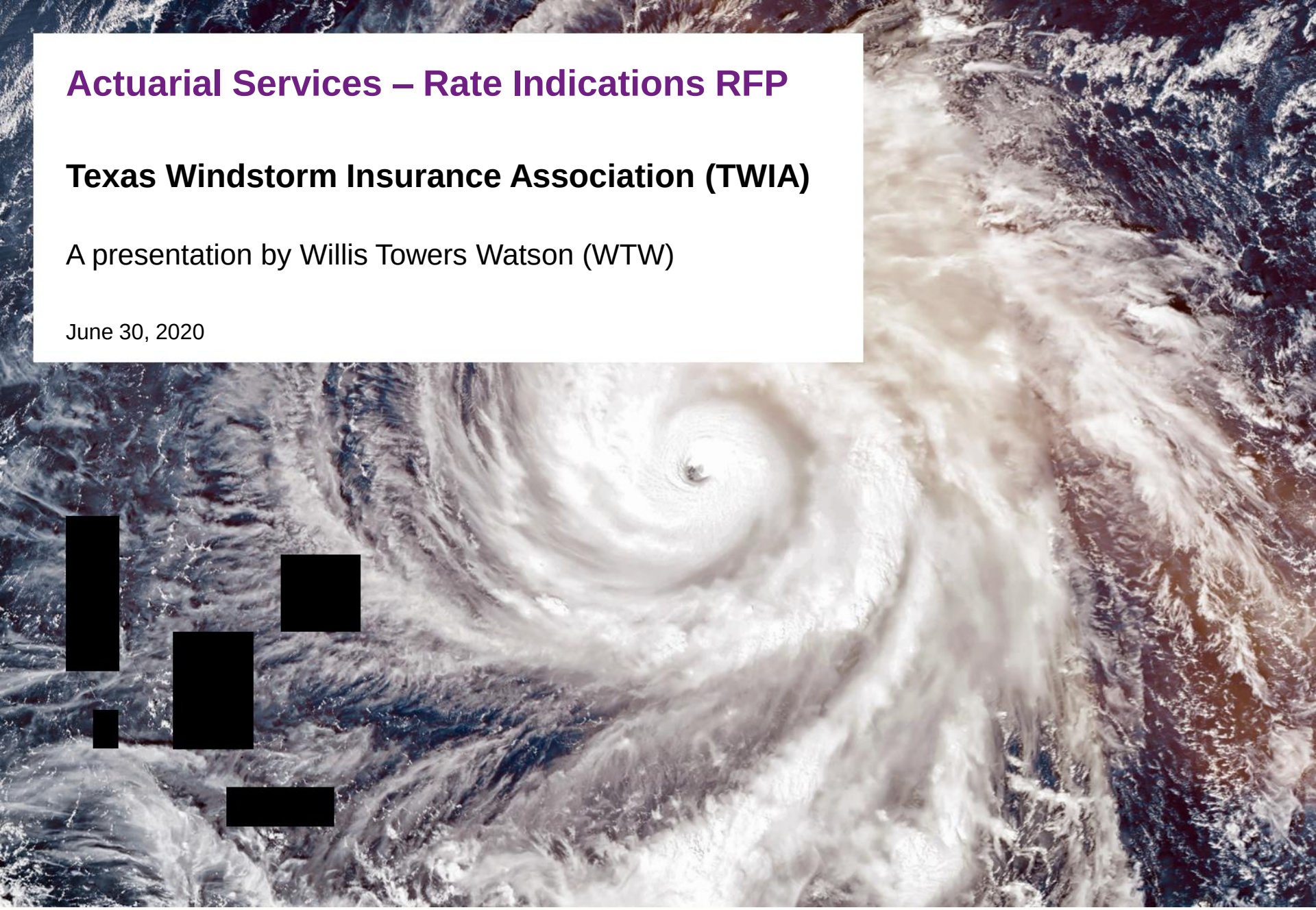
Eric Krafcheck
eric.krafcheck@milliman.com

Actuarial Services – Rate Indications RFP

Texas Windstorm Insurance Association (TWIA)

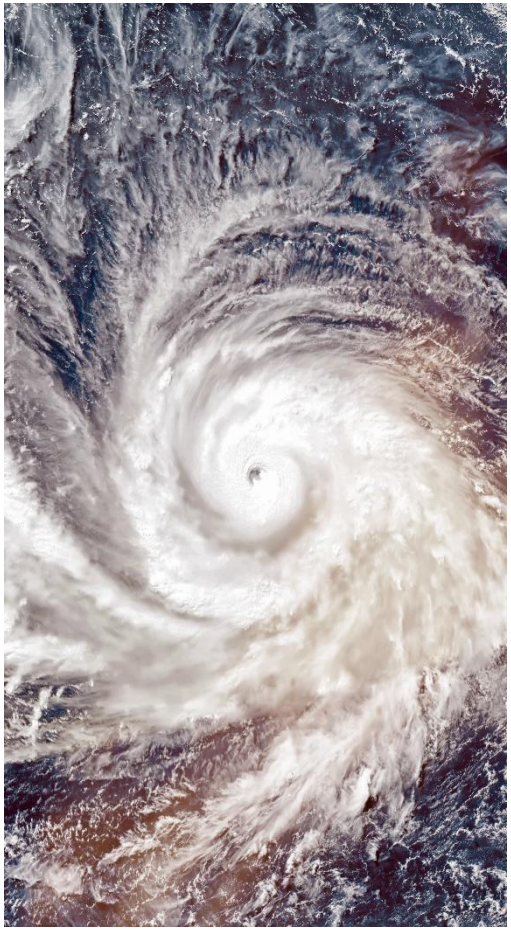
A presentation by Willis Towers Watson (WTW)

June 30, 2020



Willis Towers Watson

Agenda



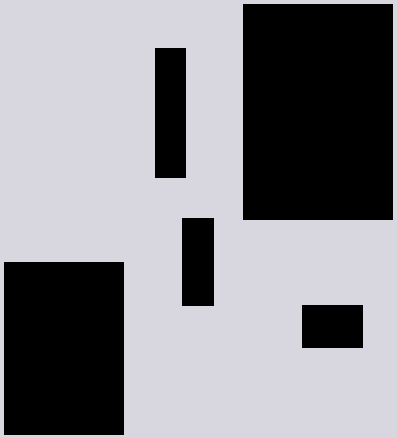
- Introduction
- Qualifications
- Review of Catastrophe Models
- Rate Review
- Quality Assurance Review
- Closing - Why choose Willis Towers Watson
- Questions

Introduction

We understand that TWIA is looking for an experienced actuarial partner to provide the following services:

Review of Catastrophe Models	Provide insights into differences between RMS and AIR with respect to AAL and 1:100 year PML
Rate Review	Thorough review of rate level for residential and commercial wind/hail property insurance
Expert Testimony (if necessary)	Willis Towers Watson will be available to present their findings to the Actuarial and Underwriting Committee, the Board of Directors, and Texas governmental bodies (if necessary)
Status Updates	Willis Towers Watson will be available to provide status updates and participate in discussions by telephone or in person
Quality Assurance Review	Our overall quality program, Excellence, is a key differentiator that sets Willis Towers Watson apart

Qualifications



Why Willis Towers Watson

A qualified and experienced team

Lisa Sukow
FCAS, MAAA
Engagement Leader

- 25 years of property and casualty experience
- Extensive experience in Texas with USAA and Allstate
- Extensive experience communicating with regulators to proactively address rate filing questions
- Bachelor of Science degree in Mathematics from Notre Dame

Jade Nguyen
Cat Model Expert

- 15 years of catastrophe modeling experience
- Extensive experience working with Texas-based clients and brokers as a consultant on catastrophe modeling and advising on the management of catastrophe risk.
- Participated in TWIA RFP for Reinsurance Brokerage in 2016
- Manages all catastrophe modeling functions in the Dallas office
- Bachelor of Arts degree in Mathematics from DePaul University, Chicago

Jarrett Cabell
FCAS, MAAA
Rate Review

- 14 years of property and casualty experience
- Experience developing commercial multi-peril and residential property rate indications and integrating catastrophe modeling results in coastal states
- Extensive experience working for insurance carriers prior to WTW
- Bachelor of Science degree in Mathematics from Washington University

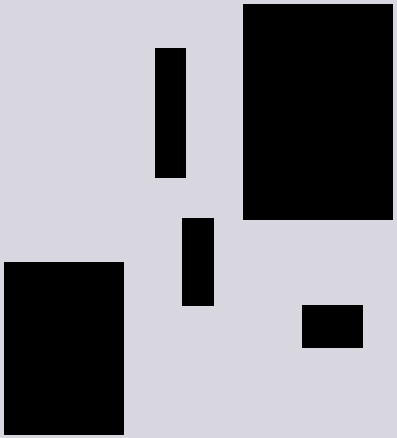
Why Willis Towers Watson

A combination of technical and actuarial expertise

Technical expertise	▪ Catastrophe modeling ▪ Predictive modeling
Actuarial expertise	▪ Ratemaking and pricing for many lines of business, including cat and non-cat perils ▪ Actuarial review ▪ Solid understanding of rate regulation and actuarial standards of practice ▪ Expert testimony
Consulting expertise	▪ Support large, diverse P&C insurer client base ▪ Effective project management and clear communication style ▪ Experience working with TDI and other regulators ▪ Ability to leverage our network to bring appropriate expertise as needed

Close tie between insurance consulting and reinsurance brokerage puts Willis Towers Watson in a unique position to advise clients across the entire breadth of ratemaking and catastrophe risk management

Review of Catastrophe Models



Catastrophe model expertise

Our experience

One of the key advantages of working with Willis Towers Watson is the **collaborative** approach we take across our large network of associates to provide you with access to the **best experts** available throughout the firm.

Our proposal includes access to the **Catastrophe Analytics Unit**, an experienced team dedicated to understanding and interpreting the risk posed by natural or man-made hazards.

Catastrophe Analytics specialized projects include:

- Review and technical evaluation of commercial catastrophe risk models
- Understanding the changes in cat models
- Conducting modeling research
- Reviewing company specific internal models and benchmarking
- Building proprietary models

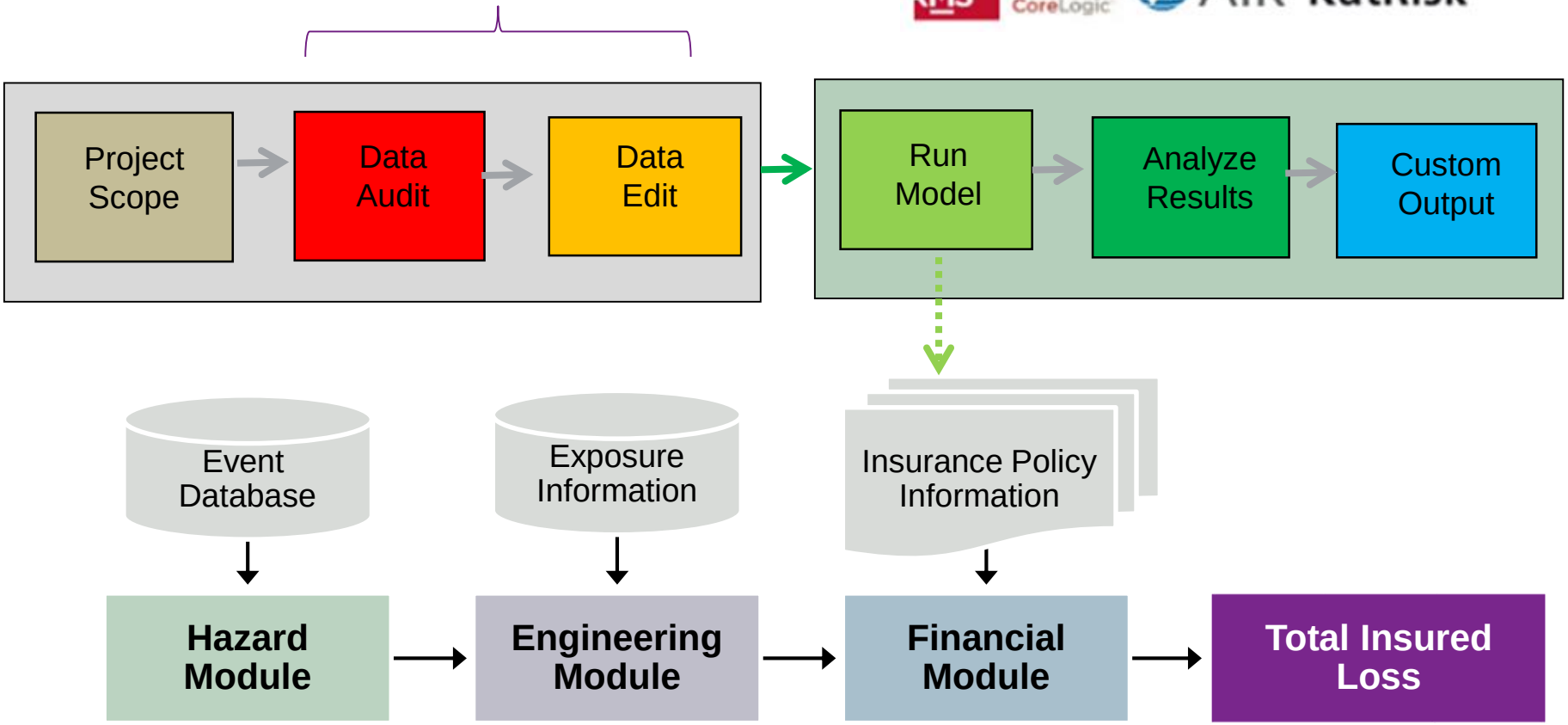
Ratemaking considerations and compliance with ASOP #38 – *Using Models Outside the Actuary's Area of Expertise*

- Determine appropriate reliance on experts
- Have a basic understanding of the model
- Evaluate whether the model is appropriate for the intended application
- Determine that appropriate validation has occurred
- Determine the appropriate use of the model

Catastrophe models: Process and action plan

WTW uses the latest release of all major commercially available catastrophe models for all applicable lines & perils

Opportunity to identify and resolve any data issues



Examples of catastrophe model review considerations

Hazard Considerations

- Source of hurricane model data
- Wind speeds
  - Distance to coast, surface roughness, geological factors affect rate of inland decay (land's terrain & vegetation)
- Near-term vs. Long-term view
- Validation and calibrations

Financial / Insurance Considerations

- Insurance to value / Replacement costs
- Demand surge
- Storm surge in consideration of coverage leakage
- Financial perspective of interest
  - Ground up, gross, net of reinsurance

Engineering Considerations

- Year built & building codes
- Mitigation and retrofit measures
- Individual risk characteristics
- Contents and non-structural elements damage

Non-Modeled Losses Considerations

- Loss Adjustment Expenses
- Debris/hazardous waste removal
- Damage from fallen trees
- Inflation due to political pressure
- Building/Ordinance coverage
  - Demolition & building upgrade cost

Examples of catastrophe model review considerations

Model differences

Why the model differences?

- The models, although similar in concept, can produce significantly different loss estimates reflecting differences in underlying assumptions and methodologies adopted
  - Stochastic event generation
    - AIR events are dependent on the months through which policies are active
    - AIR generally shows more frequent U.S. landfalls than RMS for weaker hurricanes while the inverse is true for major hurricanes under the long-term view
    - RMS generally produces a larger radius of max wind (Rmax) which means larger storms at landfall
  - Vulnerability
    - AIR generally has larger inland penetration than RMS
    - AIR generates relatively lower credits for larger homes than RMS
    - AIR generates smaller credit or penalty than RMS around unknown secondary modifiers
    - AIR is less sensitive to roof age than RMS
- Level of discrepancies between models depend on portfolio and regional estimates, and can vary significantly

Examples of catastrophe model review considerations

Model differences for TWIA coastal regions

Model differences for TWIA coastal regions

- Magnitude of model differences depends on the hurricane rate being used as both RMS and AIR provide two views of hurricane activity rate for loss estimate
- Long-term rates reflect historical average of hurricane landfalls based largely on HURDAT v2 dataset by NHC
- Near-term rates
  - RMS: historical average as baseline, forecasting how a forthcoming 5-yr period may deviate from it considering the near-term influence of climate variables on frequency
  - AIR: measures hurricane risk based on years in which the sea surface temperature was above the historical mean, and therefore provides a measure of expected risk for any season/seasons in which the Atlantic is warmer than average
- Given the challenges in making reliable forecast of multi-annual average hurricane rates and the current state of the knowledge on multi-annual forecast of hurricane activity, WTW recommends using long-term event set for both RMS and AIR.
- Within RMS, near-term modeled losses are lower than long-term modeled losses by about 8%
- Within AIR, near-term modeled losses are higher than long-term modeled losses by about 7%
- Between the two models, AIR is higher than RMS modeled losses by 15% to 30% under both hurricane views, with the difference being on the higher end of the range for near-term view

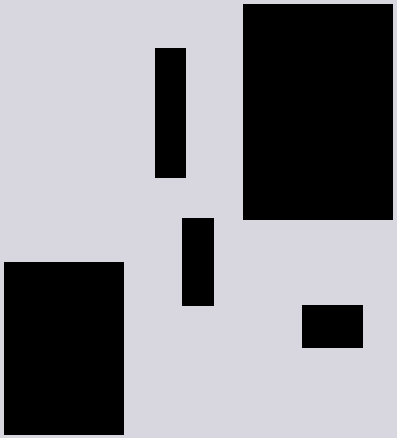
Examples of catastrophe model review considerations

RMS vs. AIR, Near-term vs. Long-term

Which model is the right one?

- WTW fully supports the use of multiple models and believes that no one vendor or product has a monopoly on the “best” approach
  - Model blending allows companies to mitigate model uncertainties, including model changes
  - Baseline is to take straight average of the two models
  - Alternatively, different weights can be assigned to each model depending on how each model performs against the company-specific data input and historical experience
  - Compare to historical events for TWIA and the industry
- Catastrophe models are by nature designed to extrapolate beyond a limited historical record based on sound principles, particularly low frequency and high severity events
  - There have been 9 major hurricanes affecting TX within the last 60 years; however, none have been a Cat 5.
  - But a few Cat 5 hurricanes have made landfall in US, most recently with Hurricane Michael in 2018, so it is possible from a scientific perspective that one could occur in TX.
  - The consideration for this type of possibility is where catastrophe modeling is distinct from using purely historical methods for predicting future losses.
- Models may produce different results, but they are validated and continuously calibrated based on sound principles using a combination of not only historical information, but also the latest demographic, building, scientific and financial data.

Rate Review



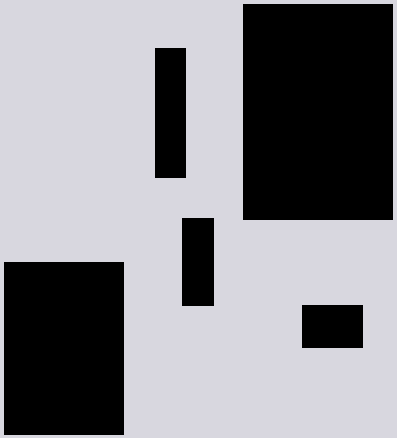
Rate Review

Ratemaking considerations for Catastrophe Exposed Areas

Accounting for expected loss and LAE ratio	▪ The output from catastrophe models should be reviewed to ensure compliance with ASOP 39, *Treatment of Catastrophe Losses in Property Casualty Insurance Ratemaking*, as well as Texas legislative requirements
	▪ The loss and LAE ratio must include a provision for:
	  • Hurricane loss and LAE – should incorporate hurricane model results and compare to historical results, any inconsistencies should be explained or if appropriate, adjustments should be made to address inconsistencies
	  • Other Wind / Hail loss and LAE – losses should be trended and developed. Premiums should be at current rate level and trended.
	▪ Consideration should be given to all changes that may affect the projected rate indication, including legislative changes and company changes, such as the impact of changing replacement cost estimators

Expense considerations	▪ Expenses should be split between fixed and variable expenses ▪ The development of the net cost of reinsurance should use assumptions that are consistent with the assumptions used to develop the hurricane loss and LAE ratio
Consulting expertise	▪ Experience using all of the above techniques to incorporate catastrophe cost into the ratemaking process, and the expertise to help determine if one methodology is superior to another, taking into consideration things like model uncertainty, credibility, and spread of risk in a region/state ▪ Close tie between insurance consulting and reinsurance brokerage puts Willis Towers Watson in a unique position to advise clients across the entire breadth of ratemaking and catastrophe risk management

Quality Assurance Review



Quality Assurance Review

Excellence and Work Review Policy

Our overall quality program, *Excellence*, is a key differentiator that sets Willis Towers Watson apart.

Excellence is a core value of Willis Towers Watson and the name for the full range of our quality efforts. Excellence is intended to produce work that is technically sound, addresses our client's business issues, meets our client's service expectations, takes full advantage of our capabilities, and reflects all of our values.

One important way we do this for all of our clients is through our Work Review Policy: all work that is developed by Willis Towers Watson for clients must be reviewed before it is delivered, and the review must be documented.

Quality Assurance Review

Three key work review components

1 Technical Review

- Requires the reviewer to check all technical aspects of the work, including compliance with applicable standards, laws and regulations
- Ensures that the data used and the calculations employed in the rate indication analyses are correct and free of error
- Ensures the proper documentation of data sources and formulas

A Technical Reviewer is required to have the appropriate expertise and experience for the portion of the work they are reviewing.

2 Consulting Review

Will require the reviewer to determine whether:

- TWIA's needs and relevant issues are identified and addressed in the analysis
- The methods, analyses, assumptions and recommendations are sound, well supported, and appropriately draw upon our intellectual capital
- The client deliverable contains information required by relevant professional standards
- The results are reasonable
- The work is explained in terms that can be understood by TWIA
- Material risks and appropriate alternatives have been considered

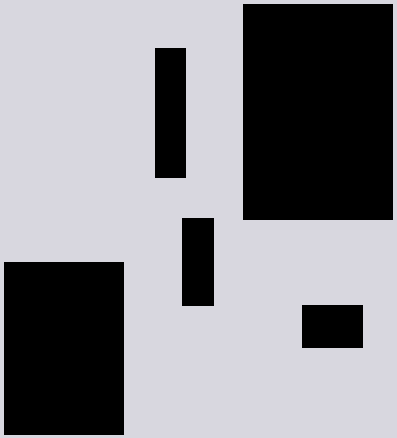
A Consulting Reviewer must have the experience and expertise to thoroughly understand the work and must be a subject matter expert.

3 Editorial Review

Ensures that:

- The spelling, grammar, and punctuation of the work are correct
- The work reads well
- The work is formatted cleanly and in accordance with Willis Towers Watson standards

Closing - Why choose Willis Towers Watson



Why Willis Towers Watson

The right mix of rate development and coastal market expertise to provide you trusted advice and strategies for success

Marketplace insight / intelligence	■ Extensive work in product design, pricing/rating, and competitive practices gives us rich insight into marketplace/competitive approaches and regulatory constraints and sensitivities across the U.S., including Texas. ■ Using our marketplace understanding, we go beyond technical solutions to develop and implement practical strategies for success in a highly dynamic market.
Texas homeowners experience	■ We have experience with the preparation of and submission of rate and rule filings in Texas. ■ We have numerous working relationships with TDI staff and other individuals in the Texas marketplace that allow us to stay abreast of trends in Texas as they relate to the types of filings being approved and what the TDI is focusing on during the current annual rate filing cycle. ■ In addition to the preparation of and submission of filings, we have provided responses to subsequent clarification letters from regulators after the filing has been submitted.
Record of success	■ We have a track record of success working with all types of insurers -- across many lines of business and ranging in size from small regional to large global multi-national.

Thoughtful and collaborative approach

We will:

- ✓ listen
- ✓ work closely with you to understand your unique situation and tailor our services to best address your needs
- ✓ establish timelines that suit your needs
- ✓ manage the project carefully
- ✓ communicate with you every step of the way
- ✓ provide insights beyond “the numbers”

We will not:

- ✓ begin projects with a preconceived notion of what the “right answer” is

Timeline

Contract awarded	June 30
Contract signed	July 1
Actuarial & Underwriting Committee	July 21 or 23
Board of Directors	August 4
Annual rate filing submitted	August 15

In light of the compressed timeframe, TWIA might consider an alternative engagement where WTW peer reviews TWIA's indications with particular emphasis on the hurricane loss ratio and debt payoff.

Questions

Actuarial Services
Proposal Presentation

TWIA
TEXAS WINDSTORM INSURANCE ASSOCIATION

MERLINOS actuaries consultants

Who We Are

Merlinos & Associates is a property, casualty, health, disability, and life actuarial consulting firm founded in 1988, currently serving clients in the U.S. and internationally.

With 53 actuarial professionals, we are one of the largest independent actuarial firms in the United States.

- 34 credentialed actuaries (FCAS, FSA, ACAS, ASA, MAAA), 19 actuarial analysts.
- 27 P&C credentialed actuaries under one roof.
  - ✓ The most in any consulting office in the U.S.
- 50% of our credentialed actuaries worked at P&C, health, and life insurance companies and/or reinsurance companies prior to joining Merlinos.
- Top 10 P&C actuarial consulting firm based on P&C loss reserves of the insurance companies for whom we provide a statutory Statement of Actuarial Opinion.

Other Staff Credentials

- ✓ Chartered Property Casualty Underwriter
- ✓ Certified Specialist in Predictive Analytics
- ✓ Associate in Risk Management
- ✓ Chartered Financial Analyst
- ✓ Chartered Enterprise Risk Analyst
- ✓ Associate in Loss Control Management

Coastal Property Experience

- We have provided property ratemaking and reserving services, including independent rate indications, to over a dozen insurance companies operating in Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.
- We also have worked closely for insurance regulators in Gulf states reviewing rate filings of property writers, assisting in the financial examinations of property carriers, and assisting in the supervision of distressed property carriers.

In 2012, we were contracted by TWIA to perform an independent actuarial analysis of the pricing of their Residential and Commercial books of business.

- Provided a thorough review of TWIA's overall rate level and rate structure for both residential and commercial property insurance, and prepared a report for the TWIA Board of Directors with findings, including an indication of overall rate needed to achieve rate adequacy.
- Identified and presented possible structural changes to TWIA's rate program and the implications of those changes for possible rate changes.

Cypress Property & Casualty Insurance Company
Edison Insurance Company
Gulfstream P&C Insurance Company
Lighthouse Property & Casualty Insurance Company
Maison Insurance Company
Security First Insurance Company
Weston Insurance Company
Louisiana Citizens Property Insurance Corporation
Massachusetts Property Insurance Underwriting Association
Georgia Underwriting Association
Swyfft

Catastrophe Model Experience

- Use and investigation of a variety of catastrophe models in our pricing services.
- Development of portfolio analyses and policy level profit analyses using various catastrophe models.
- Development of complex classification pricing systems using catastrophe models.
- Review of actuarial components of hurricane models as part of the Florida Commission on Hurricane Loss Projection Methodologies professional team.
- Review of use of variety of catastrophe models for pricing and rate development as part of our services to numerous state insurance departments.
- Development of integrated pricing analyses to blend considerations of model risk, use of reinsurance, and cost of capital concerns.

Models	Catastrophes
AIR	Hurricane
RMS	Severe Convective Storm
EQECAT	Earthquake and Fire Following
ARA	Flood
Karen Clark & Co.	Wildfire

Actuarial Services
Proposal Presentation

Thank you!

TWIA
TEXAS WINDSTORM INSURANCE ASSOCIATION

MERLINOS actuaries consultants

Texas Windstorm Insurance Association

TEXAS WINDSTORM INSURANCE ASSOCIATION

Proposal for Actuarial Services
June 1, 2020

Presented by:
Christopher J. Burkhalter, FCAS, MAAA
President & Principal

THE BURKHALTER GROUP
Consulting Actuaries

PO Box 1546 | Madison, MS 39130 | 601.668.7611 | cburkhalter@tbgactuarial.com

PRESENTATION OVERVIEW

- The Firm
- The Team
- The Project
- Final Remarks / Q & A

THE FIRM

- Founded in 2018
  - Formerly Bickerstaff, Whatley, Ryan & Burkhalter (1990)
  - Corporate restructuring and re-domestication
- Six fully-credentialed actuaries
  - Offices in Mississippi, Texas, Pennsylvania, & California
  - Three senior actuaries will provide backup consultation

THE FIRM

- Patrick L. Whatley, FCAS, MAAA
  - Richardson, Texas office (1995)
  - 1972 mathematics graduate – Texas A&M
  - Provided expert testimony before the Texas Legislature on insurance related matters
  - Extensive experience in property rate hearings before the Texas Department of Insurance

THE FIRM

- Kevin M. Ryan, FCAS, MAAA
  - West Chester, Pennsylvania office (2001)
  - Mathematics graduate – Fairfield University
  - Extensive experience in all facets of insurance
    - Insurance companies (Aetna & Industrial Indemnity)
    - Regulatory (Deputy Director of the Illinois DOI)
    - Consulting (Milliman and Wexford)
    - P&C rating bureau (Vice President of ISO)
    - Workers comp (President & CEO of NCCI)
  - Former President of the Casualty Actuarial Society

THE FIRM

- Richard J. Roth, FCAS
  - Huntington Beach, California office (2003)
  - Math/Stats/Econ degrees – Stanford University
  - Extensive regulatory experience
    - Assistant Commissioner of California
    - Worldwide expert in earthquake insurance
  - Extensive experience working with cat modelers
  - Board of Directors - Casualty Actuarial Society

THE TEAM

- Windrie Wong, FCAS, MAAA
  - Palm Desert, California
  - Honors graduate – The University of Wisconsin
  - Company experience at Sentry Insurance
  - Consulting experience
    - Milliman
    - BWR&B / The Burkhalter Group

THE TEAM

- Matthew J. Stephenson, FCAS, MAAA
  - Madison, Mississippi office (2013)
  - Summa cum laude graduate – The University of Mississippi
  - Master's degree in Mathematics - Vanderbilt
  - Extensive experience with three different wind pools

THE TEAM

- Christopher J Burkhalter, FCAS, MAAA
  - Madison, Mississippi office (1999)
  - Physics graduate – The University of Mississippi
  - Master's degree in Physics – University of New Orleans
  - Naval Research Laboratory – Research Physicist
  - Southern Farm Bureau Casualty – 1993-1998
  - Actuarial consultant since 1999

THE PROJECT

- Property Insurance Co Experience
  - Mississippi Farm Bureau – HO & Dwelling
  - Consulting Experience
    - Numerous Homeowners filings in multiple states
      - Alabama
      - Florida
      - Hawai'i
      - Louisiana
      - Mississippi
      - South Carolina
      - Texas

THE PROJECT

- Mississippi Windstorm Underwriting Association
  - MWUA's consulting actuary since 1999
  - Over twenty analyses performed for MWUA
    - Filed rate increases in 1999 and 2002
    - KATRINA – post-storm filing and televised hearings
    - Legislative relief filing and territorial changes

THE PROJECT

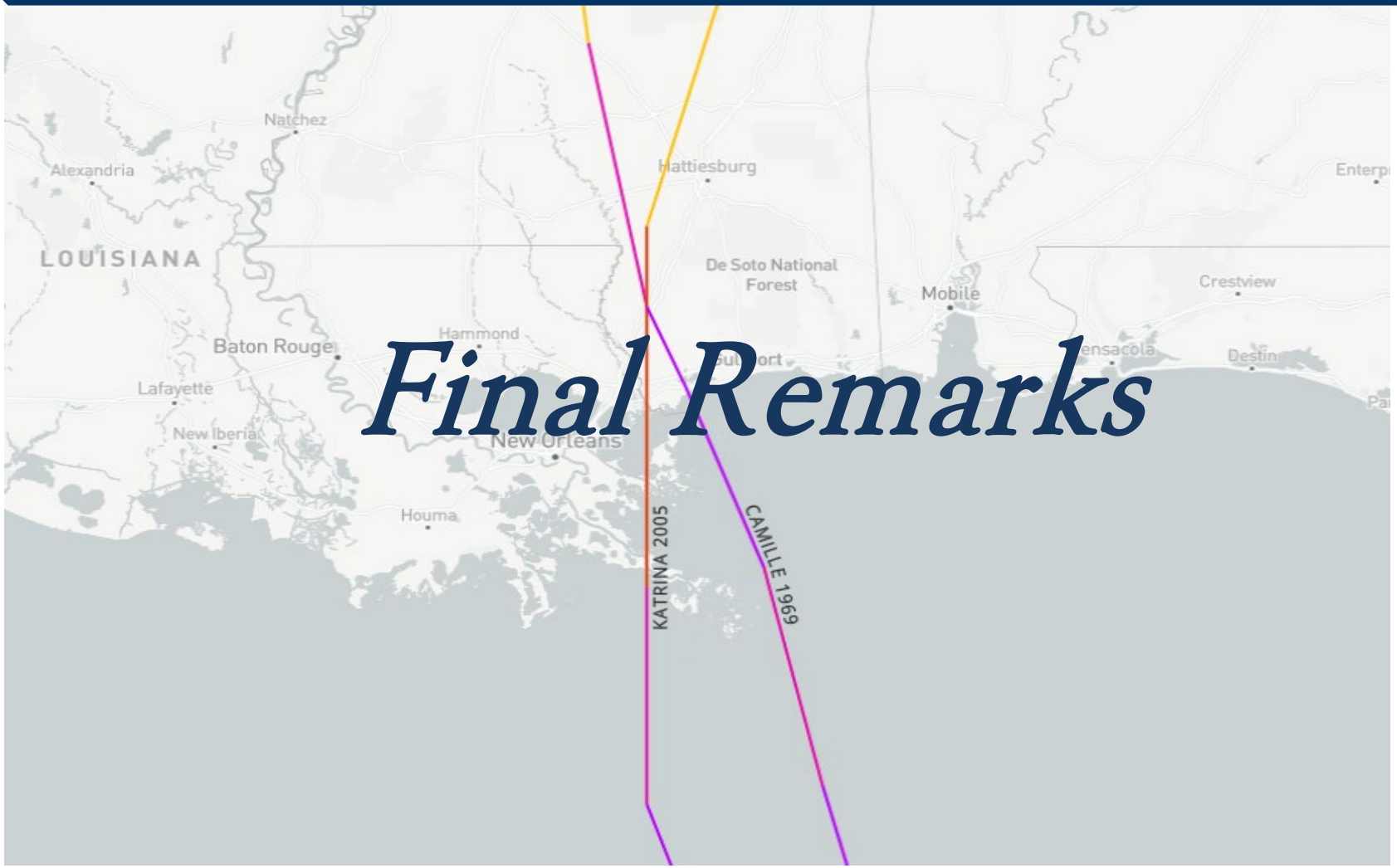
- Alabama Insurance Underwriting Association
  - AIUA's consulting actuary since 2001
  - About 32 analyses performed for AIUA
    - First filed rates effective 1/1/2002 – new reinsurance
    - In 2004, defended AIUA rates in a series of hearings
    - Assisted in selection of refined territories and "by-peril rating"

THE PROJECT

- South Carolina Wind & Hail Underwriting Association
  - SCWHUA's consulting actuary since 2002
  - About 32 analyses performed for SCWHUA
    - Reserve analyses since 2002
    - Reinsurance risk transfer analysis since 2006
    - Began rate analysis work last year

Texas Windstorm Insurance Association

TEXAS WINDSTORM INSURANCE ASSOCIATION



Final Remarks

PO Box 1546 | Madison, MS 39130 | 601.668.7611 | cburkhalter@tbgactuarial.com

THE BURKHALTER GROUP
Consulting Actuaries

Texas Windstorm Insurance Association

TEXAS WINDSTORM INSURANCE ASSOCIATION

Q & A

Texas Windstorm Insurance Association

TEXAS WINDSTORM INSURANCE ASSOCIATION

Proposal for Actuarial Services
June 1, 2020

Presented by:
Christopher J. Burkhalter, FCAS, MAAA
President & Principal

THE BURKHALTER GROUP
Consulting Actuaries

PO Box 1546 | Madison, MS 39130 | 601.668.7611 | cburkhalter@tbgactuarial.com