

# Verisk's Commercial Lines Program Initiatives: Emerging Issues and Predictive Models from ISO and AIR

CAS Ratemaking and Product Management Seminar  
March 15, 2016



SERVE | ADD VALUE | INNOVATE



# CAS Antitrust Notice

- The Casualty Actuarial Society is committed to adhering strictly to the letter and spirit of the antitrust laws. Seminars conducted under the auspices of the CAS are designed solely to provide a forum for the expression of various points of view on topics described in the programs or agendas for such meetings.
- Under no circumstances shall CAS seminars be used as a means for competing companies or firms to reach any understanding – expressed or implied – that restricts competition or in any way impairs the ability of members to exercise independent business judgment regarding matters affecting competition.
- It is the responsibility of all seminar participants to be aware of antitrust regulations, to prevent any written or verbal discussions that appear to violate these laws, and to adhere in every respect to the CAS antitrust compliance policy.



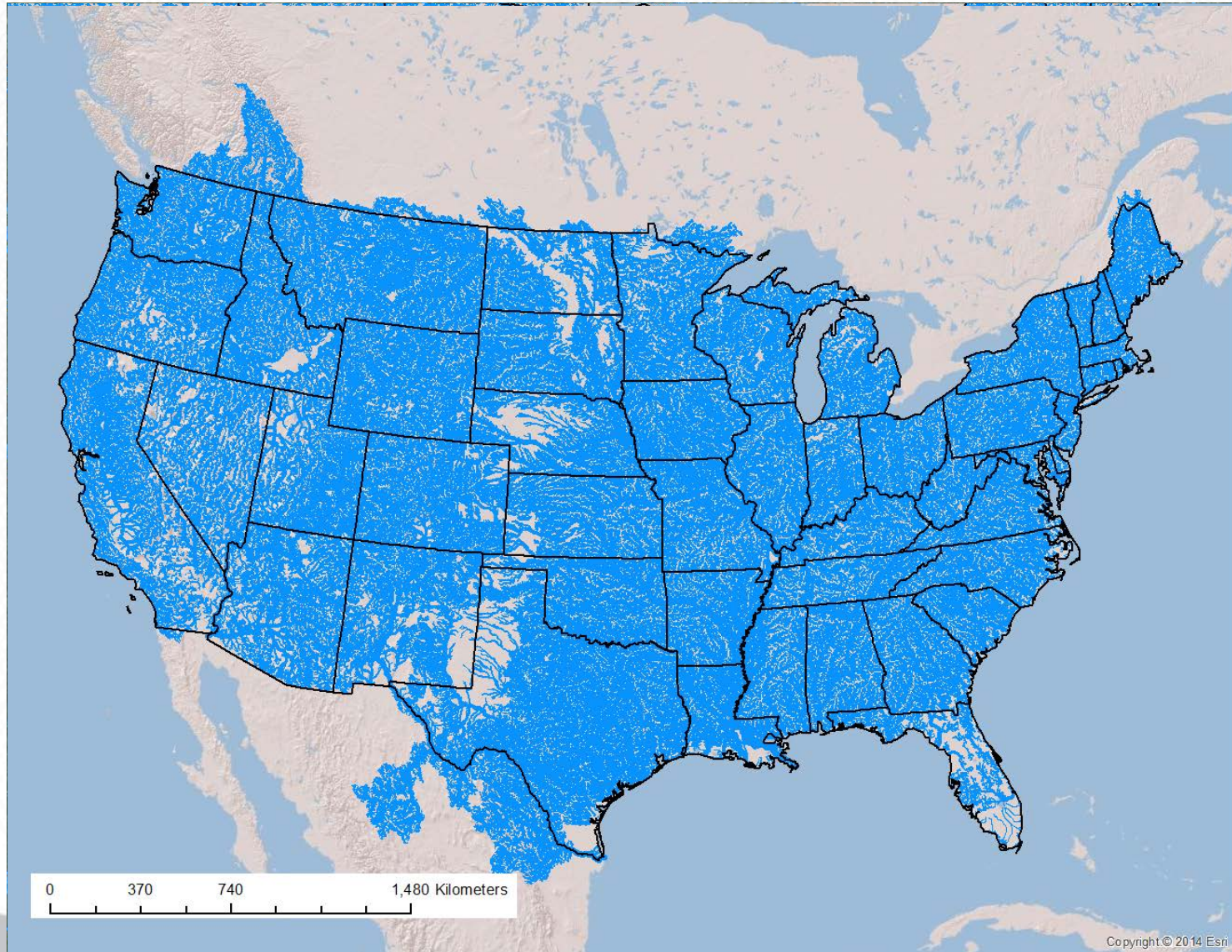
# Agenda

- Private Market Commercial Flood
- Optional Commercial Auto Class Plan
- Drones
- Professional Liability
- Cyber

# US Flood Model



# A Model That Is Robust at Multiple Scales Is Necessary for Developing Accurate Views of Risk





2.2M km of river length is modeled

30m DTM\* for water surface elevation

*\*DTM – Digital Terrain Model from National Elevation Dataset*

# A Flood Hazard Model Contains Three Main Components

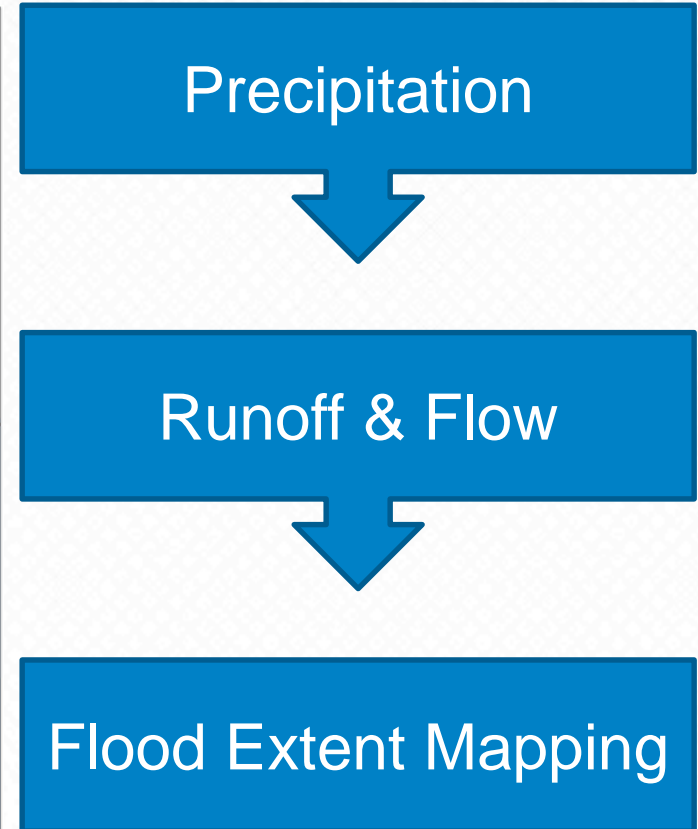
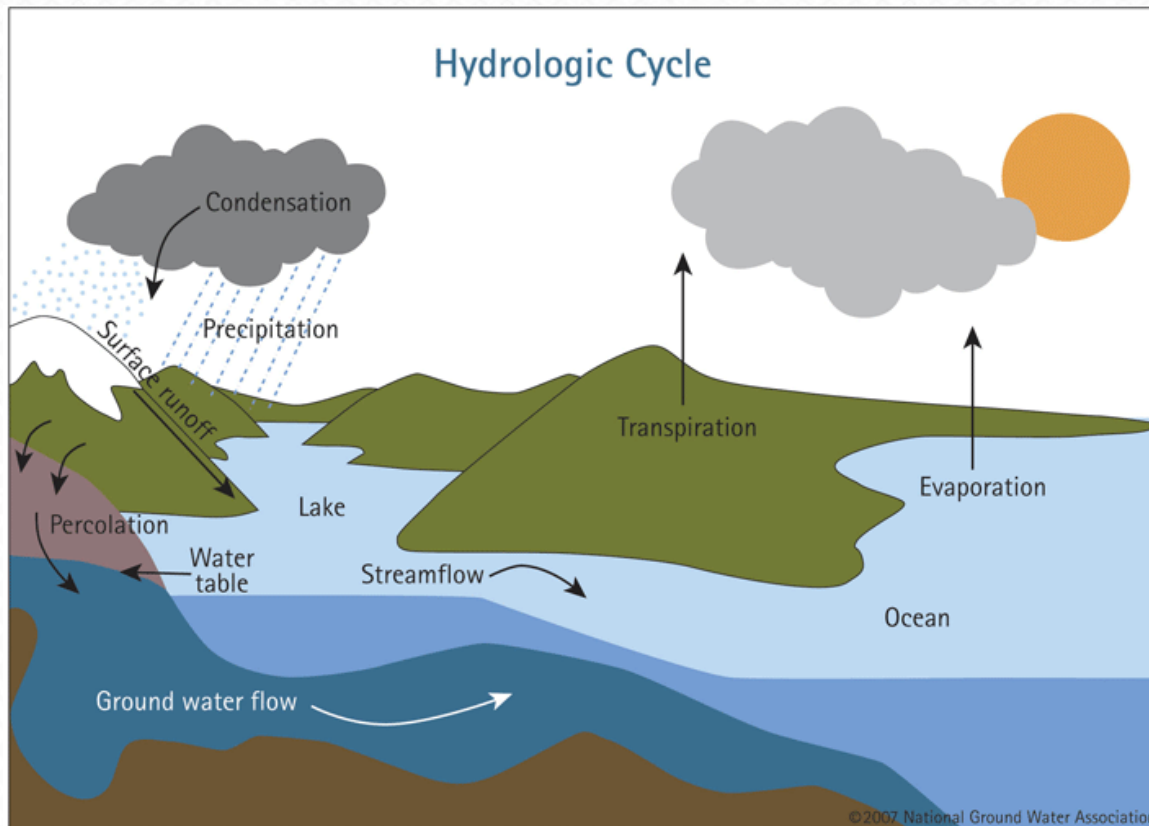
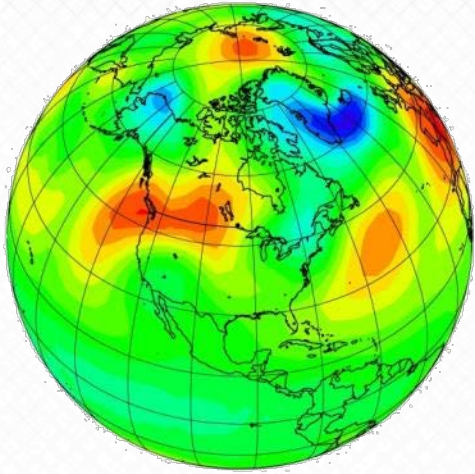


Illustration source: [http://www.ngwa.org/Fundamentals/use/PublishingImages/hydrologic\\_cycle.gif](http://www.ngwa.org/Fundamentals/use/PublishingImages/hydrologic_cycle.gif)

# Precipitation Is Simulated by Coupling Global Circulation and Numerical Weather Prediction Models

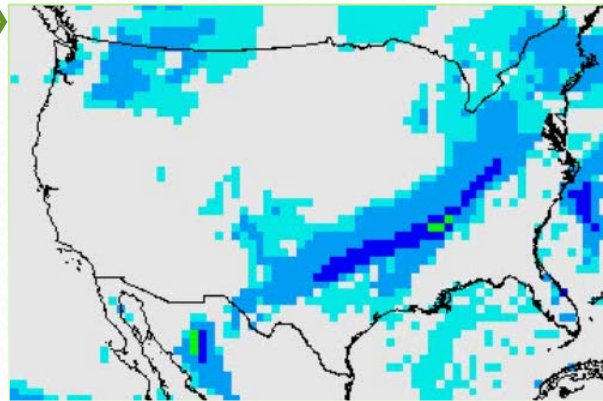
Global Circulation Model



~ 300 km x 300 km

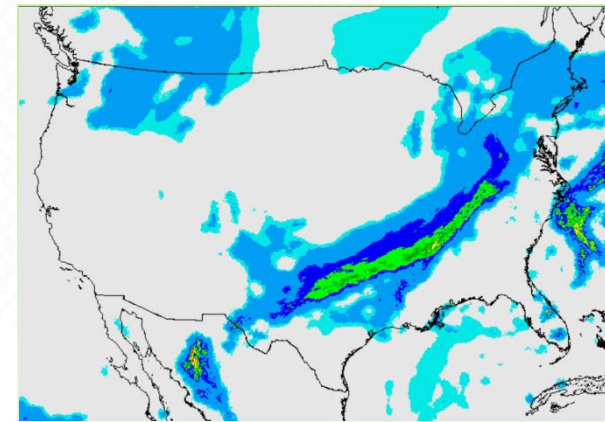
Precipitation pattern is consistent with observed data at multiple scales

Numerical Weather Prediction Model



64 km x 64 km

Downscaled

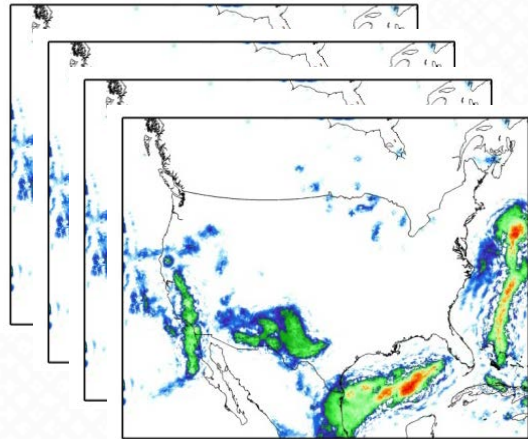


8 km x 8 km



# Well Established Approaches Are Used to Transform Precipitation to Flow

Precipitation  
 $i = 1 \dots 10,000$  years



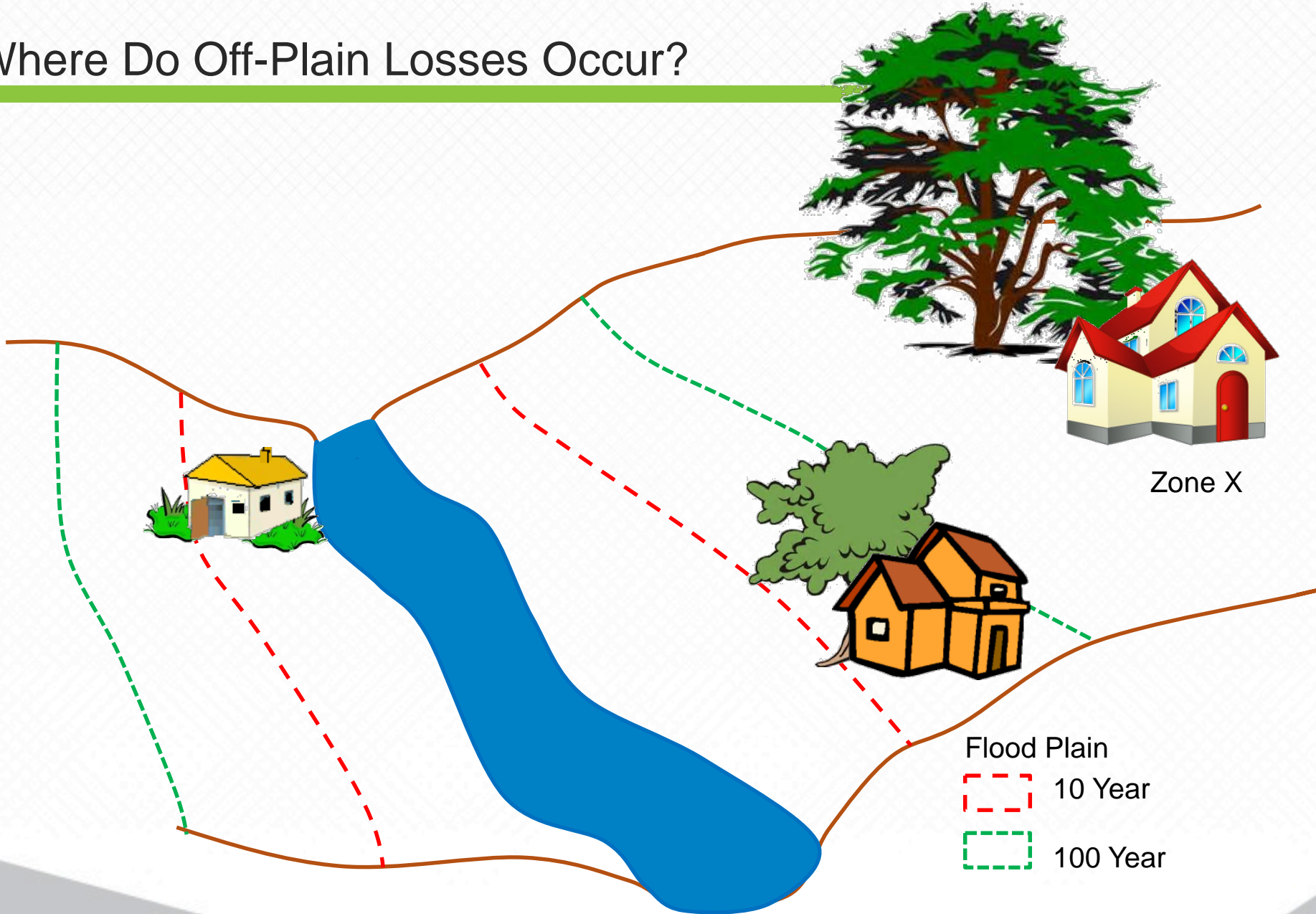
Runoff & Flow  
Generation  
Model

Excess  
Runoff

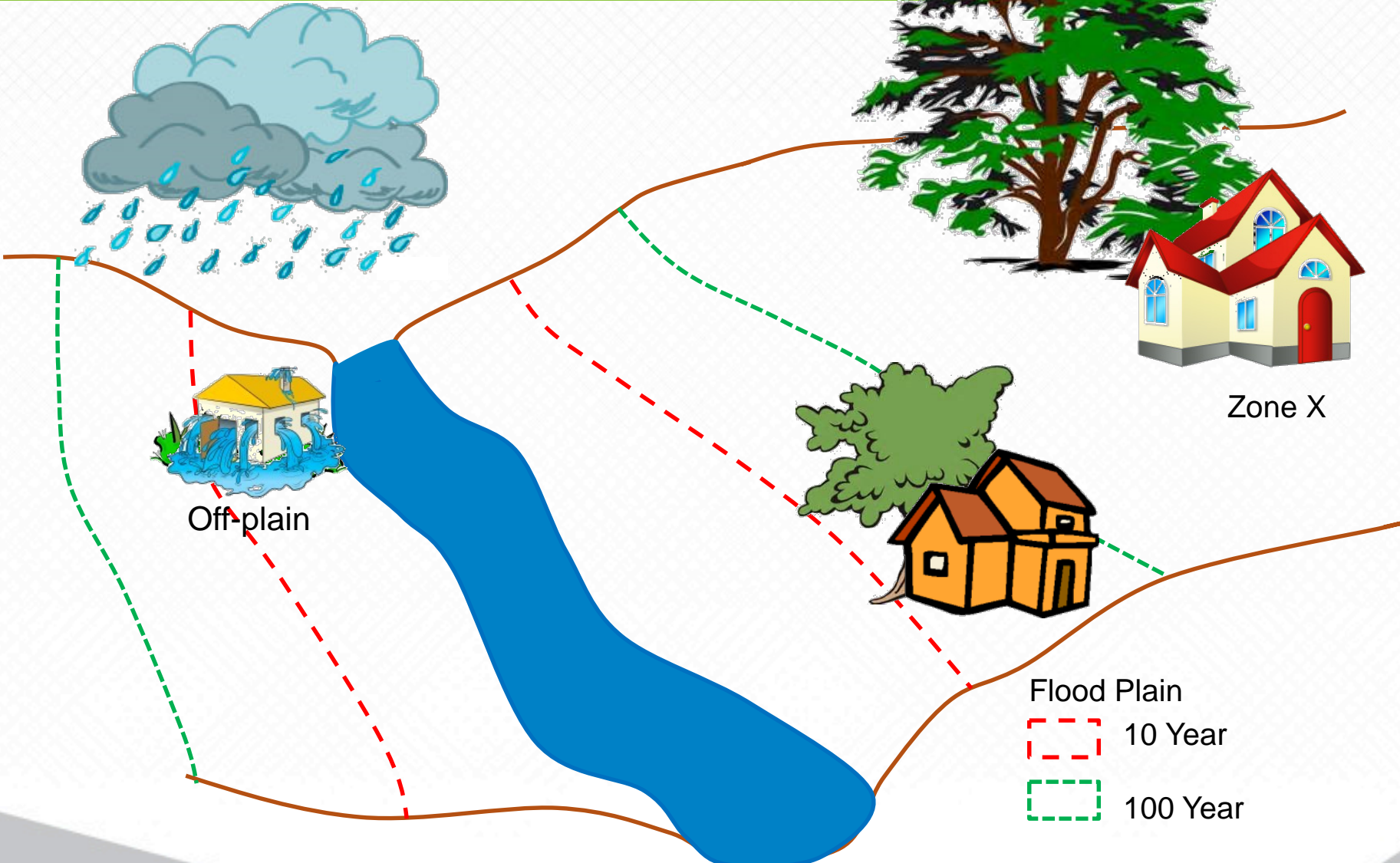
Flow



# Where Do Off-Plain Losses Occur?



# Off-Plain Losses Are Driven by the Precipitation Pattern and Can Happen Anywhere

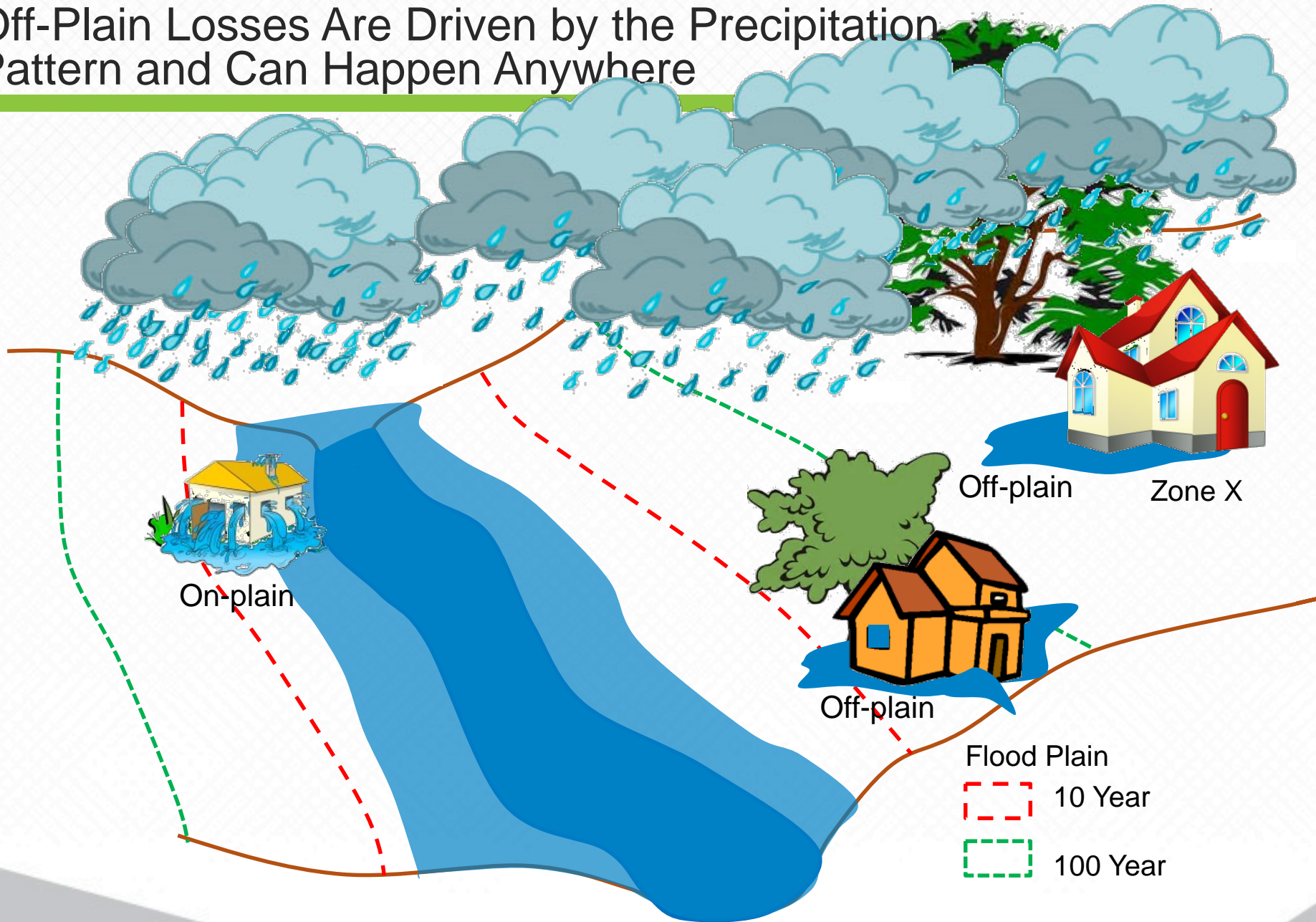


Off-plain

Zone X

Flood Plain  
10 Year  
100 Year

# Off-Plain Losses Are Driven by the Precipitation Pattern and Can Happen Anywhere



# Off-Plain Flood Vulnerability Relates to Excess Runoff and Relative Elevation

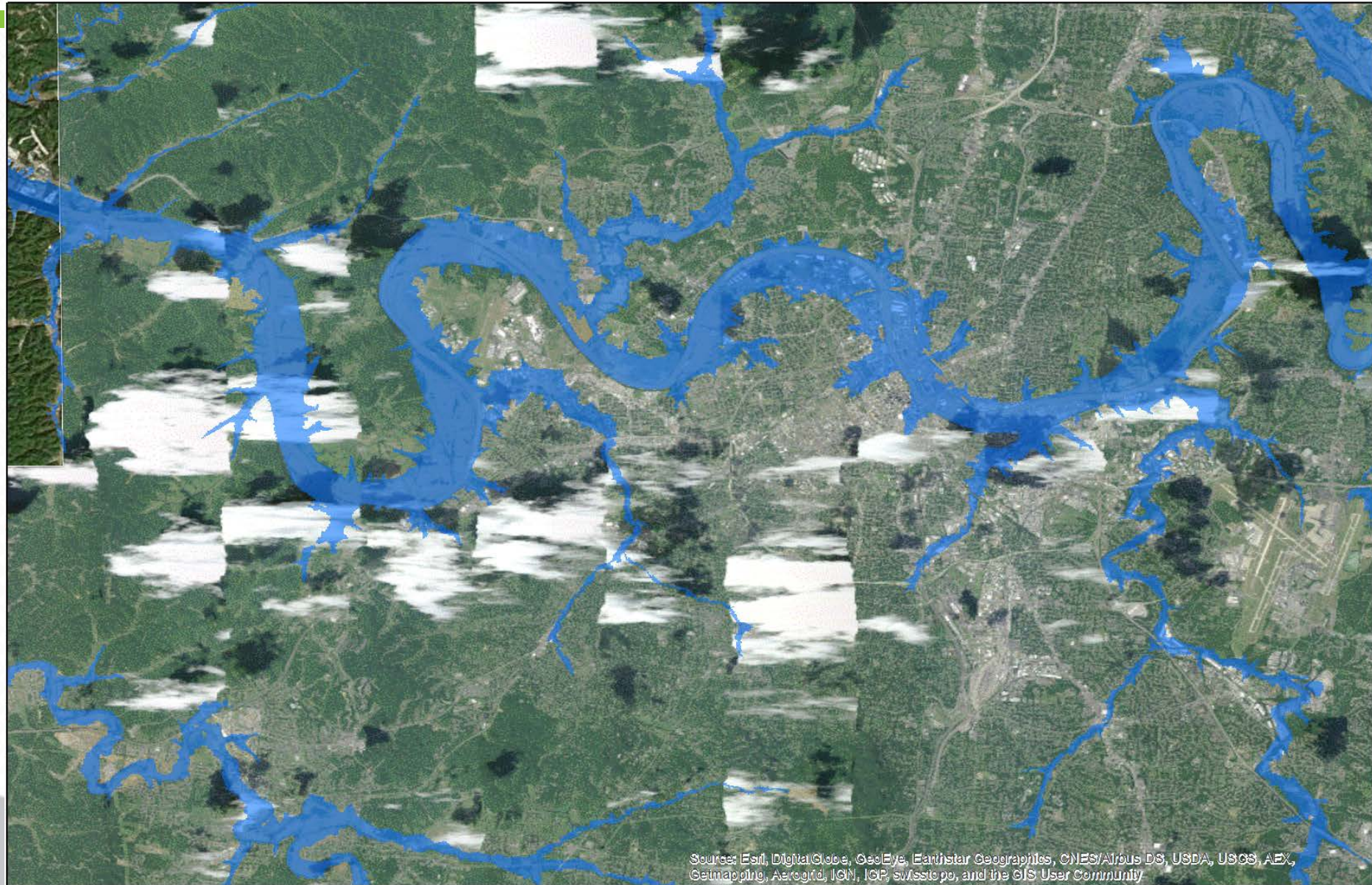


Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

# Off-Plain Flood Vulnerability Relates to Excess Runoff and Relative Elevation

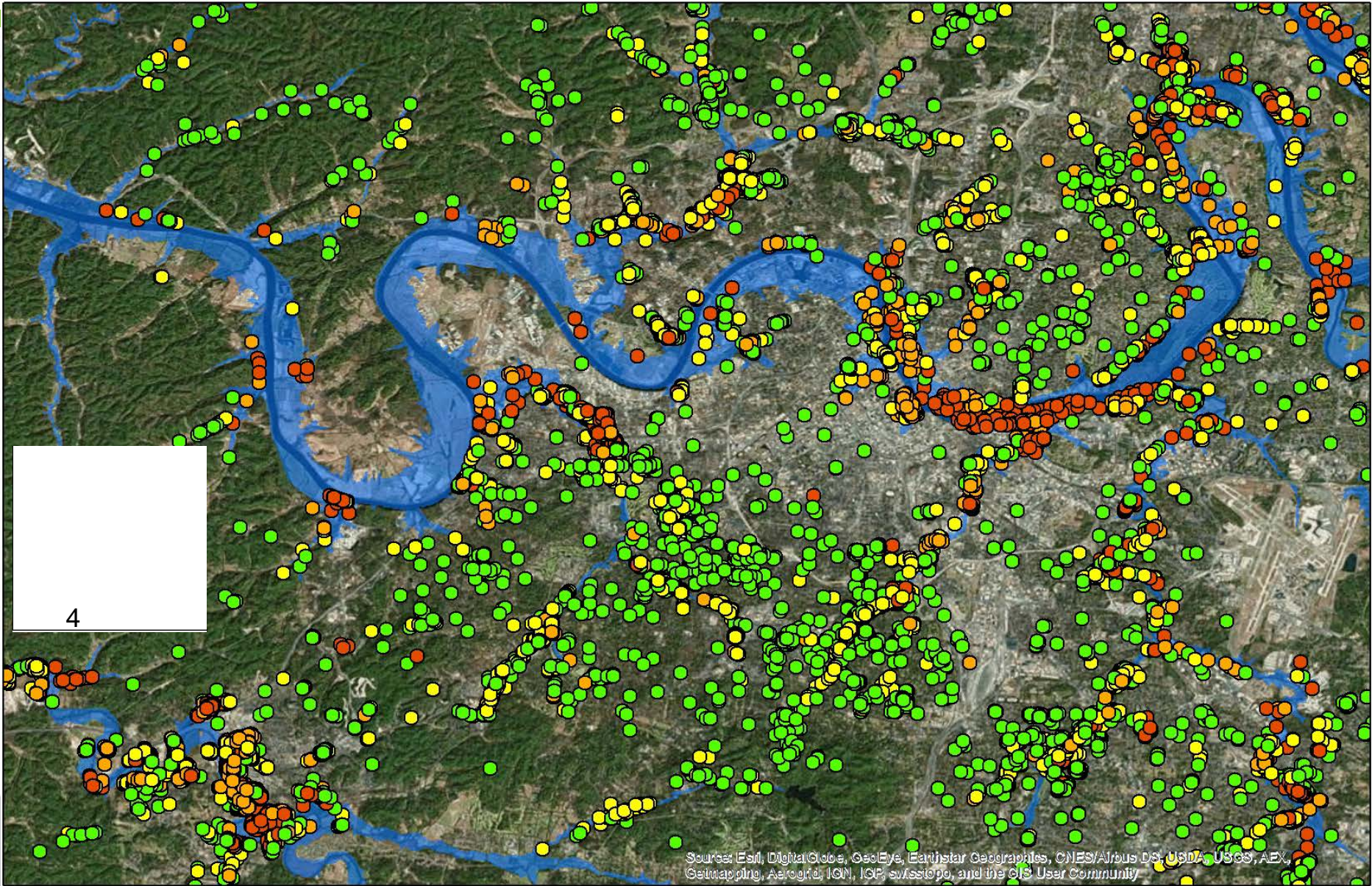


# Off-Plain Flood Vulnerability Relates to Excess Runoff and Relative Elevation



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

# Off-Plain Flood Vulnerability Relates to Excess Runoff and Relative Elevation

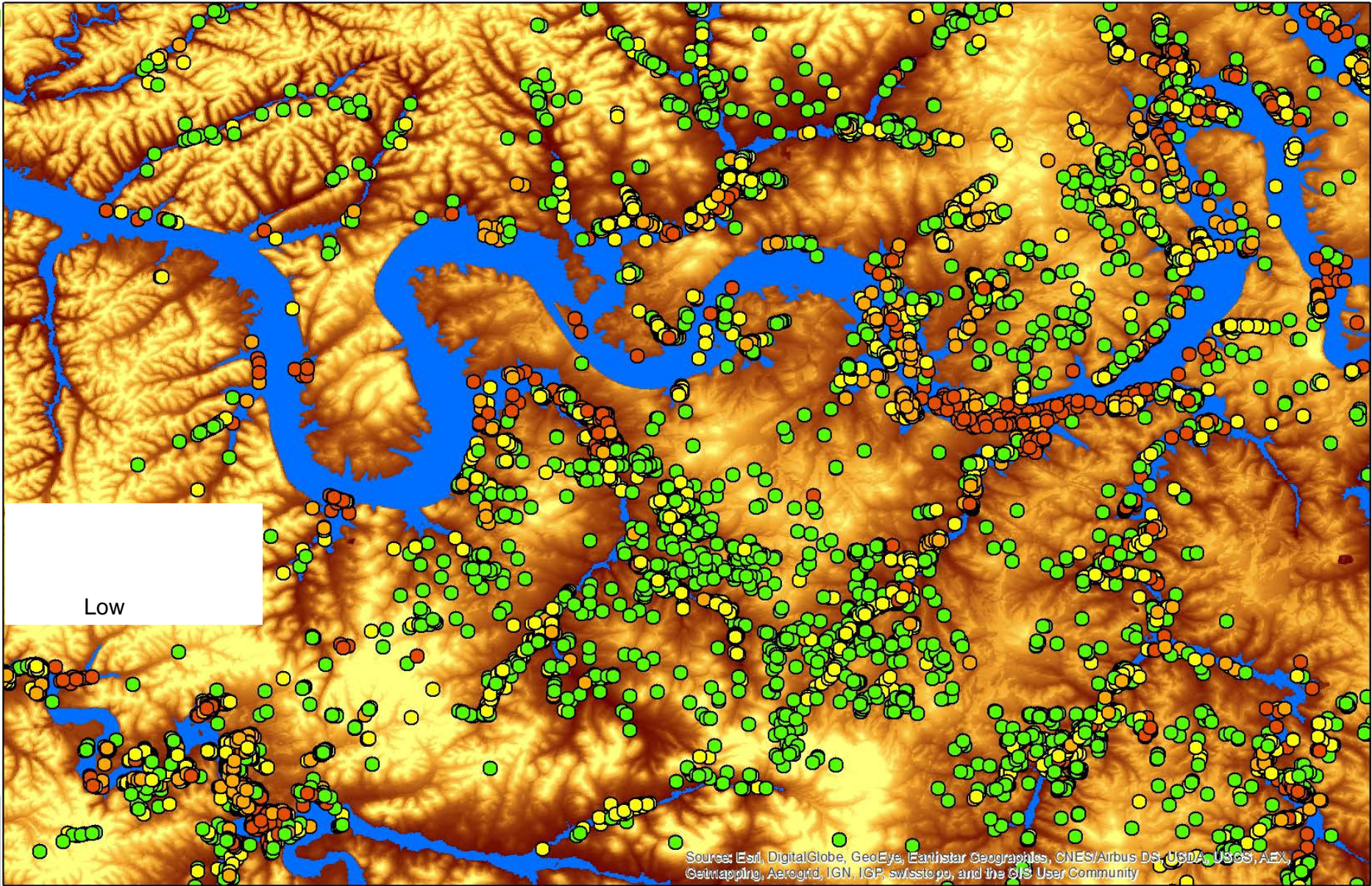


4

Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



# Off-Plain Flood Vulnerability Relates to Excess Runoff and Relative Elevation

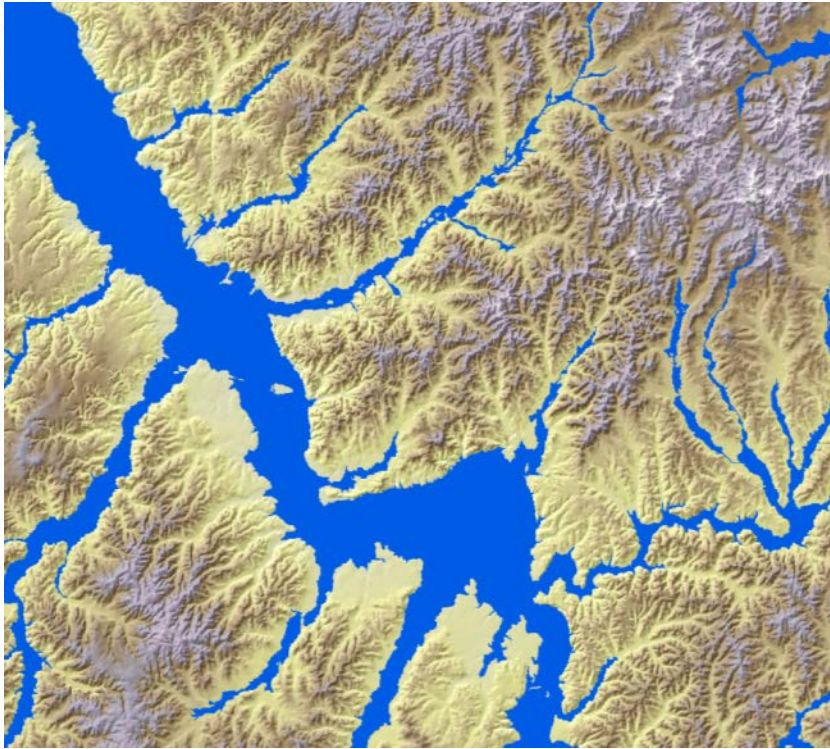


Low

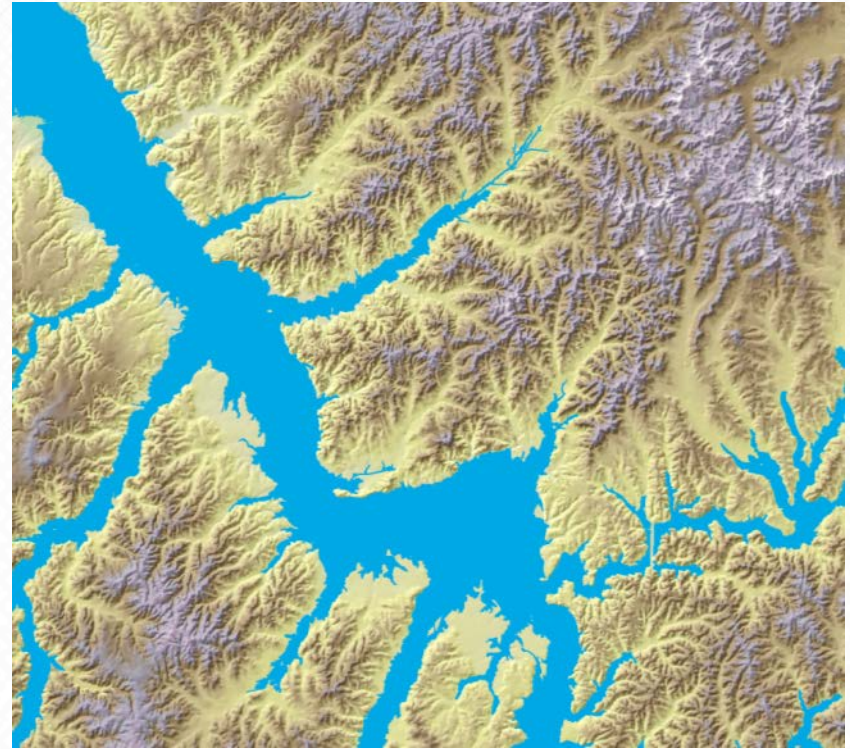
Sources: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



# AIR Flood Maps Are Compared with FEMA Flood Extent Maps

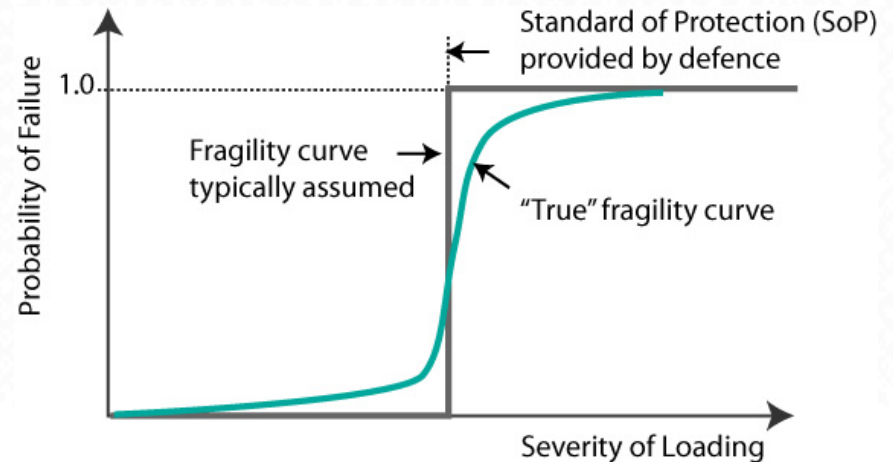
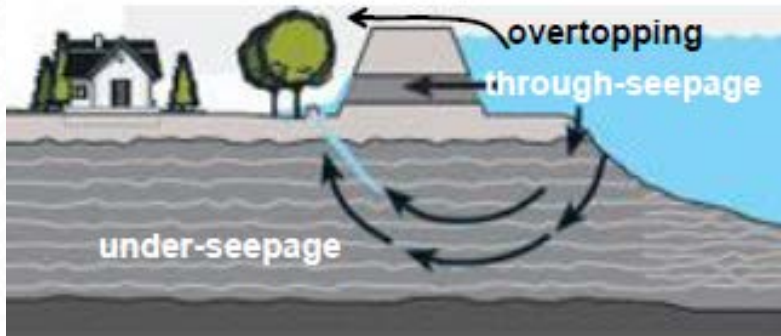


Modeled 100-Year Flood Map  
Bolivar, TN



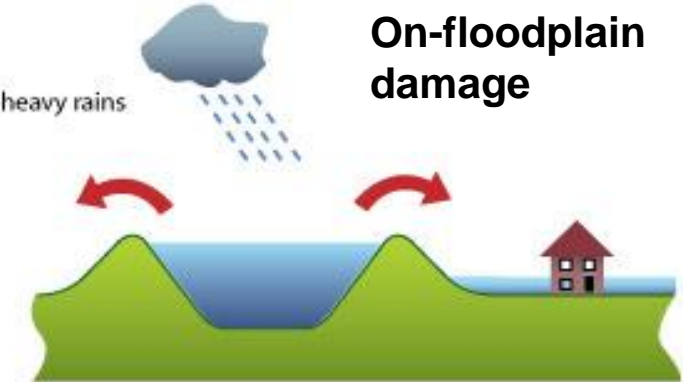
FEMA 100-Year Flood Map  
Bolivar, TN

# AIR Takes a Probabilistic Approach to Modeling Flood Defenses




# The AIR Inland Flood Model Includes Separate Damage Functions for Modeling On- and Off-Floodplain Losses

**On-floodplain damage**



heavy rains

The diagram shows a cross-section of a landscape with a central valley containing a body of water. A house is situated on the right side of the valley. Red arrows indicate water flowing from the valley towards the house. A cloud with rain is shown above the valley, labeled 'heavy rains'.



An aerial photograph showing a residential area with houses and trees completely surrounded by floodwater. The water is murky and extends to the edges of the frame.



**Off-floodplain damage**



heavy rains

sewers blocked

The diagram shows a cross-section of a house on a green hillside. A red line indicates a sewer pipe that is blocked, with water overflowing from the ground surface. A cloud with rain is shown above the house, labeled 'heavy rains'. The text 'sewers blocked' is written next to the pipe.



Two photographs showing sewer overflow. The left photo shows a street with several large, white, foamy jets of water erupting from the ground. The right photo shows a basement with a large, white, foamy jet of water erupting from a pipe.

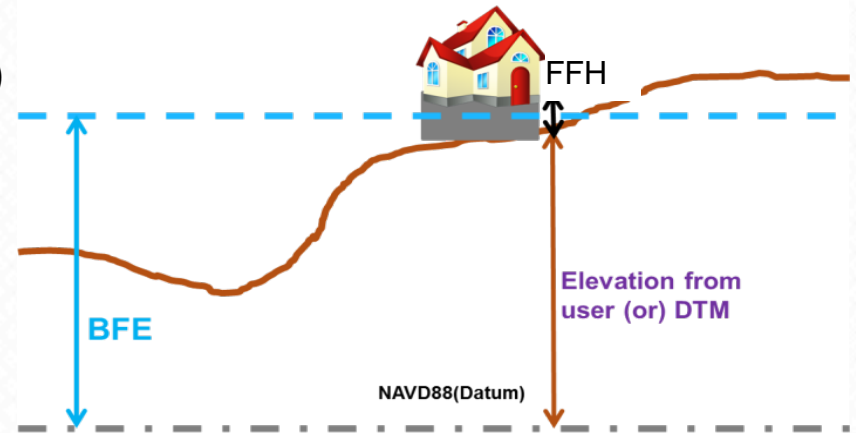
# Primary and Secondary Risk Features Enable Improved Loss Estimates

## Primary

- Occupancy, construction, height
- Year-built, location (in case of unknowns)

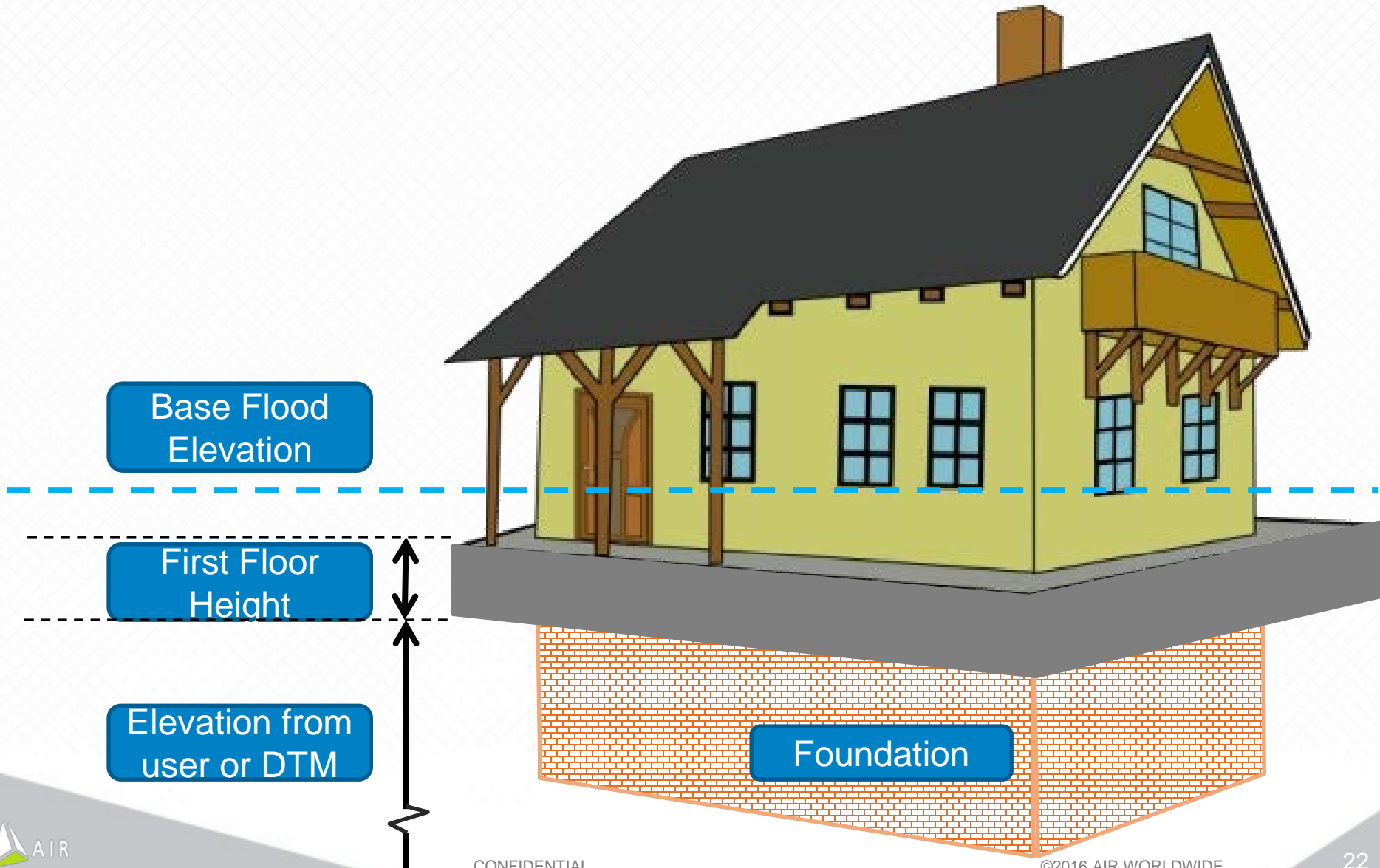
## Secondary\*

- Foundation type, including basement
- Number of basement levels
- Nature of finish in basements—  
finished/unfinished
- Height of the first floor in the building and/or BFE
- Service equipment flood-protection level
- Content relative vulnerability level
- Elevation of the local ground surface
- Custom standards of protection

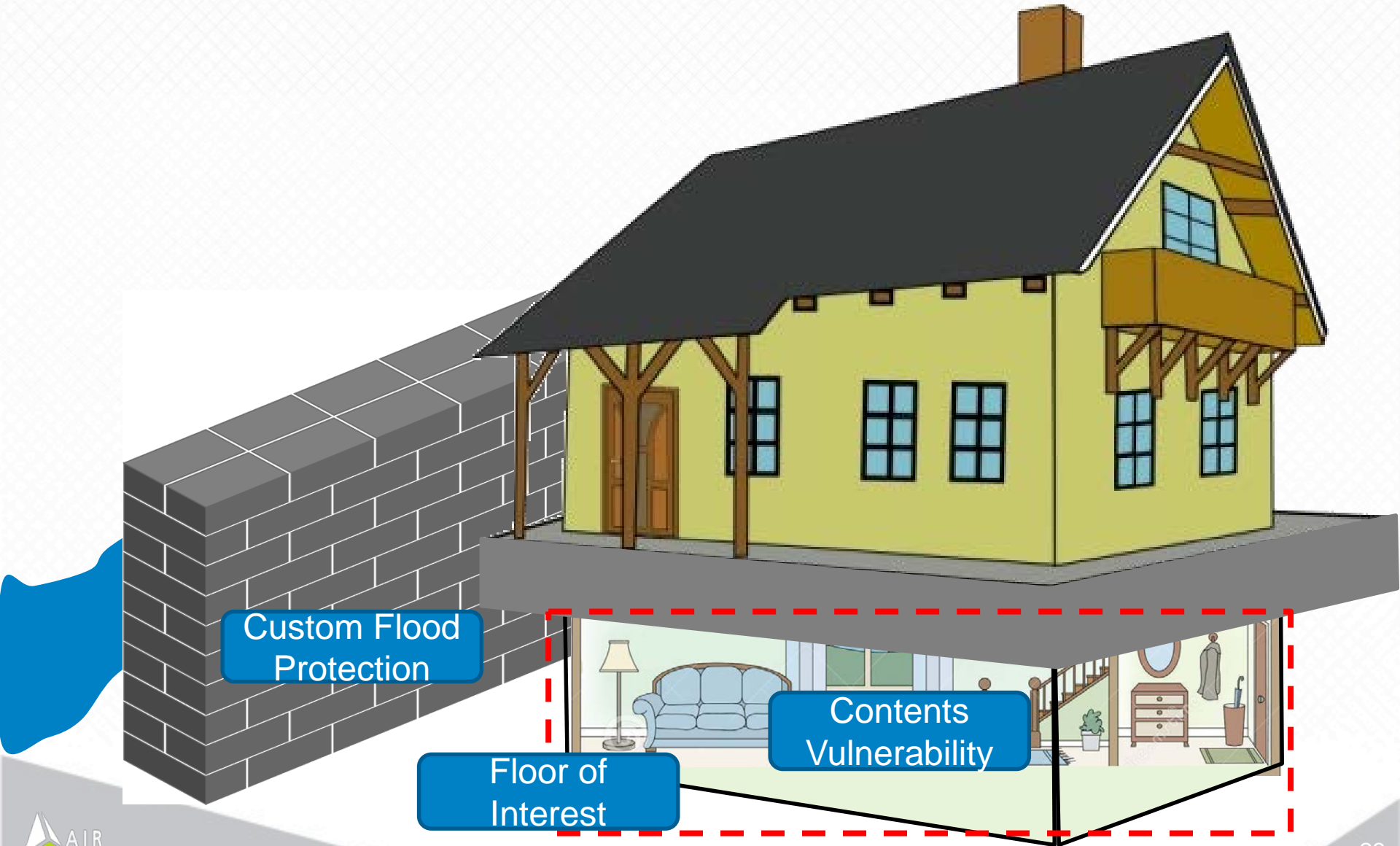


\*List is identical to that supported in the new U.S. Hurricane Model for storm surge

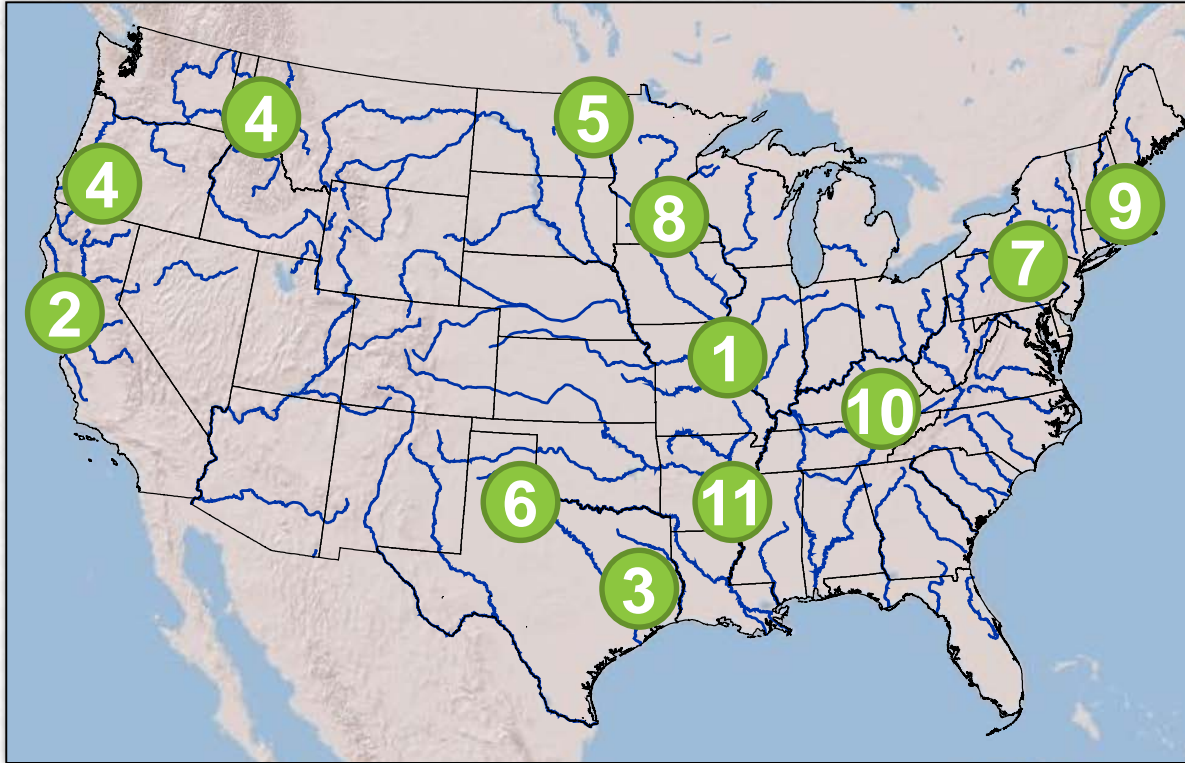
# Secondary Modifiers Play a Key Role in the Accuracy of Loss Estimates



# Secondary Modifiers Play a Key Role in the Accuracy of Loss Estimates



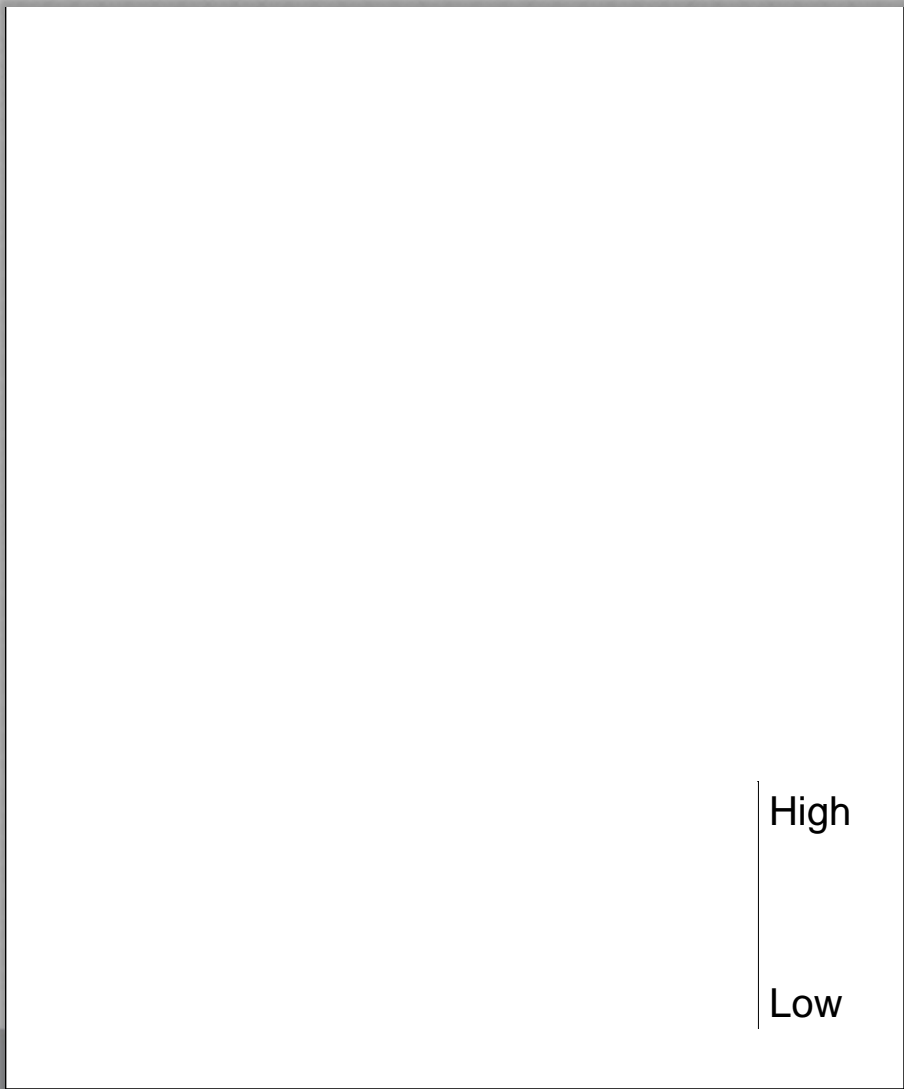
# Historical Events Used for Validation



1. The Great Flood, 1993
2. California Flood, 1995
3. Gulf Coast Flooding, 1995
4. Pacific Northwest, 1996-97
5. Red River Flood, 1997
6. Texas Flood, 1998
7. Northeast Flood, 2006
8. Midwest Flooding, 2008
9. Rhode Island Flooding, 2010
10. Tennessee Flooding, 2010
11. Lower Mississippi River, 2011



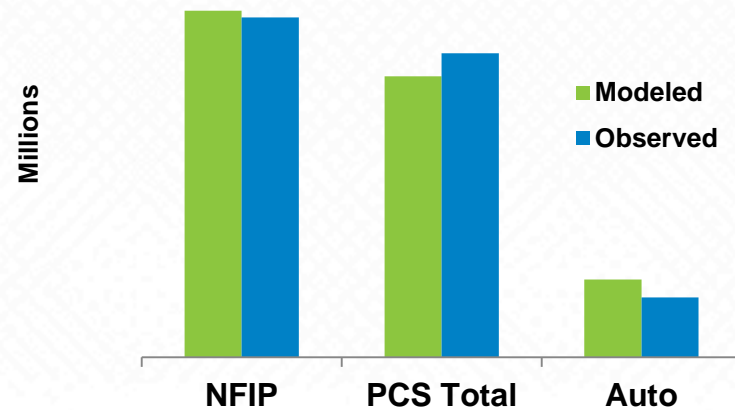
# Industry Exposure Database (IED) Enables AIR to Validate the Model at the Industry Level



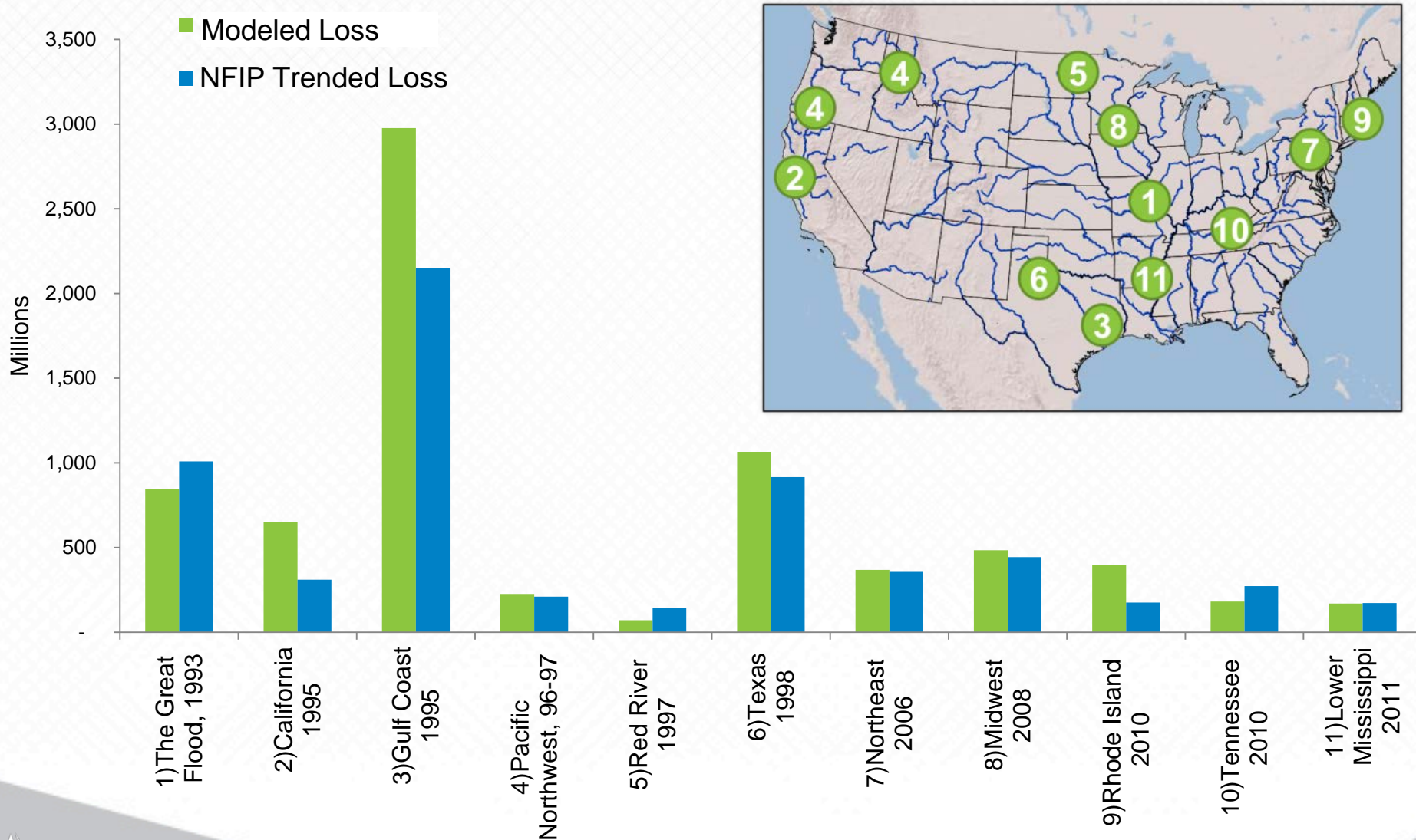
## Data sources

- NFIP insured losses
- PCS<sup>®</sup> insured losses
- National Weather Service economic losses
- Claims data from Xactware<sup>®</sup>

## Northeast Flood, 2006



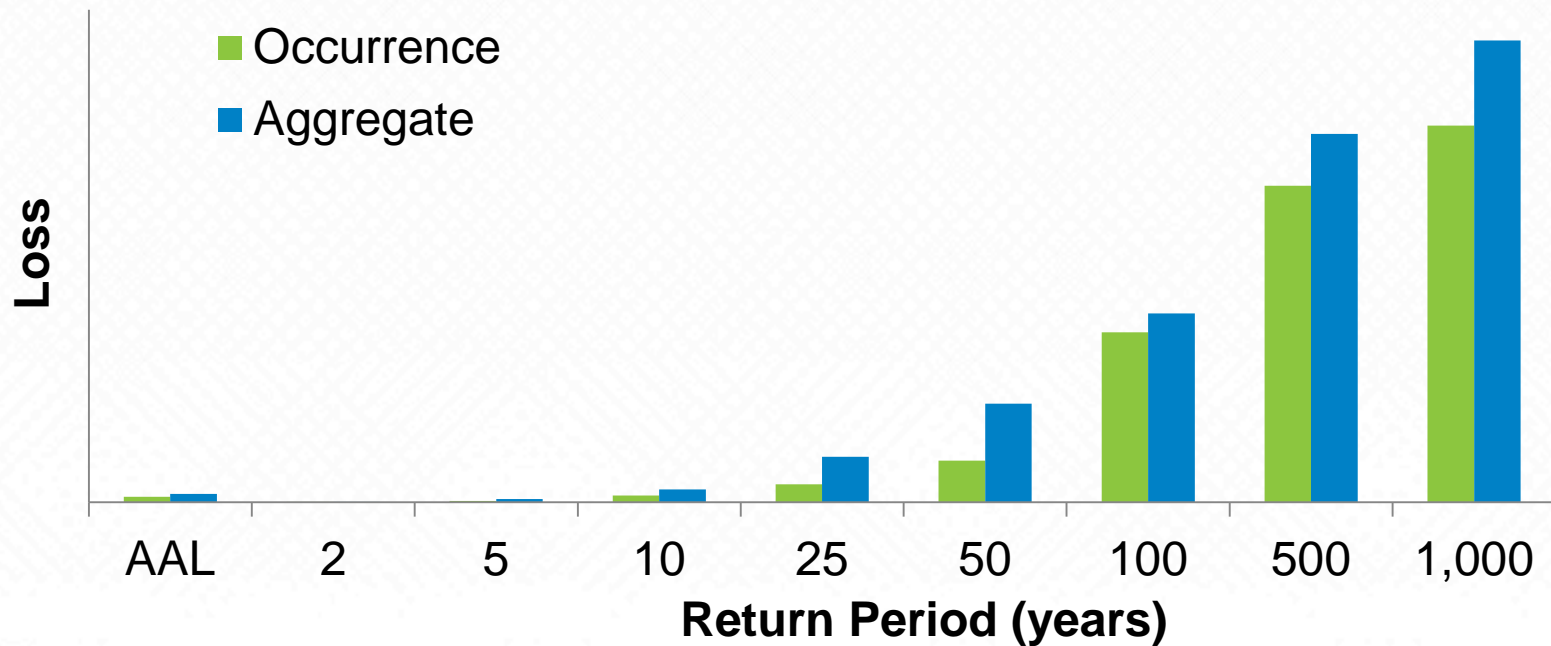
# Comparison of Model and Trended NFIP Losses for All Marquee Events





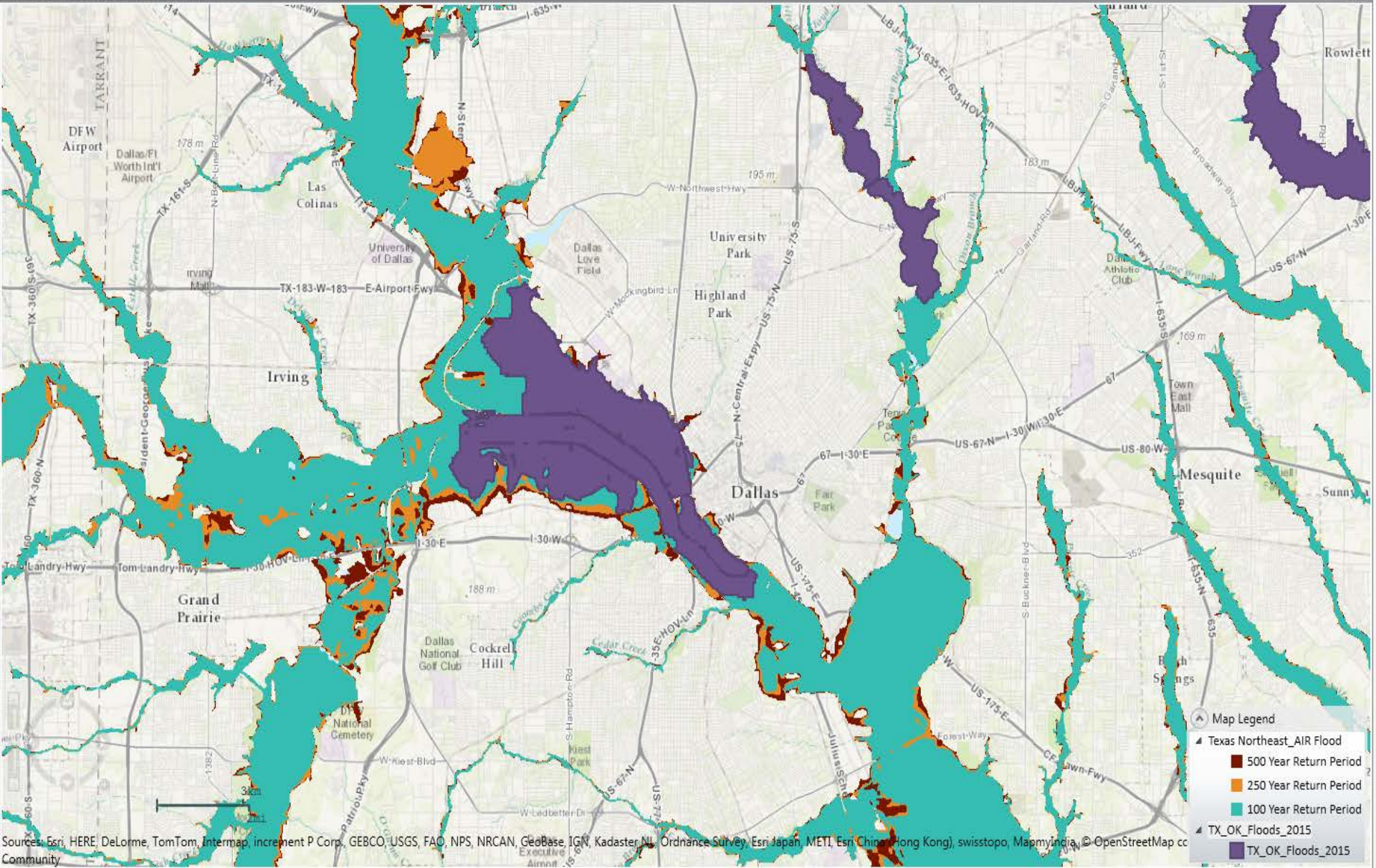
# Losses Can Be Aggregated with Other Perils

- Produces full distribution of loss on your portfolio
- Quantifies tail risk, determines AAL
- Solves issue of combining “flood scores” with probabilistic modeling



# Accumulate Against AIR Flood Hazard Maps

Map - Spatial Fact-Total Replacement Value





# Advantages of the AIR U.S. Inland Flood Model

- Obtain absolute loss, not just binary or relative risk
- Differentiate between multiple risks
- AIR's flood maps offer a consistent and complete national view
- Simulation method gives you the advantage:
  - Account for correlations between locations in flood scenarios
  - Aggregate losses with hurricane, earthquake, and other perils
  - Apply insurance terms accurately

# Commercial Lines Private Flood Insurance – ISO Solutions





# Private Flood Insurance – Commercial Lines

- ISO currently makes available commercial lines flood endorsements
- These endorsements may be used in three ways:
  - Primary
  - Excess of NFIP
  - Wrap-Around (Difference in Conditions)
- Refer-to-company rating subject to regulatory requirements
- Rating information under development



# Private Flood Insurance – Commercial Lines

## Source of Data:

- AIR model will be key component of loss cost development
- ISO statistical data from use of ISO endorsements
  - Approx. \$800 million in premium reported
  - Loss data heavily influenced by Sandy
- FEMA data



# Optional Commercial Auto Class Plan





# Scope

The Optional Class Plan provides different loss costs for the following:

- **Vehicles**
  - Trucks, Tractors, and Trailers (but not zone-rated)
  - Private Passenger Types
- **Coverages**
  - Combined Single Limit Liability
  - Collision
  - Comprehensive



# Predictive Modeling

- Generalized Linear Models
- Continuous Treatment of Numeric variables
- Extensive Co-validation



# Class Plan Key Results

- Updated mostly multiplicative rating algorithm
- Introduction of new variables
- Further refinement of existing variables
  - Additional segmentation of variable itself
  - Varying the factors by coverage in more places
- Provided as an optional rating rule



# New Variables

- **NAICs Code**
  - Industry classification
  - Hierarchical six-digit structure
  - Allows additional differentiation in rating by type of business
  
- **Original Cost New (OCN) and Vehicle Age**
  - Current – reflected for physical damage
  - Optional plan – reflected for both physical damage and liability



# Further Refinement of Existing Variables

- Allow the primary and secondary factors to differ in more places for liability, comprehensive, and collision
- Expand size of fleet buckets from current fleet and non-fleet categories to include additional groupings
- Expand number of OCN ranges
- Expand number of Age ranges
- Trailers vs. Trucks



# Timing and Mechanics

- **Optional rating rule**
  - Filing Began in October 2015
  - Companies choosing to use this rule need to determine their own effective date and are responsible to independently notify regulatory authorities, as appropriate
- **Longer Term:**
  - Optional rating rule replaces current rating rule in ISO Commercial Auto Program
    - Will not occur prior to 2020

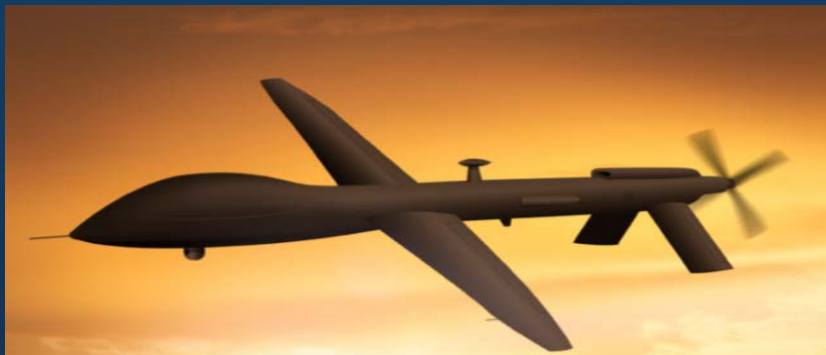
# Drones – The Short Story







# Regulatory/Applications





# FAA Modernization And Reform Act

- Creation and publication of a five-year Roadmap to support safe and efficient UAS operations
- Section 333 Exemption process
- Proposed rules for commercial use published February 2015
  - In part, limit flights to daylight and visual-line-of-sight operations
- Recreational Use





# Review of Approved Exemptions (Section 333)

- Key findings<sup>1</sup>
  - 247 unique platforms
  - 90% are **rotary wing**
  - All (but one) **weigh less than 55 lbs**
  - Nearly all rely on **electrical propulsion**
  - Median endurance of **25 minutes**

<sup>1</sup> Association for Unmanned Vehicle Systems International (AUSVI) reviewed the first 1,000 approved FAA Section 333 exemptions  
Source: <http://auvsilink.org/advocacy/Section333.html>



# Top 10 Industries Using UAS via Exemption

Industry / Operation	# of Exemptions
Aerial photography	512
Real estate	350
Aerial survey	301
Aerial inspection	242
Agriculture	164
Construction	134
Infrastructure inspection	102
Film and TV	91
Utility inspection	78
Environmental	61

Source: AUVSI, [The First 1,000 Commercial UAS Exemptions](#), September 2015

# Drone Rating Considerations





# Drone Rating Considerations

- Limited Data on Non-military Drone Losses
- Crashes
  - Bodily Injury
  - Property Damage
  - Will all crashes yield one or the other -- or both?





# Drone Rating Considerations (Cont'd)

- **Location**

- Rural
- Urban
- Weather



- **Drone Characteristics**

- Size
- Capabilities and Operations (photography, spraying, payload capabilities)

- **Operator**

- Experience
- Training

# ISO Drone Options







# ISO Drones Options

- **Liability endorsements implemented 6/1/2015**
  - 3 exclusionary endorsements
  - 3 limited coverage endorsements
- **Commercial Lines Property currently planned timeframes**
  - Commercial Inland Marine to be released Q1 2016
  - Commercial Property and Capital Assets to be filed in Q2 2016
  - Farm endorsements to be filed Q4 2016
  - Businessowners to be filed during 2016



# New ISO Liability Endorsements

- **Optional exclusion endorsements - GL**
  - Coverage A only
  - Coverage B only
  - Coverage A and B
- **Optional coverage endorsements - GL**
  - Coverage A only
  - Coverage B only
  - Coverage A and B
- **Similar options for use with the ISO CU Program**
  - No option for designated aggregate limit

# Professional Liability – Other than Medical





# Growth of Professional Liability Programs

- **Errors and Omissions coverage generally not provided under other liability policies**
- **Additional Licensed Professions**
- **Tasks Performed by Some Professionals Grow**
  - Increased Potential Exposure to Liability



# Professional Liability (Other Than Medical) – Current ISO Programs



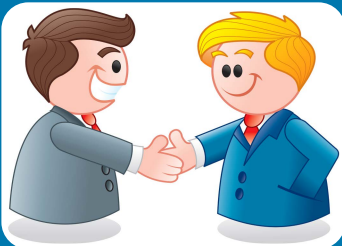
## Lawyers – March 2011

- Defense within limits



## Real Estate Agents & Brokers – January 2014

- Defense outside the limits of insurance
- Optional defense within limits available



## Insurance Agents & Brokers – May 2014

- Defense outside the limits of insurance
- Optional defense within limits available



# Miscellaneous Professional Liability – ISO Activity

Base Policy

Class-specific Endorsements

~20 Initial Classifications

Additional Classifications –  
Ongoing Introduction



# Miscellaneous Professional Liability – Sample Classifications

- Corporate Trainer
- Court Reporter
- Photographic Studios
- Salon Services
- Tour Operators

# Cyber

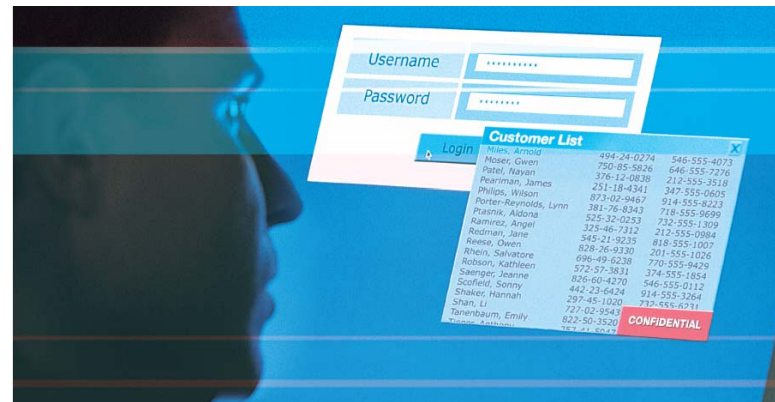






# Increased Consumer Awareness

- News reports
- Personal experiences
- Education (Agents | Brokers | Insurers)
- Executive/Board of Directors Priority
- Government activity





# Cyber Insurance

- **Insurance coverage approaches**
  - Stand-alone insurance policies
  - Commercial Package Policies
  - Roll-on coverage to existing insurance policies (e.g., Businessowners, D&O, Professional Liability, etc.)
- **Typical coverages and rating approaches**
  - 1<sup>st</sup> and 3<sup>rd</sup> Party coverages
  - Revenue/Assets | Number of Records



# Cyber Insurance Market Overview

- **Admitted Market vs. Nonadmitted Market**
  - Standard policies | Manuscript policies
- **Cyber insurance – in its infancy, but maturing**
  - Increasing number of carriers are writing cyber insurance
- **Cyber insurance take-up rate**
- **Marketplace capacity**
  - Currently estimated to be \$1B – \$2B
  - Industry experts project it to grow to \$20B by 2025



# Emerging Cyber Issues

- Cloud Computing
- Medical Devices
- Internet of Things (IoT)
- Autonomous Cars
- Broadening coverage expectations
- Black Hat Hackers – more creative and relentless

# Regulatory Landscape

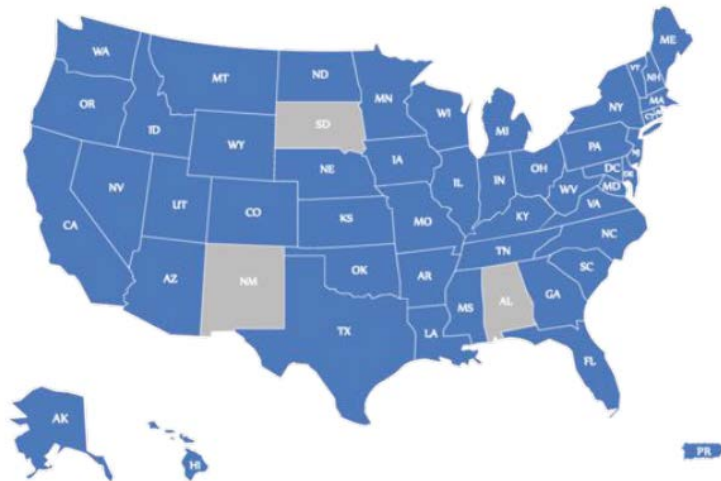




# Regulatory Landscape

- **State Laws / Regulations**

- Data Breach-related and Notification Laws in 47 States, the District of Columbia, Puerto Rico, U.S. Virgin Islands and Guam (as of September 2015)



California was first state (2003).

Today, Alabama, New Mexico and South Dakota are the only states without a current law



# U.S. Regulatory Landscape

- **Federal Legislative and Regulatory Initiatives**
  - The Health Insurance Portability and Accountability Act (HIPAA) and Health Information Technology for Economic and Clinical Health (HITECH) Act
  - Graham-Leach-Bliley
  - Efforts to encourage development of Information Sharing and Analysis Organizations (ISAOs)
  - Monitor how Financial institutions manage cyber threats
- **NAIC – Cybersecurity Task Force**

# Cyber Data







# Cyber Data Considerations

- What is the intended use of the data?
- Who is going to contribute the data?
- How is the data going to be contributed?
- How is the data going to be aggregated?
- How is the raw data going to be turned into useful information?
- What is the desired data?





# Cyber Database Examples

## Cyber Threat (Live/Occurring) Database

A real-time compendium of known and emerging threats within the cyber realm, including mitigation recommendations and threat analysis (to assist in the mitigation of cyber threats).

## Post Incident Database

A compendium of post-cyber incident event details.

## Insurance Claims and Pricing Database

A tool for the centralized reporting of insurance policy, premium and claims information, to assist insurers in underwriting and pricing risk.




# Publicly Available Cyber Resources

- Betterley Reports (Cyber Risk | Tech E&O | Media Liability)
- Data Loss Data Breach (<http://datalossdb.org/>)
- Identity Theft Resource Center (<http://www.idtheftcenter.org/IN-THE-NEWS/Alerts/>)
- Insurance Information Institute (*Cyber Risks: The Growing Threat* [June 2014])
- NetDiligence (*2014 Cyber Claims Study* [December 2014] and other studies)
- Ponemon Institute (May 2015 *Cost of Data Breach Study* | September 2014 *Is Your Company Ready For A Big Data Breach?* Study, and other studies)
- Verizon (April 2015 *Data Breach Investigations Report*)
- ISO Cyber Risk Solutions (<http://www.verisk.com/iso/cyber-risk/iso-cyber-risk-solutions.html>)
- Industry and cyber-specific conferences

# The Verisk Standard Has Been Implemented with an AIR Preparer's Guide

AIR Cyber Exposure Data Standard Preparer's Guide

- 2 Cyber-Exposure Data Fields, Company
- 2 Cyber-Exposure Data Fields, Info by C
- 2 Cyber-Exposure Data Fields, Data
- 2 Cyber-Exposure Data Fields, Asset
- 2 Cyber-Exposure Data Fields, Transfer
- 2 Cyber-Exposure Data Fields, Insuranc
- 2 Cyber-Exposure Data Fields, Reinsura
- 2 Cyber-Exposure Data Fields, Premium
- Reference
- 2 Cyber-Exposure Quality Score Rubric
- 2 ISO Country Codes
- 2 Currency Codes



Home > AIR Cyber Exposure Data Standard Preparer's Guide

## AIR Cyber Exposure Data Standard Preparer's Guide

Cyber risk has become the fastest growing peril in 2015. The ability to accurately analyze cyber risk requires a complete understanding of the cyber exposure. It is imperative to capture these data in a format that can be used by a variety of interested parties. It is also essential for the exposure data standard to be used today as well as in the future; it must be robust. With these guidelines, Verisk is offering a comprehensive, transparent, global data standard that organizations will be able to grow into; not grow out of.

The Verisk Cyber Exposure Data Standard represents a key first step -- development of a common standard that enables capture of the right data and store it in a format that can be utilized by all.

Throughout the development of the Verisk Cyber Exposure Data Standard, many organizations have reviewed this standard and provided valuable input. These organizations include companies in the insurance, broker, and reinsurance industry segment.

This standard will help create a uniform manner for data to be transferred across the insurance value chain. The Verisk Cyber Exposure Data Standard has been formatted into a SQL data schema and can be deployed allowing the utilization of basic SQL scripts.

### This Guide

AIR Worldwide has developed this preparer's guide to help companies implement the Verisk Cyber Exposure Data Standard. The informational tables that follow describe the fields, validation rules, default values, and data types of this standard. Many of these fields are optional to provide flexibility for different organizations that collect different types of information or at different levels of detail. Since this cyber data standard is very comprehensive, it might be construed as too much data to capture.

**Do not fear, the only mandatory data you need from the insured are the company's industry tab and revenue data.**

Collecting and storing this data forms a basis for accumulated risk in the future. It is expected that organizations will grow into this standard, as opposed to outgrowing it in the near future.

A brief description of each table follows. Click a specific table name to view the complete table or just click through all the tables. For your convenience, the tables are sortable by column.

Data Standard Category	Brief Description	Mandatory?
Company	The Company table includes basic information like industry, revenue, recovery plans, and other company-wide items that you might already have.	Mandatory
Country Information	The Country Information table allows several data fields to be collected for separate countries.	Optional
Asset	The Asset table categorizes assets like data, computers, and other physical assets (e.g., heating controls), as well as asset attributes like physical location and recovery costs. Providing this information is optional, though if you choose to provide it, certain fields are mandatory.	Optional
Data	The Data table describes information that you can provide for multiple types of data per company.	Optional
Transfers	The Transfer table captures how associated storage and transfer mechanisms might be at risk.	Optional
Insurance	The Insurance table contains fields for insurance policy conditions.	Optional
Re-Insurance	The Re-Insurance table contains fields for insurance policy conditions.	Optional
Premium	The Premium table contains fields for premium policy conditions.	Optional
Quality Score Rubric	Some tabs include fields that ask for a scaled rating. For these fields, use the Quality Score Rubric for guidance.	Optional

**Copyright**  
2016 AIR Worldwide. All rights reserved.

# Cyber Model



# AIR's Stochastic Modeling Framework Can Be Applied to Cyber

## HAZARD



Event  
Generation



Intensity Calculation

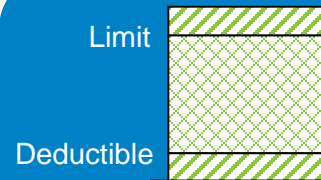


Exposure Information

## VULNERABILITY



Damage  
Estimation



Policy  
Conditions

## FINANCIAL



Loss Calculation

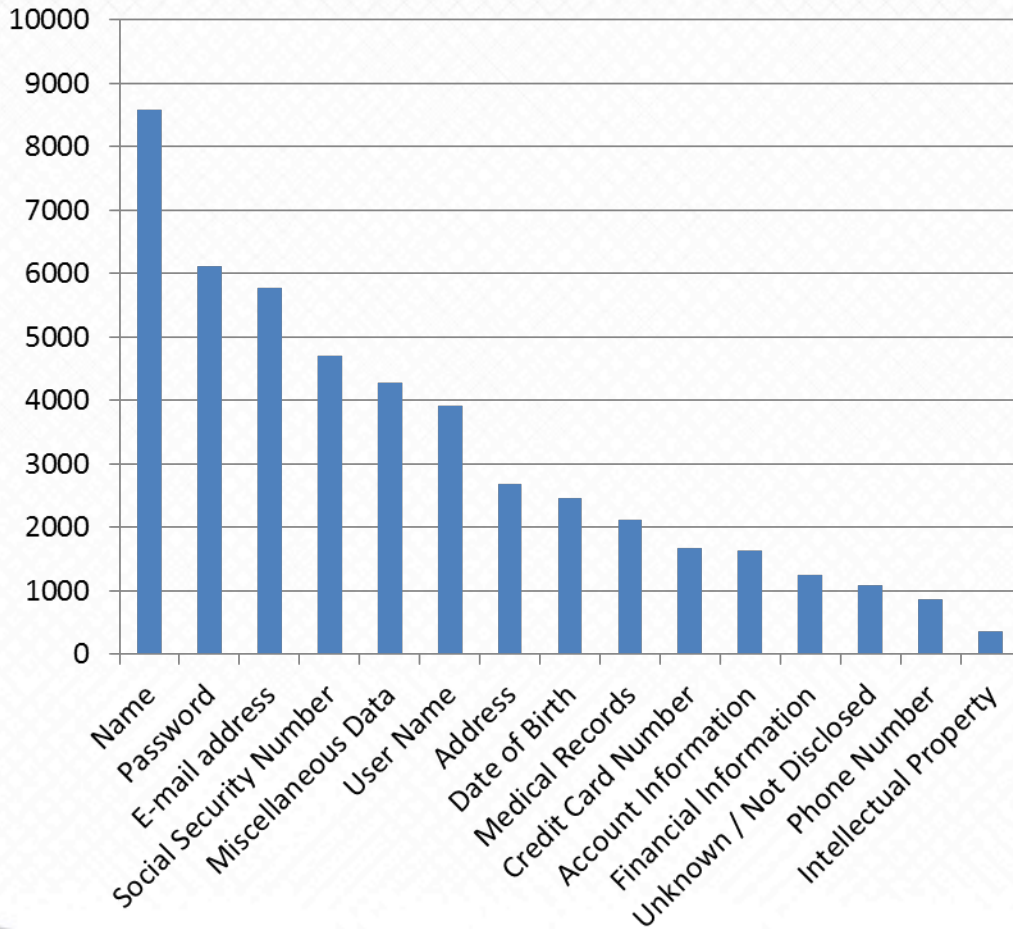
# Risk Based Security (RBS) Selected as Incident Data Provider



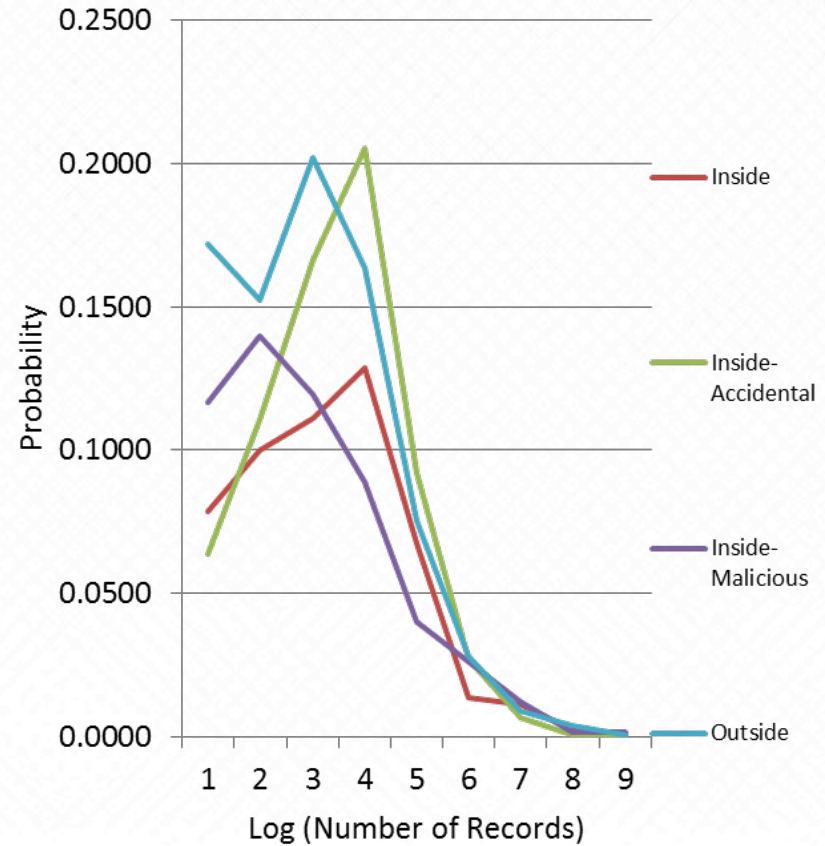
- Has developed a database of over 16,000 historical worldwide cyber incidents
- Based in Richmond, Virginia
- Publically disclosed clients include AIG and Willis

# Risk Based Security Data Examples

Count of RBS Events that Impacted Different Data Types



Probability of attack size by source





# BitSight Collaboration will Give the AIR Model Several Key Benefits

## BITSIGHT

- Analyzes public traffic on the Internet to unobtrusively give scores to companies
- Based in Cambridge, Massachusetts
- Founded by several MIT graduates
- Publically disclosed clients include AIG and Liberty

# BitSight Will Provide Clients a Real-Time View of the Risk Directly Within the AIR Model in Touchstone



Note: This is the only aspect of the BitSight collaboration that will require clients to also license BitSight's product

# BitSight's Scores Will Inform the Model's Relative Vulnerabilities

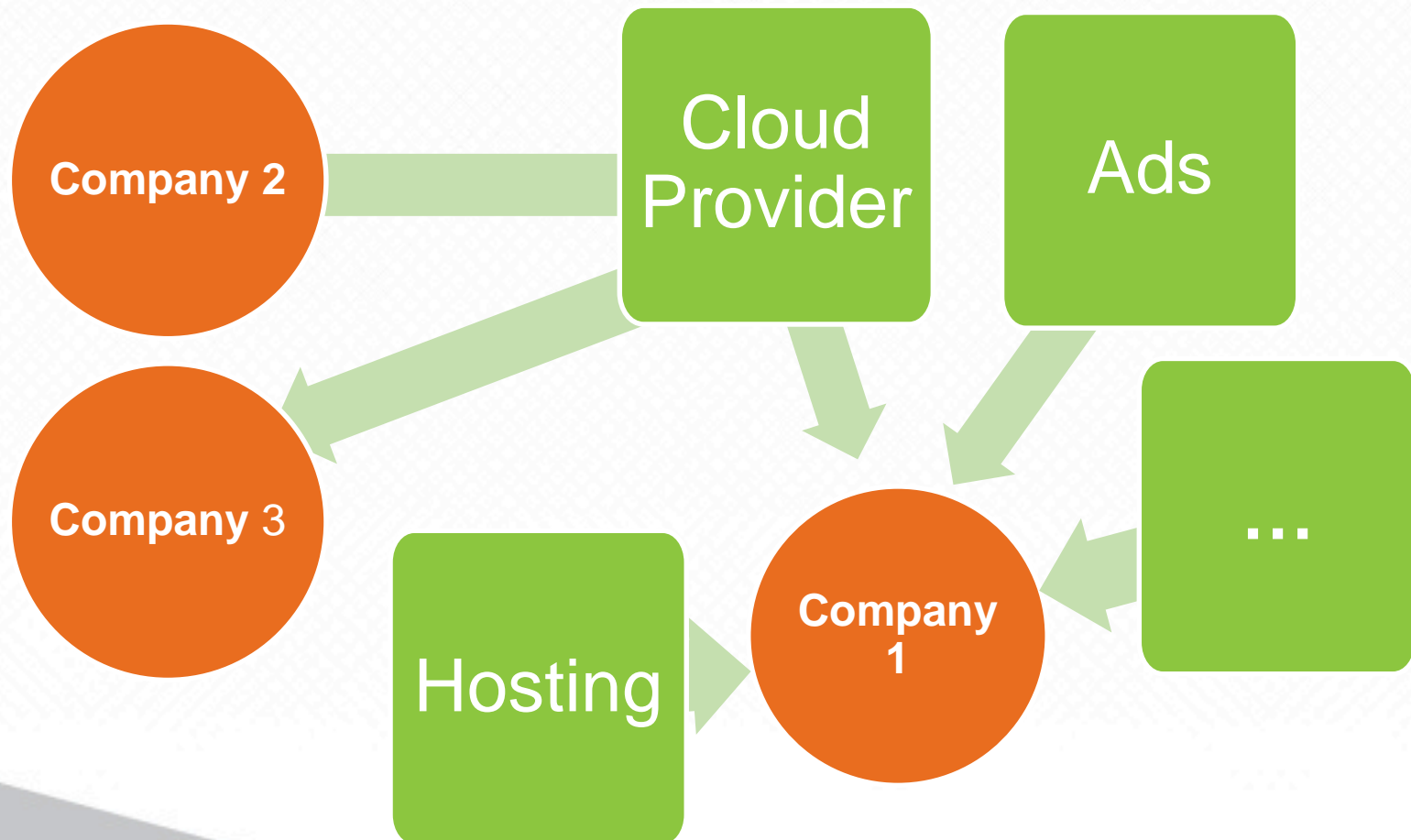


# BitSight's Data Will Inform the Development of the Cyber Industry Exposure Database



# AIR's Collaboration with BitSight Provides Business Connectivity Data

- Automatically and seamlessly identify cyber dependencies – and evaluate deterministic cyber aggregation scenarios based on these dependencies



# Contact Information

---

**John Elbl**  
**Vice President**  
**Verisk Insurance Solutions – AIR Worldwide**  
**[jelbl@air-worldwide.com](mailto:jelbl@air-worldwide.com)**

# Questions?





# Contact Information

**Tim McCarthy, ACAS, MAAA**  
Actuarial Director – Commercial Liability  
Verisk Insurance Solutions - ISO Solutions

[timothy.mccarthy@verisk.com](mailto:timothy.mccarthy@verisk.com)

<http://www.linkedin.com/in/timmccarthyactuary>



## Follow Us



[www.linkedin.com/company/iso](http://www.linkedin.com/company/iso)



@isonews