Milliman

Private Flood Rating Plans

CAS RPM: US Flood Insurance

Overview

- Flood Feasibility Study: Florida Example
- Florida Private Flood Programs
- Flood Pricing Structures

Flood Feasibility Study: Florida Example

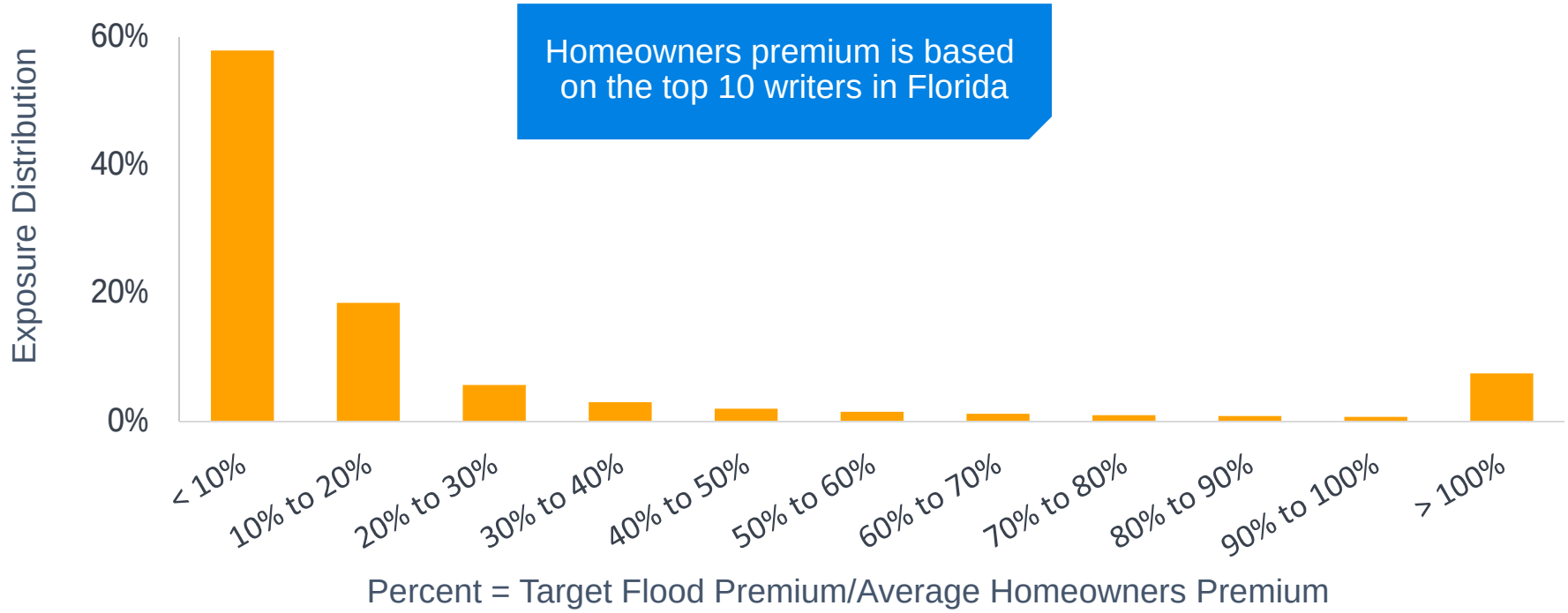
Critical assumptions and data underlying Florida study

- **Market basket** of 400,000 risks representing single family homes in Florida, developed by Milliman based on parcel data and other third-party sources
- **GIS variables** created by Milliman based on data from NOAA and USGS
- **Maximum flood limits** of $250k, consistent with NFIP coverage
- **NFIP rates** current as of October 2017 (most recent available)
- **KatRisk catastrophe model** to estimate inland flood and storm surge losses
- **Target loss ratio** of 35% assumes 65% for expenses, reinsurance and profit
- **$100 minimum premium**, no additional provision for non-modeled losses

This is just an example – the use of different data sources, catastrophe models and target expense assumptions will produce different results.

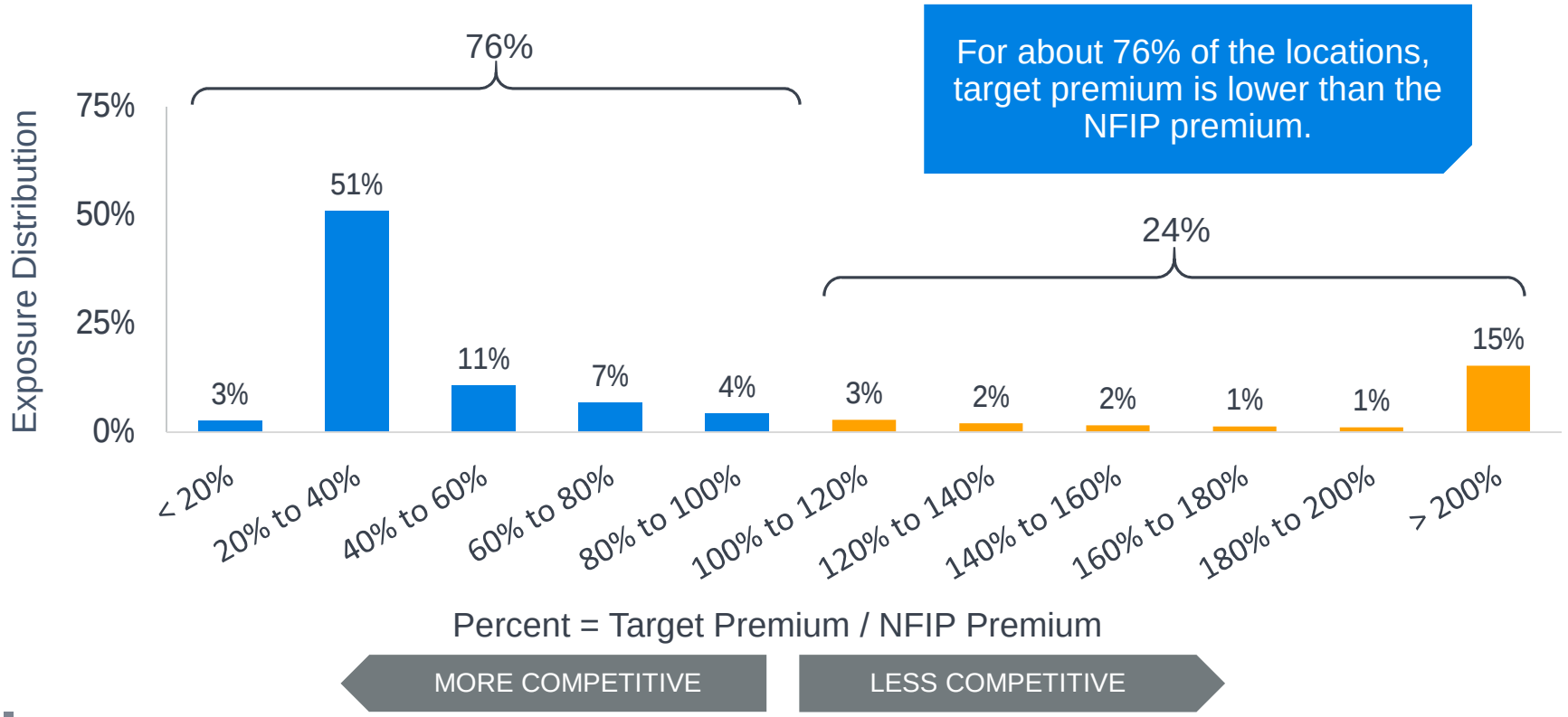
Overall – target flood premium vs. homeowners premium

Target Flood Premium as % of Homeowners



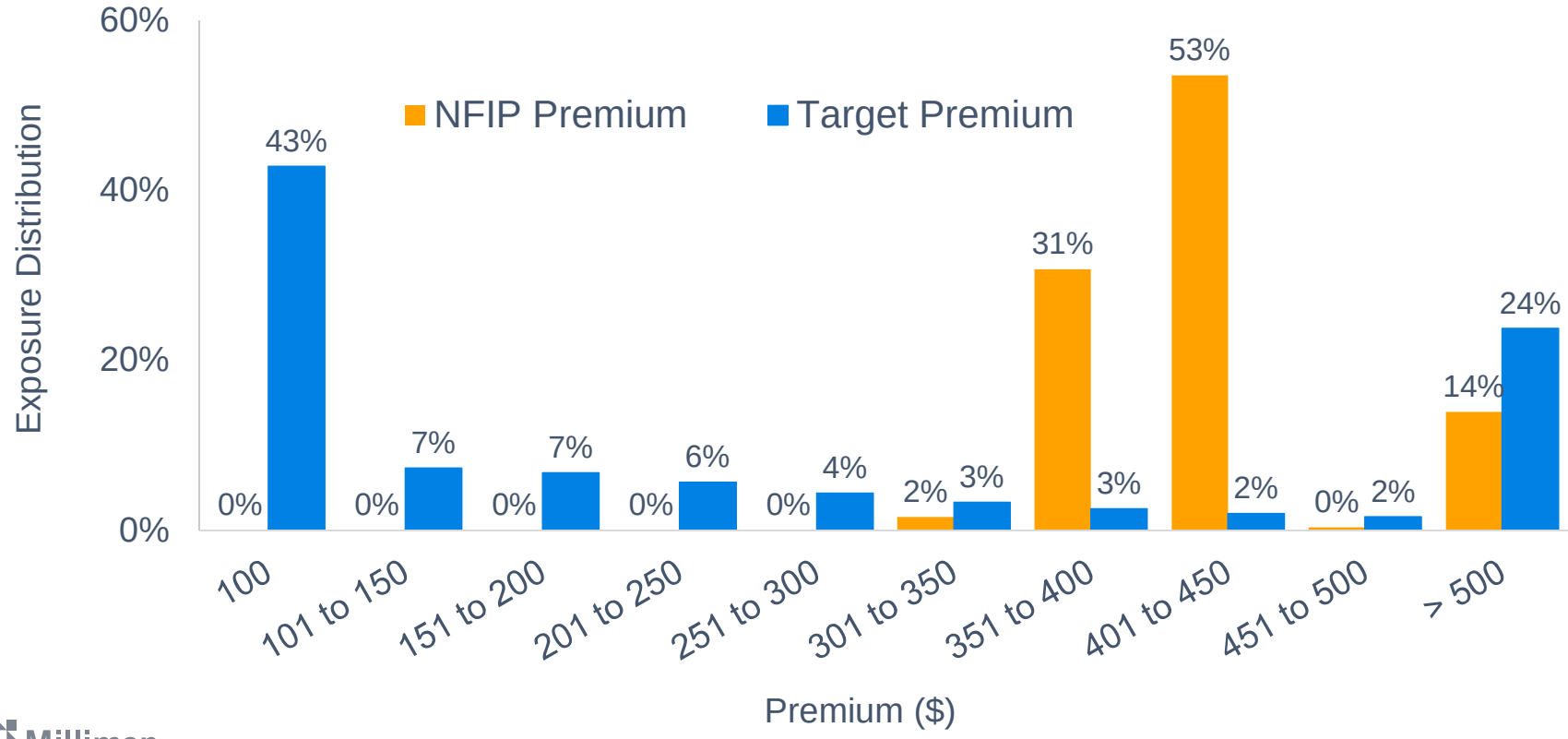
Overall – target flood premium vs. NFIP premium

Target Premium as % of NFIP Statewide Distribution



Overall – distribution of target and NFIP premiums

Target vs. NFIP Premium Distribution



Modeled NFIP loss ratios by segment

Policies that can be written at less than current NFIP rates can be identified based on several key factors

Segmentation buckets are based on:

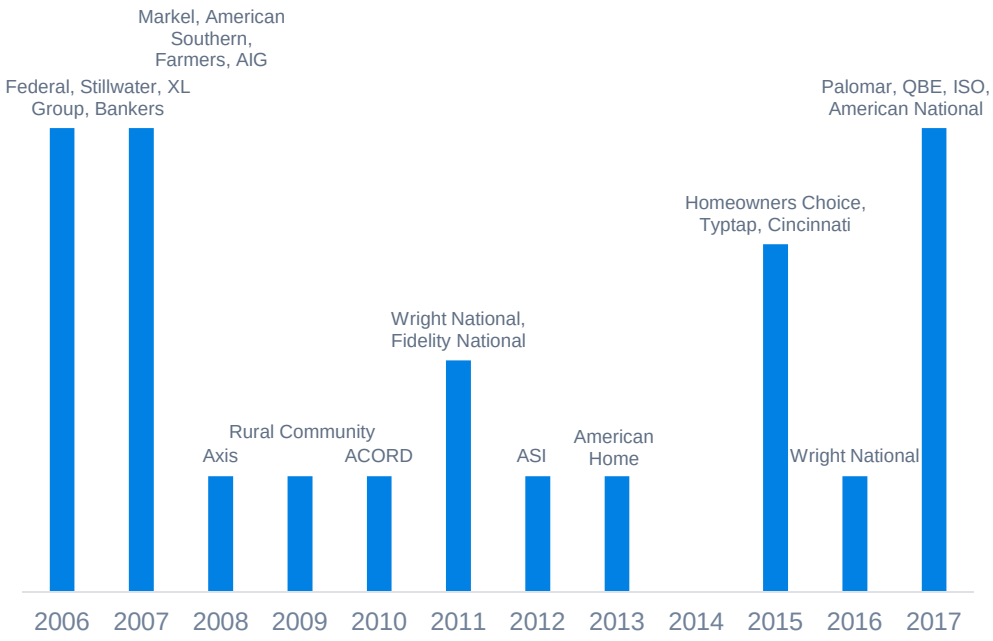
- Elevation
- Relative Elevation
- Distance to Coast
- Insurance to Value

Florida Private Flood Programs

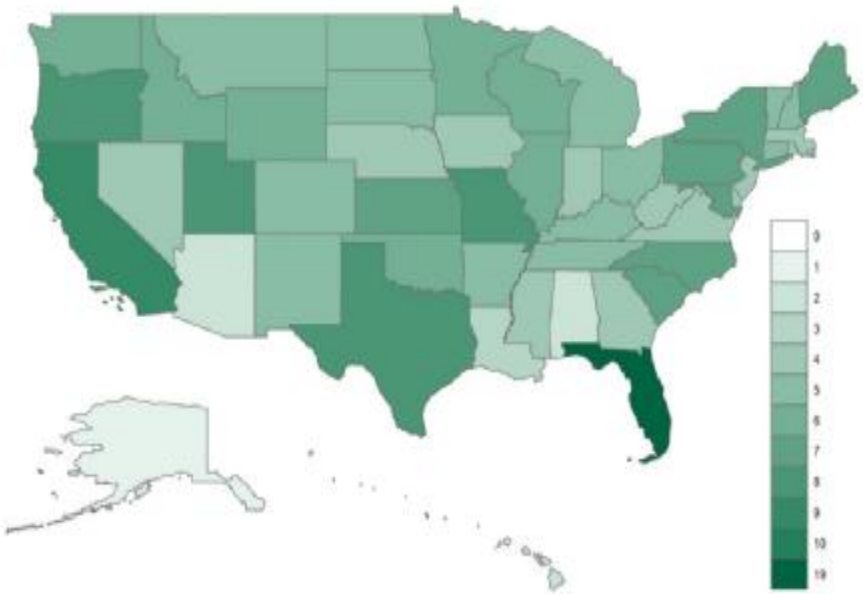
Private flood growth

Entrants to the private flood market have increased in recent years; highest activity in Florida

Private Standalone Flood Program Launches



Number of Private Standalone Flood Programs by State (2017)



Source: SNL.com; excludes non-admitted and endorsement programs

Current Florida flood programs

As of March 2018

Standalone	Endorsement	Excess of NFIP
• American Home • American Security (lender placed) • Federal • Homeowners Choice • TypTap • Lloyds Underwriters (surplus lines) • Voyager Indemnity (surplus lines)	• AIG Property Casualty • American Integrity • ASI • Centauri • Florida Peninsula/Edison • Homeowners Choice • Progressive Property • Safe Harbor* • Southern Oak • Tower Hill/Omega* • Universal North America • U.S. Coastal* • Weston	• American Home • American Security (lender placed) • ASI • Bankers • Federal • Markel • PURE • Wright National

* Proprietary rates. All others based on NFIP or simplified rating structure.

Rapid Private Flood Growth in 2017

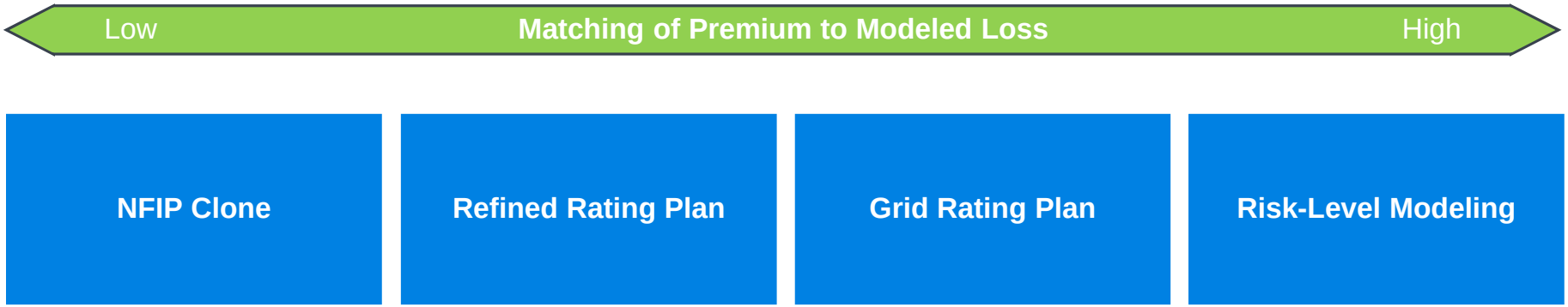
Private Flood written premiums grew over 50% in 2017, up to $624 million

State	Private Written Premiums (Millions)		2017 to 2016	
	2016	2017	% Change	$ Change
Florida	47.8	84.5	77%	36.7
California	48.8	72.0	48%	23.2
Texas	31.8	53.5	68%	21.7
New York	27.4	47.7	74%	20.3
New Jersey	17	28.9	70%	11.9
Pennsylvania	13.2	18.8	42%	5.6
Louisiana	11.5	17.9	56%	6.4
Massachusetts	9	15.3	70%	6.3
Ohio	5.6	14.2	154%	8.6
Illinois	9.8	14.0	43%	4.2

.Source: Insurance Journal. Originally reported by S&P Global

Flood Pricing Structures

Flood pricing structures



Risk-level modeling

- Cat model is run on every risk to derive annual average loss (AAL)
- Loss is loaded for reinsurance, expense, and profit to derive premium

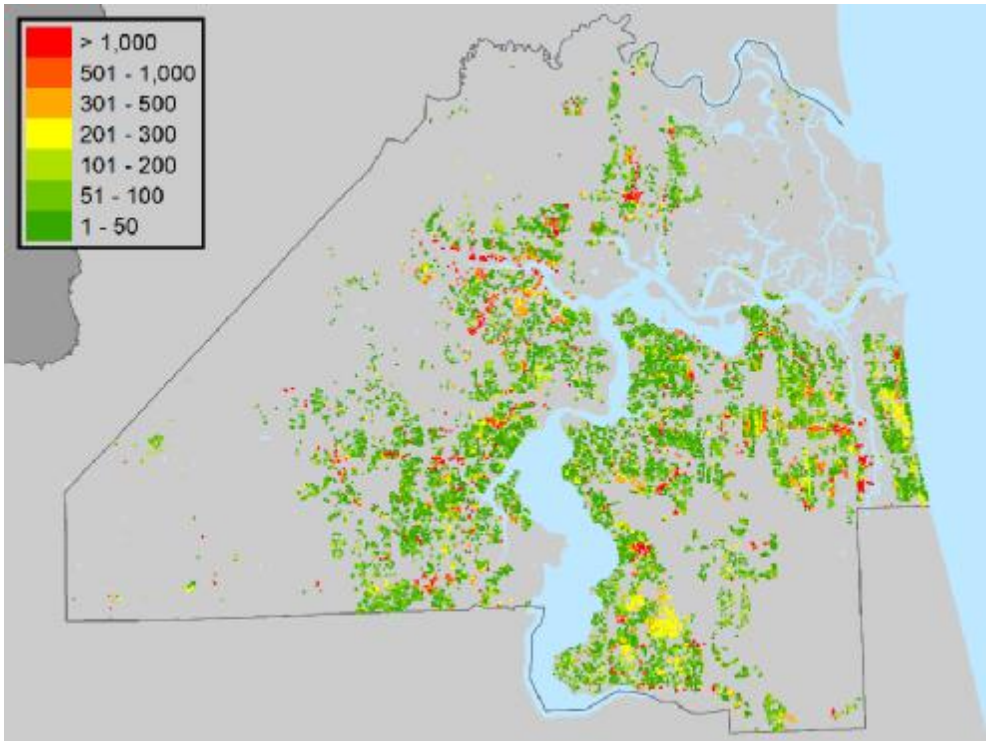
Advantages

- Low requirements and time to develop
- Matches premium to modeled loss
- Large market of profitable risks

Disadvantages

- Requires cat model call at quote
- Limited transparency for agents, regulators, and internal stakeholders
- Difficult to control pricing strategy
- Discontinuities and extreme values
- Reliance on one cat model

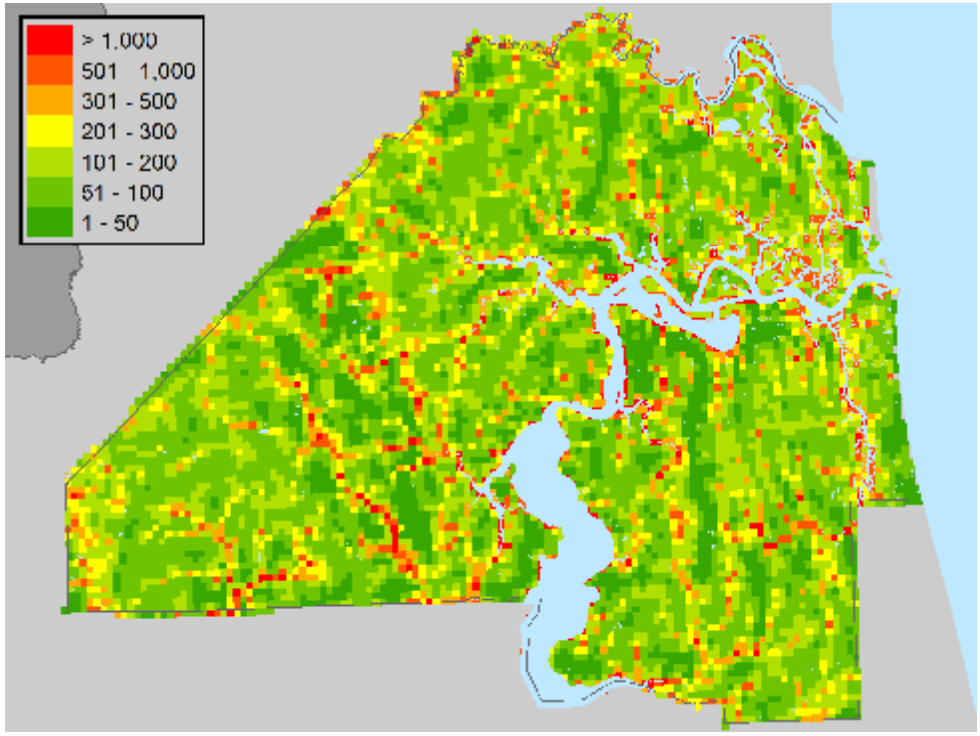
Duval County Inland Flood Base Rates



Grid rating plan

- Precompiled approach to all geographical characteristics from risk-level modeling
- Grids typically based on latitude and longitude, but could use other features such as census block
- Rates for each grid use base risk cat model results to determine geographic component of rate
- Utilizes separate factors for building characteristics and policy terms
  - Number of Stories
  - Amount of Insurance
  - Insurance to Value
  - Deductible
  - Presence of Basement
  - First Floor Height
  - Construction
  - Year Built

Duval County Inland Flood Base Rates



Grid rating plan

Advantages

- Can be similar to risk-level modeling without having to call a cat model at quote
- Large market of profitable risks
- Easier regulatory approval than risk-level modeling
- Can control pricing strategy around building characteristics

Disadvantages

- Maintenance of base rates can be difficult
  - At 10 meter resolution (100 square meters), Florida has over 1.7 billion grids.
  - At 30 meter resolution (900 square meters), Florida has over 180 million grids.
- Lower resolutions can be used, but premium will diverge from modeled loss as resolution decreases
  - There are about 454,000 census blocks over land in Florida.
  - The median size is over 21,000 square meters. Average size is over 312,000 square meters.
- Similar issues to risk-level modeling regarding:
  - Limited transparency for agents, regulators, and internal stakeholders
  - Difficult to control geographic pricing strategy
  - Discontinuities and extreme values

Refined rating plan

- Complete rating plan with unique territories, rating factors, and algorithm
- Reflects geographical and building characteristics that relate to flood risk

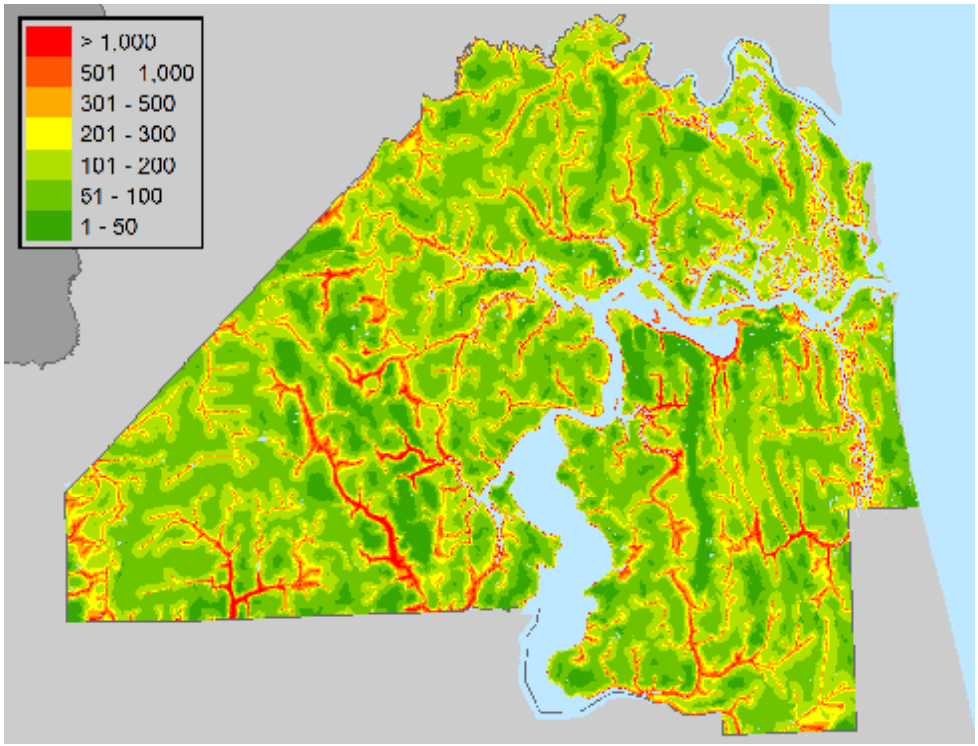
Advantages

- Easy to explain to agents and regulators
- Easiest method to compare and use multiple catastrophe models
- Can control pricing strategy
- Fewer discontinuities and extreme values
- Large market of profitable risks

Disadvantages

- High development time required to ensure rating plan is an accurate estimate of modeled loss
- Requires significant Geographic Information Systems (GIS) expertise

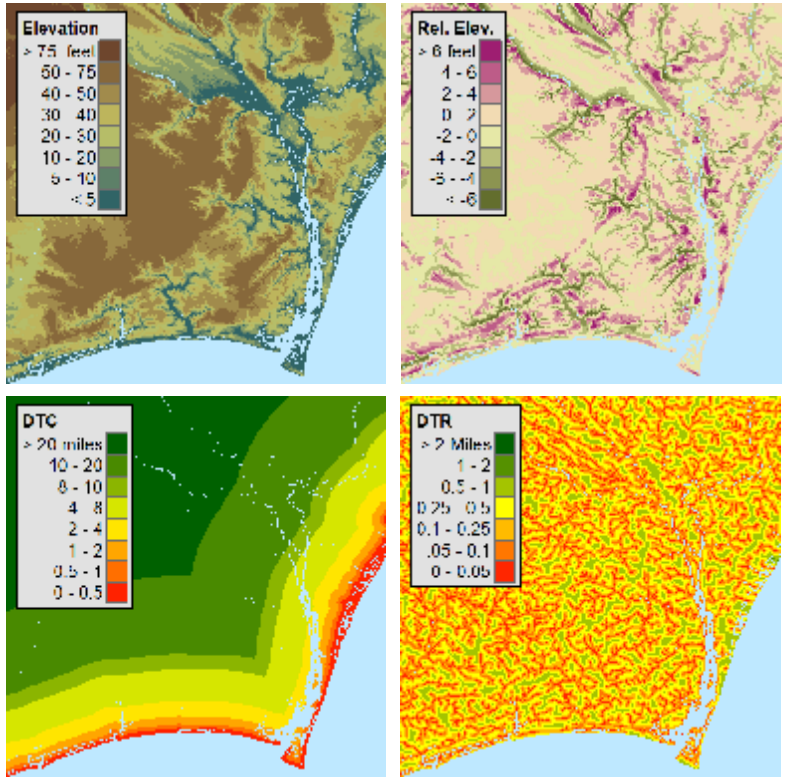
Duval County Inland Flood Base Rates



Refined rating geographic variables

Flood Risk Factors

- Elevation
- Relative elevation (elevation relative to nearby elevation)
- Distance to coast
- Distance to river / stream
- Size of river / stream
- Hydrological units / watersheds
- Slope
- Curvature



NFIP clone

- Rates and territories follow NFIP
- Underwriting used to avoid unprofitable areas

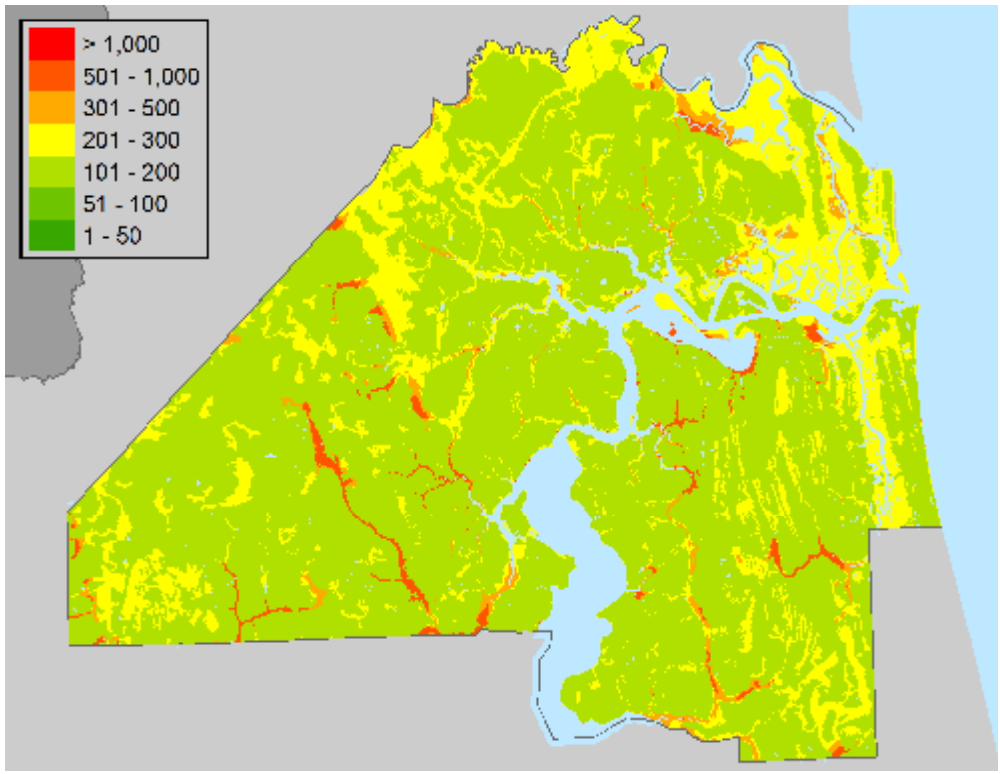
Advantages

- Low requirements and time to develop
- Easy to explain to agents and regulators
- Faster IT implementation time

Disadvantages

- Limited market of profitable risks
- Limited rate differentiation, especially outside of Special Flood Hazard Area (SFHA)
- Underutilization of technology and advanced analytics
- Rates may be obsolete once NFIP rolls out refined rate structure

Duval County Inland Flood Base Rates



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Thank you

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