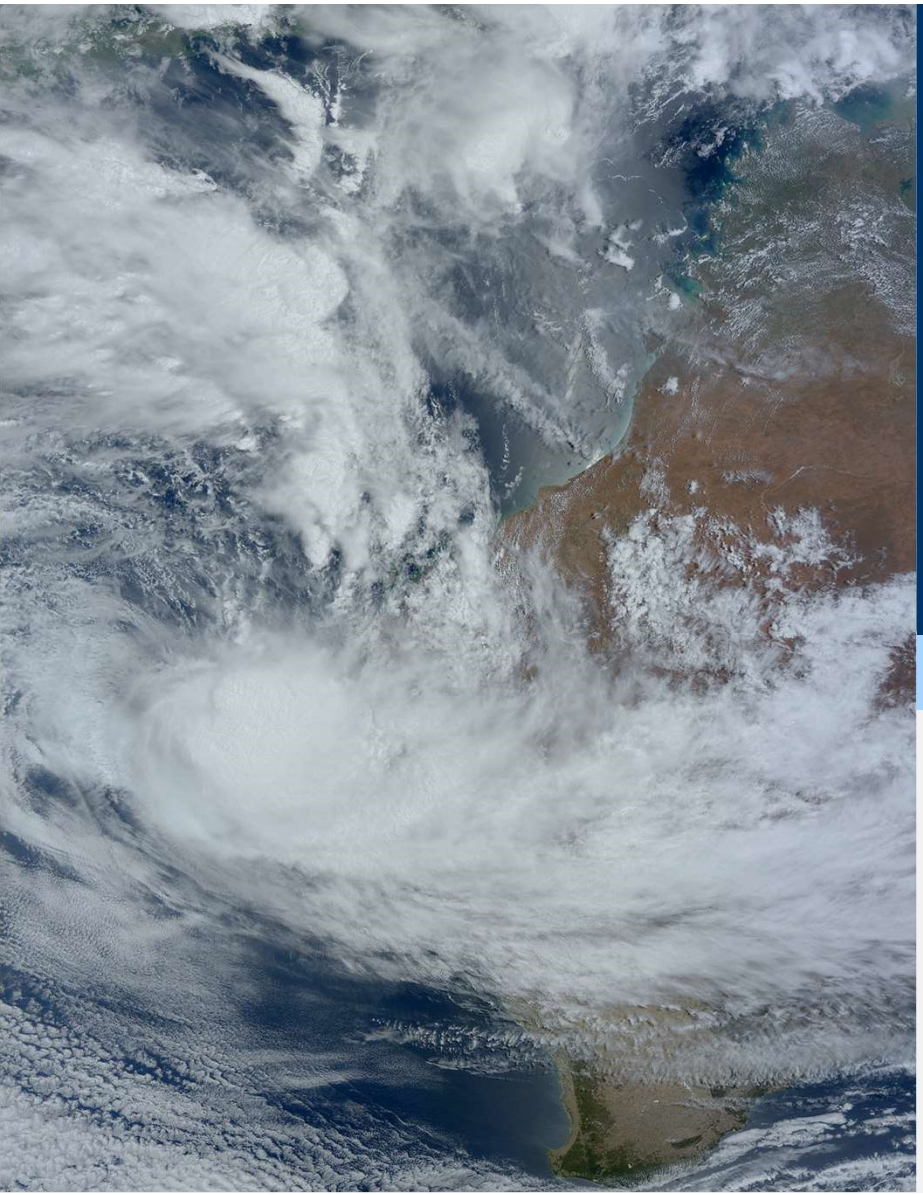


Dive In!
The NC Private Flood Program

CAS RPM Presentation – March 16, 2021

TODAY'S PRESENTERS

Rebecca Williams, ACAS, MAAA

- Actuary
- North Carolina Rate Bureau

David Evans, FCAS, MAAA

- Consulting Actuary
- Milliman, Inc.

Polling Question: Flood Insurance

Which group is most important for increasing flood insurance awareness?

Realtors

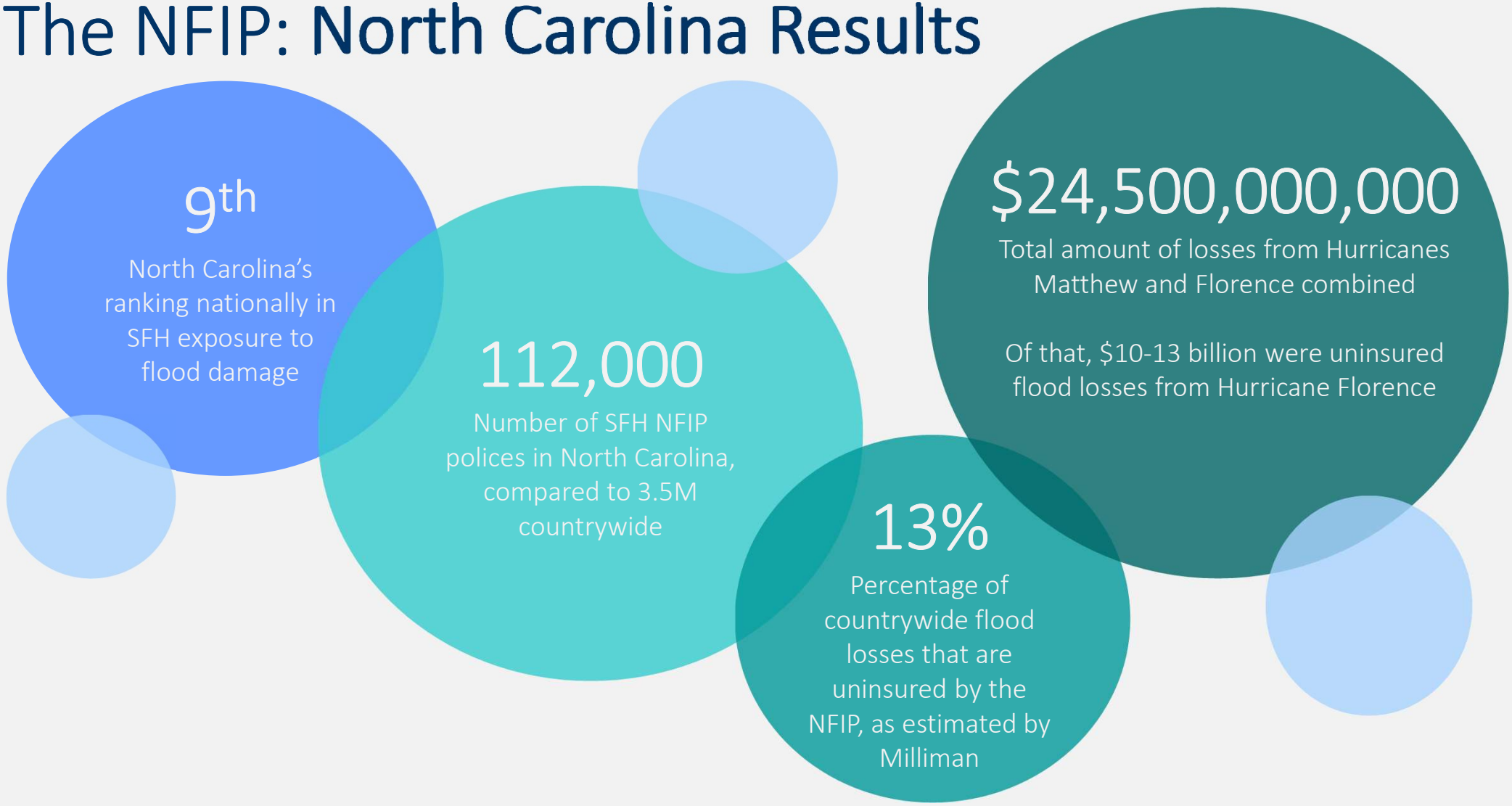
Consumers

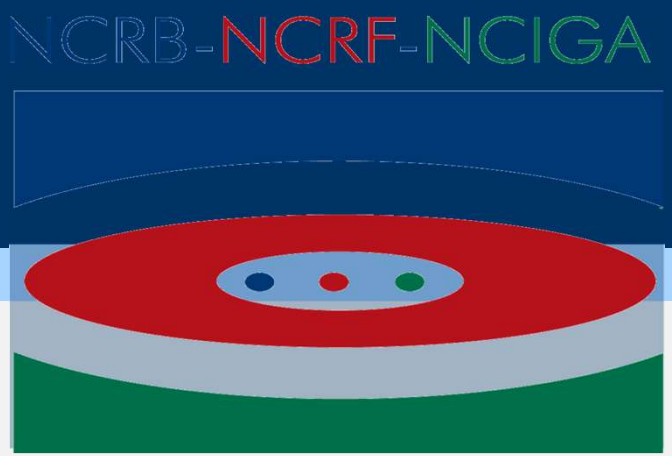
Insurance Agents

Governmental Entities

Insurance Companies

The NFIP: North Carolina Results





Who is NCRB?

North Carolina Rate Bureau

The Bureau shall promulgate and propose rates for insurance against loss to residential real property with not more than four housing units

NCGS 58-36-1

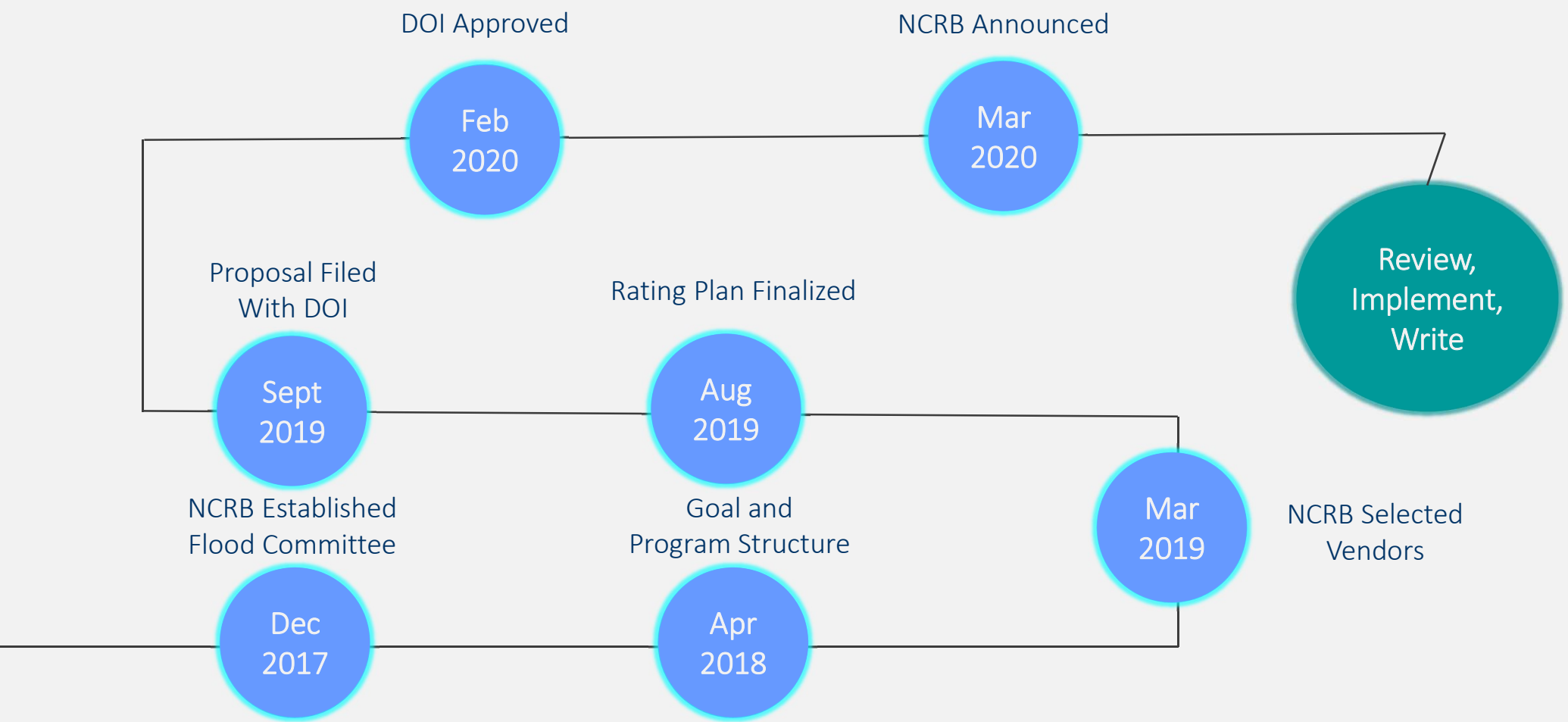
Every insurer shall adhere to the uniform classification plan, experience rating plan, and policy form

NCGS 58-36-100(o)

The DOI shall be authorized to take appropriate action to plan for and establish a private flood insurance market.

2016- HB287

NCRB Flood Timeline



NCRB Program

Goal:

To develop a long term, quality flood solution for the state of North Carolina that is accepted by lenders and offers residential risk coverage options that are equal to or greater than the current policy offered by the NFIP.

Plan:

- ✓ Bring in industry experts to create a property flood subcommittee
- ✓ Bring in top flood experts to help build a new flood program for North Carolina
- ✓ Match price to risk and cover residential property types

NCRB-NCRF-NCIGA

ISO

KatRisk

Milliman

Top Goals and Considerations

- NC offers a Flood program that is consistent with a countrywide solution
- NC offers a flood program that is similar to FEMA/NFIP program
- NC Flood Solution should be a long term quality product
- NC Flood Program has lender market acceptance (mortgage companies)

North Carolina: Program Overview

NFIP vs. NCRB Forms

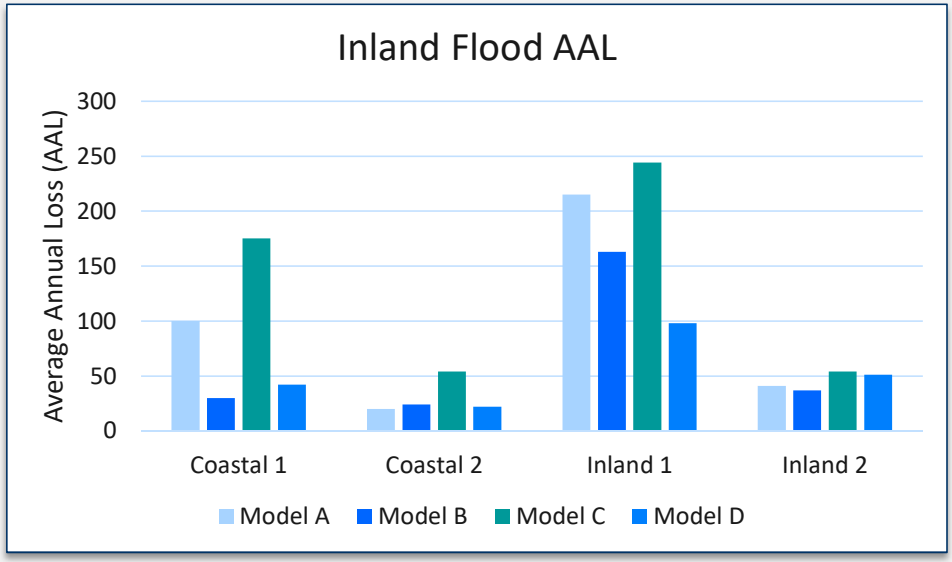
The following notable differences exist between NFIP and NCRB:

Program Detail	NFIP	NCRB
Coverage A: Dwelling Limits	$250,000 maximum	No limit
Coverage C: Personal Property Limits	$100,000 maximum	No limit
Coverage D: Additional Living Expenses	Not covered	Optional
Deductibles	Separate deductibles by coverage type	Single deductible per policy
Replacement Cost	Single family dwellings only Detached garage & personal property not covered	1-4 family dwellings, with 1 detached garage Optional endorsements for personal property and other structures
Basement/Below Ground Areas - Dwelling	Covered	Covered
Basement/Below Ground Areas- Contents	Not covered (exception for certain appliances)	Optional
Detached Garages/Structures	Up to 1 (Within the coverage A limit)	1 detached garage (Within the coverage A limit) - Optional (ex. 10% in additional to coverage A for all structures, or scheduled structures)
Increased Cost of Compliance	$30,000 maximum	$30,000 minimum, with higher limits available
Ordinance or Law	Not covered	Optional

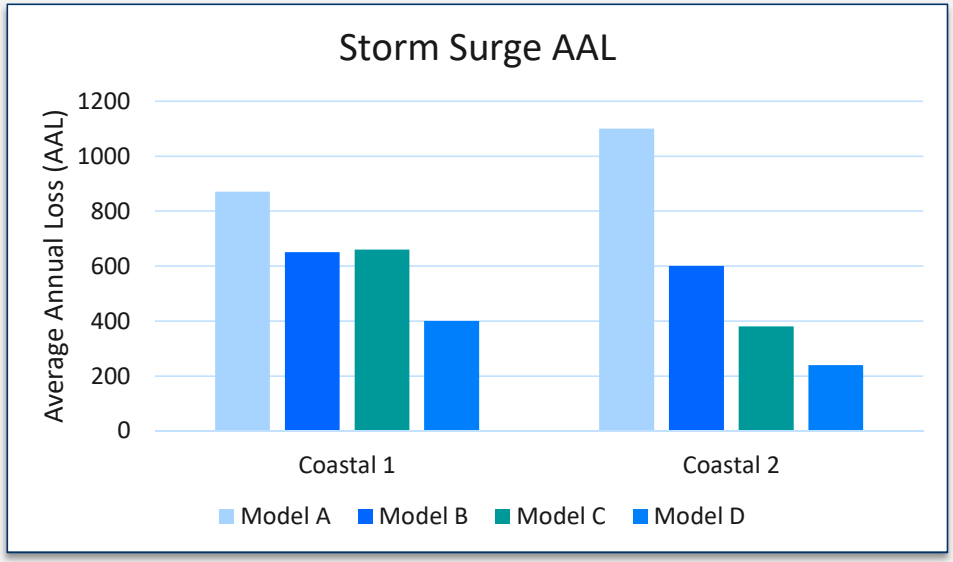
Model Evaluation: Average AAL

Average AAL impacts the rate level

Wide disparities exist across different models for inland flood



Storm surge also has sizeable variation of AALs among the models



Model Evaluation: Outlier Analysis

Model A inland flood AALs have more variation than other models

Inland Flood (4 Counties)

	% Missing AAL	% Zero AAL	Below 50% of min	Over 150% of max
Model A	0.0%	19.5%	70.4%	4.8%
Model B	11.4%	1.2%	16.7%	7.2%
Model C	0.0%	0.0%	0.4%	16.3%
Model D	0.0%	0.5%	0.8%	45.4%

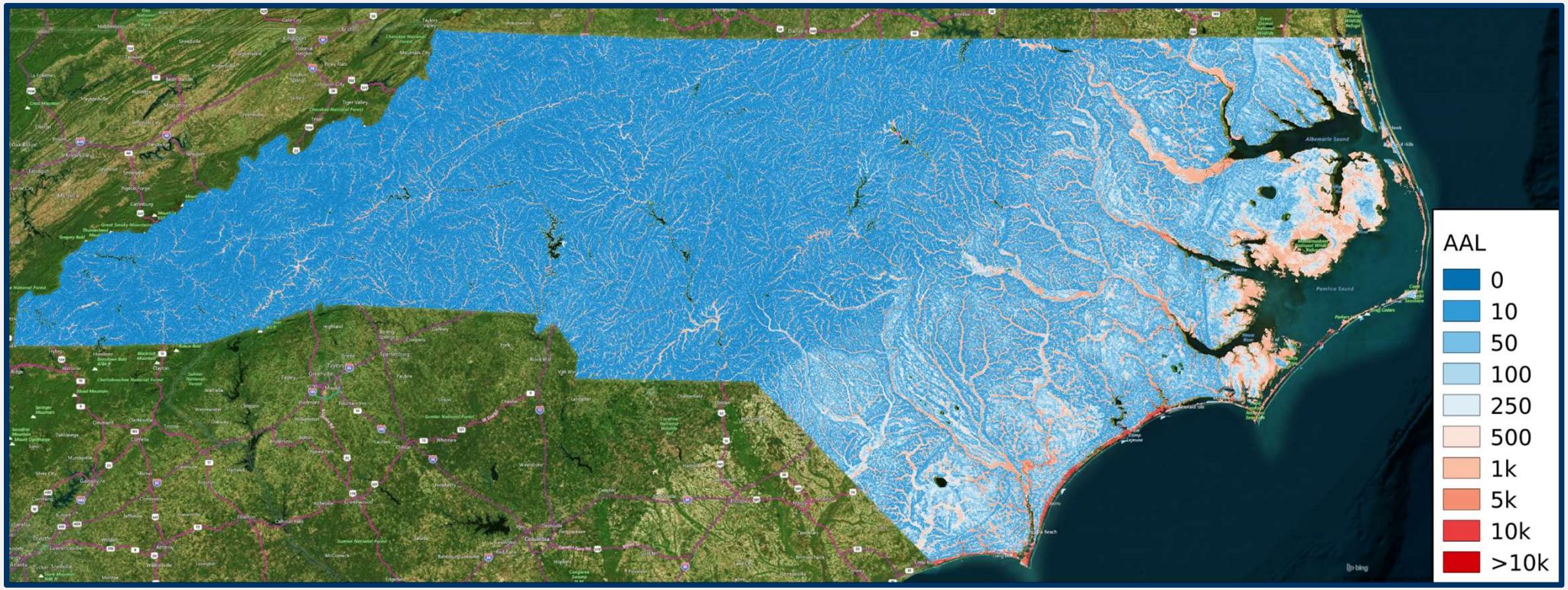
Models B and C have the fewest outliers; Model B had many locations with missing AAL

Storm Surge (2 Counties)

	% Missing AAL	% Zero AAL	Below 50% of min	Over 150% of max
Model A	0.0%	26.8%	0.5%	25.6%
Model B	4.7%	20.4%	0.0%	24.3%
Model C	0.0%	49.7%	20.3%	0.7%
Model D	0.0%	47.9%	11.4%	0.3%

Models A, B, and C have about 10-15% more outliers

Inland Flood + Storm Surge: Ground Up Loss



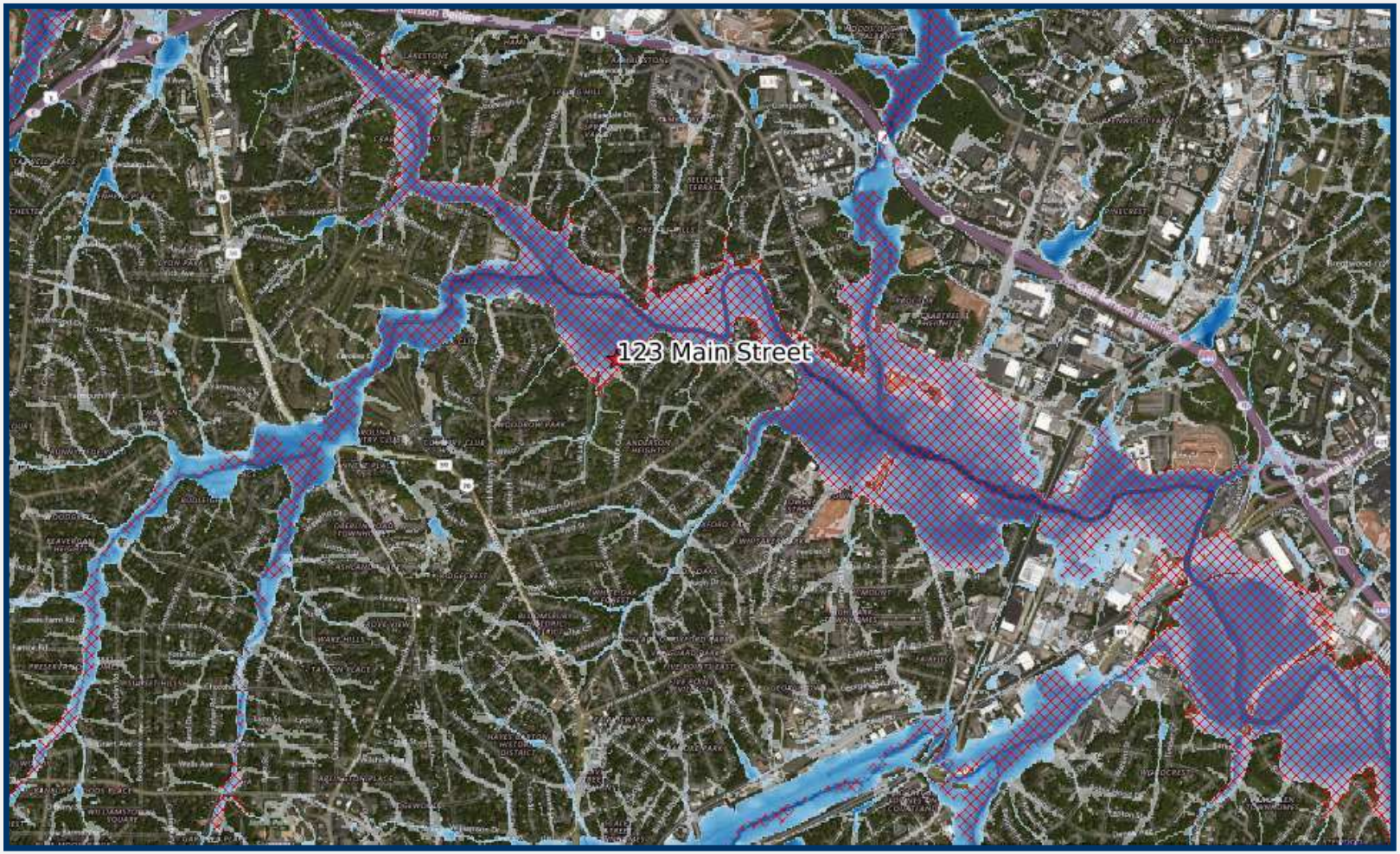
NFIP vs. NCRB Rating

In addition to reflecting North Carolina specific rates, the following notable differences exist between the NFIP and the North Carolina flood product:

Rating Characteristic	NFIP*	NCRB
Geographic Rating Granularity	Base Flood Elevation (BFE) in SFHA	30 Meters Statewide
Modern Multiplicative Rating Algorithm	No	Yes
Transparent Impacts of Property Characteristics	No	Yes
Insurance to Value	Limited	Yes

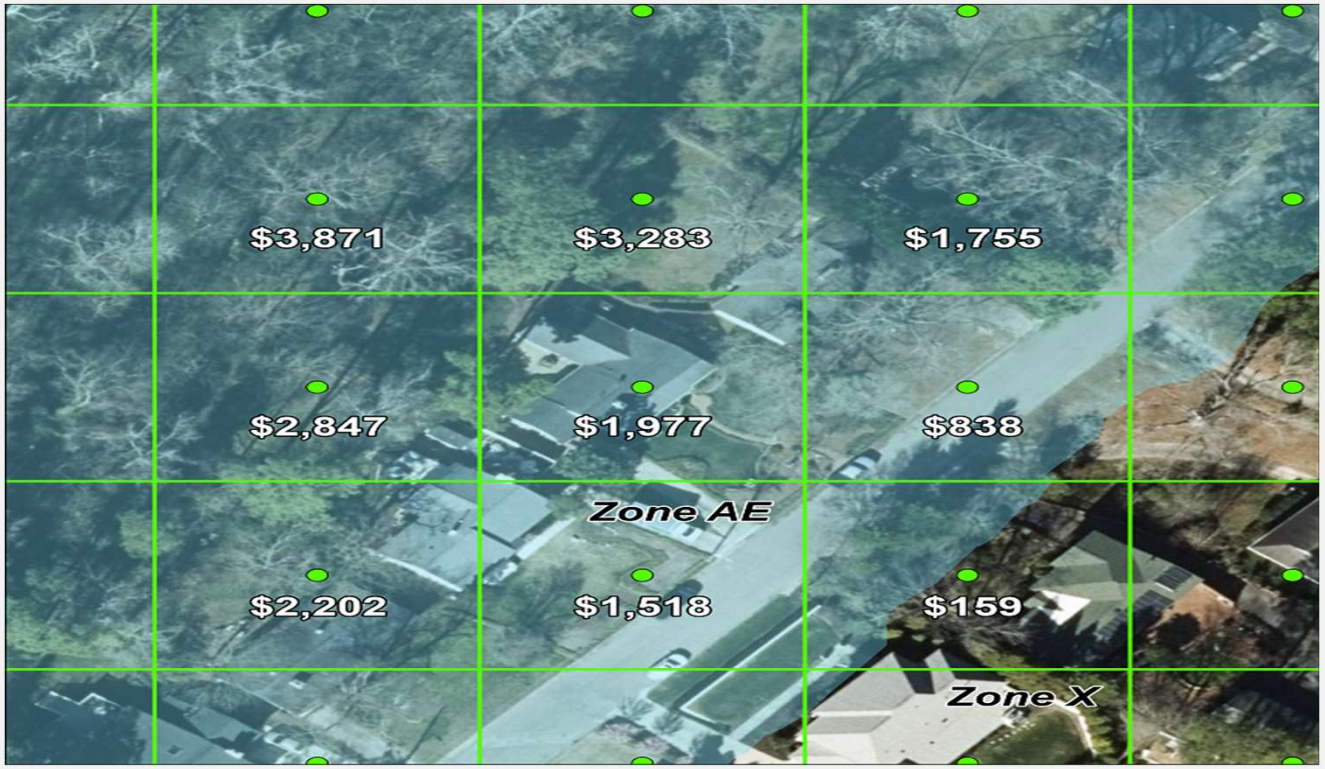
*Characteristics shown are based on NFIP rates as of April 2020. Risk Rating 2.0 is expected to address these issues

High Risk Flood Zone: Flood Map

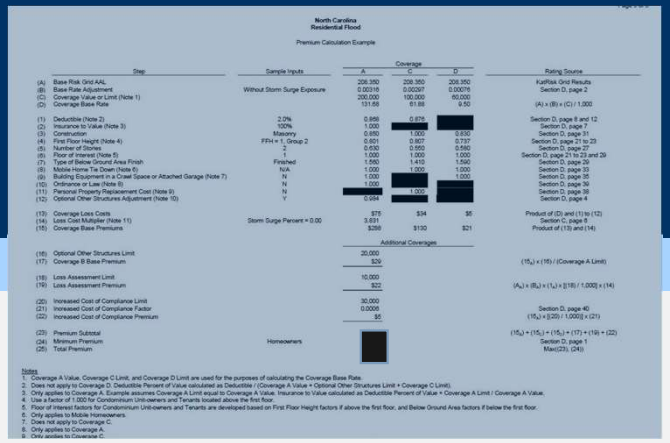


Granular Flood Rating

Flood risk varies significantly within and across flood zones



North Carolina: Flood Rating



North Carolina
Residential Flood

Premium Calculation Example

	Step	Sample Inputs	Coverage A	Coverage C	Coverage D	Rating Source
(A)	Base Risk Grid AAL		206.350	206.350	206.350	KatRisk Grid Results
(B)	Base Rate Adjustment	Without Storm Surge Exposure	0.00316	0.00297	0.00076	Section D, page 2
(C)	Coverage Value or Limit (Note 1)		200,000	100,000	60,000	
(D)	Coverage Base Rate		131.66	61.88	9.50	(A) x (B) x (C) / 1,000
(1)	Deductible (Note 2)	2.0%	0.898	0.879	[redacted]	Section D, page 8 and 12
(2)	Insurance to Value (Note 3)	100%	1.000	[redacted]	[redacted]	Section D, page 7
(3)	Construction	Masonry	0.850	1.000	0.830	Section D, page 31
(4)	First Floor Height (Note 4)	FFH = 1, Group 2	0.631	0.607	0.737	Section D, page 21 to 23
(5)	Number of Stories	2	0.620	0.620	0.680	Section D, page 27
(6)	Floor of Interest (Note 5)	1	1.000	1.000	1.000	Section D, page 21 to 23 and 29
(7)	Type of Below Ground Area Finish	Finished	1.590	1.410	1.590	Section D, page 29
(8)	Mobile Home Tie Down (Note 6)	N/A	1.000	1.000	1.000	Section D, page 33
(9)	Building Equipment in a Crawl Space or Attached Garage (Note 7)	N	1.000	[redacted]	1.000	Section D, page 35
(10)	Ordinance or Law (Note 8)	N	1.000	[redacted]	[redacted]	Section D, page 39
(11)	Personal Property Replacement Cost (Note 9)	N	[redacted]	1.000	[redacted]	Section D, page 38
(12)	Optional Other Structures Adjustment (Note 10)	Y	0.994	[redacted]	[redacted]	Section D, page 4
(13)	Coverage Loss Costs		$78	$34	$5	Product of (D) and (1) to (12)
(14)	Loss Cost Multiplier (Note 11)	Storm Surge Percent = 0.00	3.631	3.631	3.631	Section C, page 5
(15)	Coverage Base Premiums		$289	$130	$21	Product of (13) and (14)
	Additional Coverages					
(16)	Optional Other Structures Limit		20,000			
(17)	Coverage B Base Premium		$29			$(15_A) \times (16) / (\text{Coverage A Limit})$
(18)	Loss Assessment Limit		10,000			
(19)	Loss Assessment Premium		$22			$(A_R) \times (B_R) \times (1_R) \times [(18) / 1,000] \times (14)$
(20)	Increased Cost of Compliance Limit		30,000			
(21)	Increased Cost of Compliance Factor		0.0006			Section D, page 40
(22)	Increased Cost of Compliance Premium		$6			$(15_A) \times [(20) / 1,000)] \times (21)$
(23)	Premium Subtotal		[redacted]			$(15_A) + (15_C) + (15_D) + (17) + (19) + (22)$
(24)	Minimum Premium	Homeowners				Section D, page 1
(25)	Total Premium					Max((23), (24))

Notes
1. Coverage A Value, Coverage C Limit, and Coverage D Limit are used for the purposes of calculating the Coverage Base Rate.
2. Does not apply to Coverage D. Deductible Percent of Value calculated as Deductible / (Coverage A Value + Optional Other Structures Limit + Coverage C Limit).
3. Only applies to Coverage A. Example assumes Coverage A Limit equal to Coverage A Value. Insurance to Value calculated as Deductible Percent of Value + Coverage A Limit / Coverage A Value.
4. Use a factor of 1.000 for Condominium Unit-owners and Tenants located above the first floor.
5. Floor of Interest factors for Condominium Unit-owners and Tenants are developed based on First Floor Height factors if above the first floor, and Below Ground Area factors if below the first floor.
6. Only applies to Mobile Homeowners.
7. Does not apply to Coverage C.
8. Only applies to Coverage A.
9. Only applies to Coverage C.

Overview of Ratemaking Process

1. Run catastrophe model
2. Develop geographic base rates
3. Develop rating factors
4. Develop coverage factors
5. Apply rates to market basket

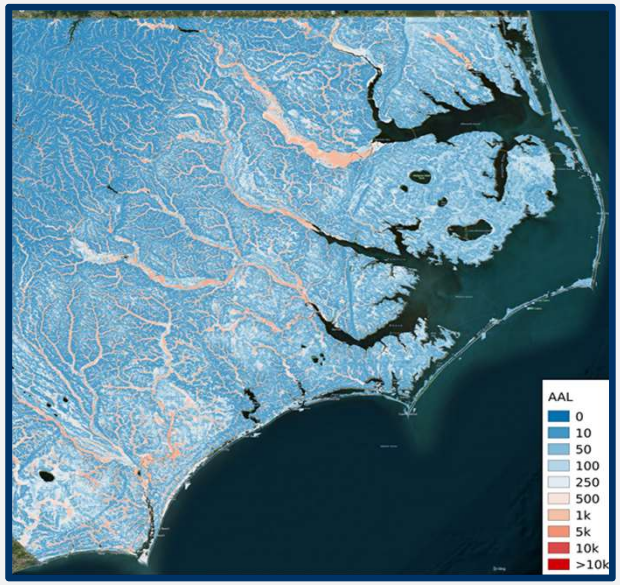
6. Adjust rates to match coverage
7. Add provisions
8. Develop expense loads
9. Apply final rates
10. Compare to other premiums

Catastrophe Modeling and Base Rates

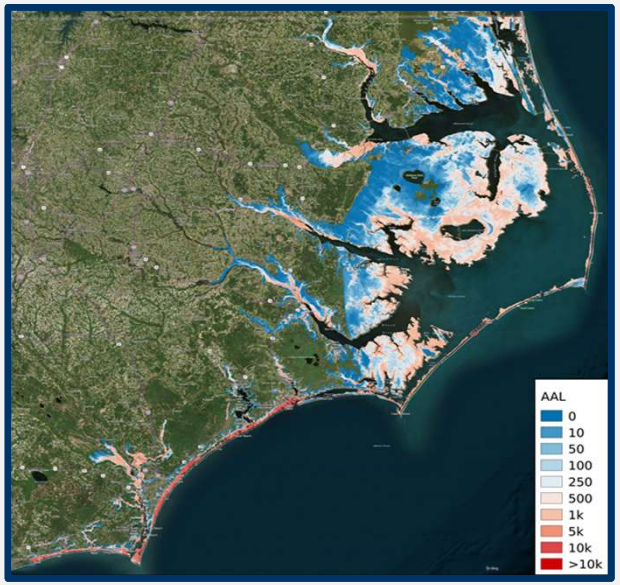
SpatialKat

✓ Probabilistic Inland Flood and Hurricane Wind/Storm Surge Model

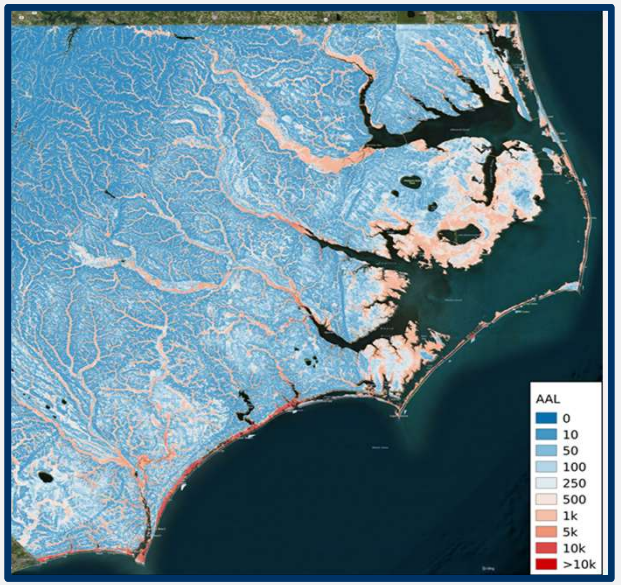
✓ For this analysis, the NCRB is using the Inland Flood and Storm Surge Models



Inland Flood



Storm Surge



Inland Flood + Storm Surge

Polling Question: Property Characteristics

What Rating Variable do you think would have the most impact on flood premium pricing?

First Floor Height

Replacement Cost of Dwelling

Location

Year Built

Number of Stories

Property Characteristics

Limits for Coverage A/B/C/D	$200K/20K /100K/60K
Replacement Value of Dwelling	$200K ITV = 100%
First Floor Height	1 Ft
# Stories	2 without basement

Premium: $1,022

Limits for Coverage A/B/C/D	$100K/20K /100K/60K
Replacement Value of Dwelling	Same as House A ITV = 50%
First Floor Height	Same as House A
# Stories	Same as House A

Premium: $921

Limits for Coverage A/B/C/D	Same as House A
Replacement Value of Dwelling	$400K ITV = 50%
First Floor Height	Same as House A
# Stories	Same as House A

Premium: $1,478

Limits for Coverage A/B/C/D	Same as House A
Replacement Value of Dwelling	Same as House A ITV = 100%
First Floor Height	8 Ft
# Stories	Same as House A

Premium: $296

Limits for Coverage A/B/C/D	Same as House A
Replacement Value of Dwelling	Same as House A ITV = 100%
First Floor Height	Same as House A
# Stories	1 with finished basement

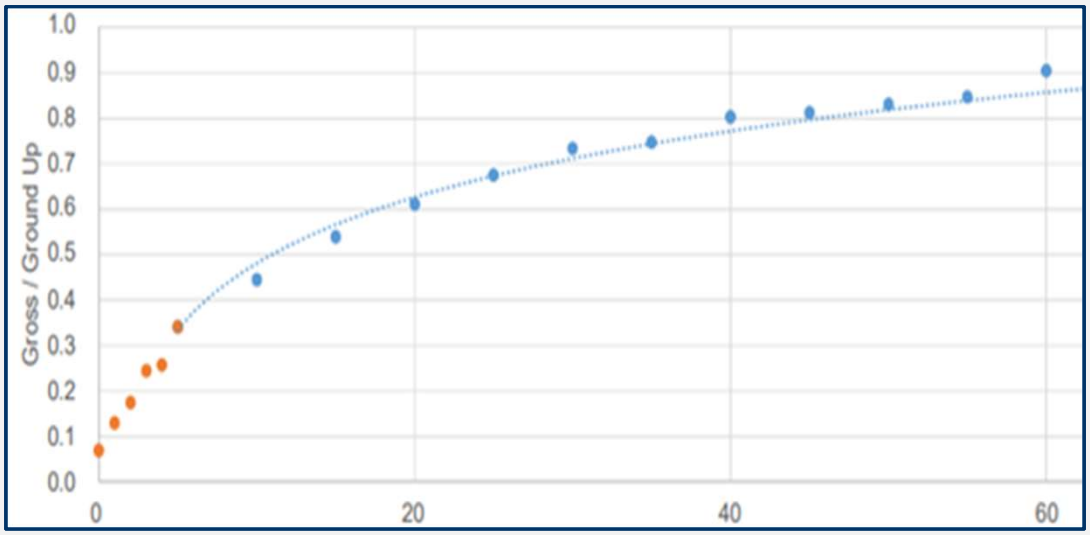
Premium: $2,584

Property Characteristics

- ✓ Developed an Exposure set specifically for Rate Development
- ✓ Utilized a Generalized Linear Model, targeting Ground Up Loss and controlling for geographic risk
- ✓ Used training dataset to ensure rates matched modeled loss
  - ✓ Added interactions based on storm surge exposure and overall risk
- ✓ Indicated Rates developed and validated on holdout dataset for:

Basement Type | Construction | First Floor Height | Floor of Interest | Number of Stories | Tie Downs | Other Structures Coverage

Coverage Factors

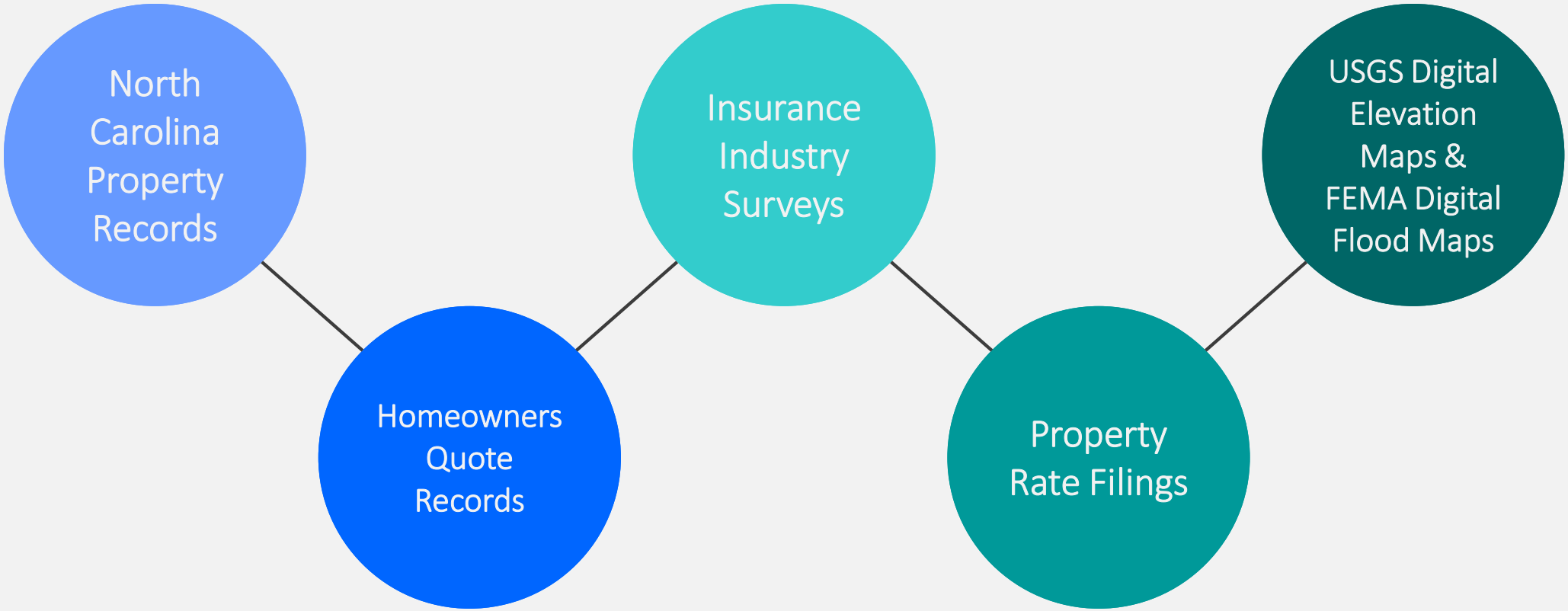


Rate development exposure set

Insurance to value adjustments

Deductible adjustments

Market Basket Validation



Match Rates to Forms

01 Coverage differences

02 Develop non-modeled rating factors

03 Select expenses

Competitive Analysis

OUTSIDE OF HIGH RISK FLOOD ZONE,

95%

OF RESIDENCES SAW A LOWER RATE!

INSIDE HIGH RISK FLOOD ZONE,

40%

OF RESIDENCES SAW A LOWER RATE!

Overview of Ratemaking Process

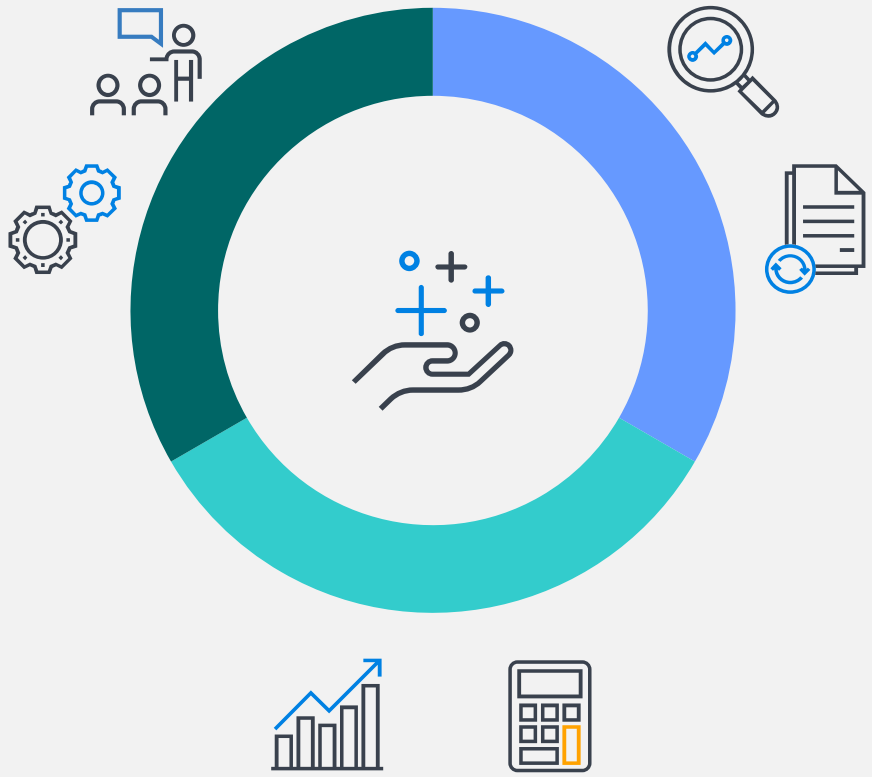
1. Run catastrophe model
2. Develop geographic base rates
3. Develop rating factors
4. Develop coverage factors
5. Apply rates to market basket

6. Adjust rates to match coverage
7. Add provisions
8. Develop expense loads
9. Apply final rates
10. Compare to other premiums

Filing Strategies

Working with the existing patchwork of requirements by state

- ✓ Trade secret protected meetings
- ✓ Public rate examples
- ✓ Regulator controlled access to rates



	Step	Sample Inputs	Coverage A	Coverage C	Coverage D
(A)	Base Risk Grid AAL		208.350	208.350	208.350
(B)	Base Rate Adjustment	Without Storm Surge Exposure	0.00316	0.00297	0.00076
(C)	Coverage Value or Limit (Note 1)		200,000	100,000	60,000
(D)	Coverage Base Rate		131.68	61.88	9.50
(1)	Deductible (Note 2)	2.0%	0.868	0.876	[redacted]
(2)	Insurance to Value (Note 3)	100%	1.000	[redacted]	[redacted]
(3)	Construction	Masonry	0.850	1.000	0.830
(4)	First Floor Height (Note 4)	FFH = 1, Group 2	0.801	0.807	0.737
(5)	Number of Stories	2	0.630	0.550	0.580
(6)	Floor of Interest (Note 5)	1	1.000	1.000	1.000
(7)	Type of Below Ground Area Finish	Finished	1.560	1.410	1.590
(8)	Mobile Home Tie Down (Note 6)	N/A	1.000	1.000	1.000
(9)	Building Equipment in a Crawl Space or Attached Garage (Note 7)	N	1.000	[redacted]	1.000
(10)	Ordinance or Law (Note 8)	N	1.000	[redacted]	[redacted]
(11)	Personal Property Replacement Cost (Note 9)	N	[redacted]	1.000	[redacted]
(12)	Optional Other Structures Adjustment (Note 10)	Y	0.984	[redacted]	[redacted]
(13)	Coverage Loss Costs		$75	$34	$5
(14)	Loss Cost Multiplier (Note 11)	Storm Surge Percent = 0.00	3.831		
(15)	Coverage Base Premiums		$288	$130	$21

	Step	Additional Coverages
(16)	Optional Other Structures Limit	20,000
(17)	Coverage B Base Premium	$28.80
(18)	Loss Assessment Limit	10,000
(19)	Loss Assessment Premium	$21.90
(20)	Increased Cost of Compliance Limit	30,000
(21)	Increased Cost of Compliance Factor	0.0006
(22)	Increased Cost of Compliance Premium	$5.18
(23)	Premium Subtotal	$494.88
(24)	Minimum Premium (Homeowners)	[redacted]
(25)	Total Premium	$494.88

Polling Question: Implementation

What concerns would you have with implementing a flood program for an insurance carrier?

- Volatility of flood risk
- Uncertainty of state rate & form regulation
- Reinsurance availability & price stability
- Perceived inability to complete with NFIP
- Lack of expertise in underwriting & claims
- Flood model and data uncertainty
- Lack of consumer demand
- Underwriting risk of severe repetitive loss properties

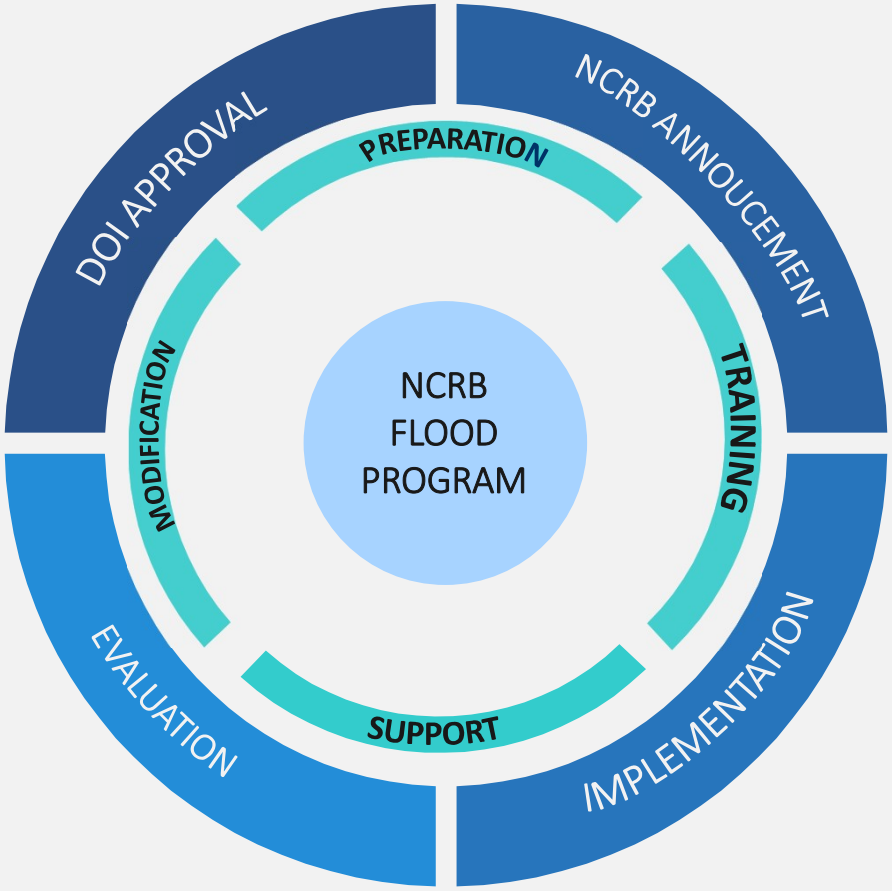
Industry Survey Results

What concerns would you have with implementing a flood program for an insurance carrier?

1. Reinsurance availability and price stability
2. Volatility of flood risk
3. Flood model and data uncertainty
4. Underwriting risk of severe repetitive loss properties
5. Lack of consumer demand
6. Uncertainty of state rate and form regulation
7. Lack of expertise in underwriting and claims
8. Perceived inability to compete with the NFIP

Flood Program: Next Steps

Flood Program: Next Steps



Flood Program: Education

NC REALTORS®

NC Coastal Agents

Drake UNIVERSITY

CAS

STATE OF NORTH CAROLINA · OFFICE OF STATE FIRE MARSHAL · FRAUD CONTROL · AGENT SERVICES · CONSUMER ASSISTANCE · DEPARTMENT OF INSURANCE · DOI · 1899

NCRB Member Companies

U.S. DEPARTMENT OF HOMELAND SECURITY

FEMA

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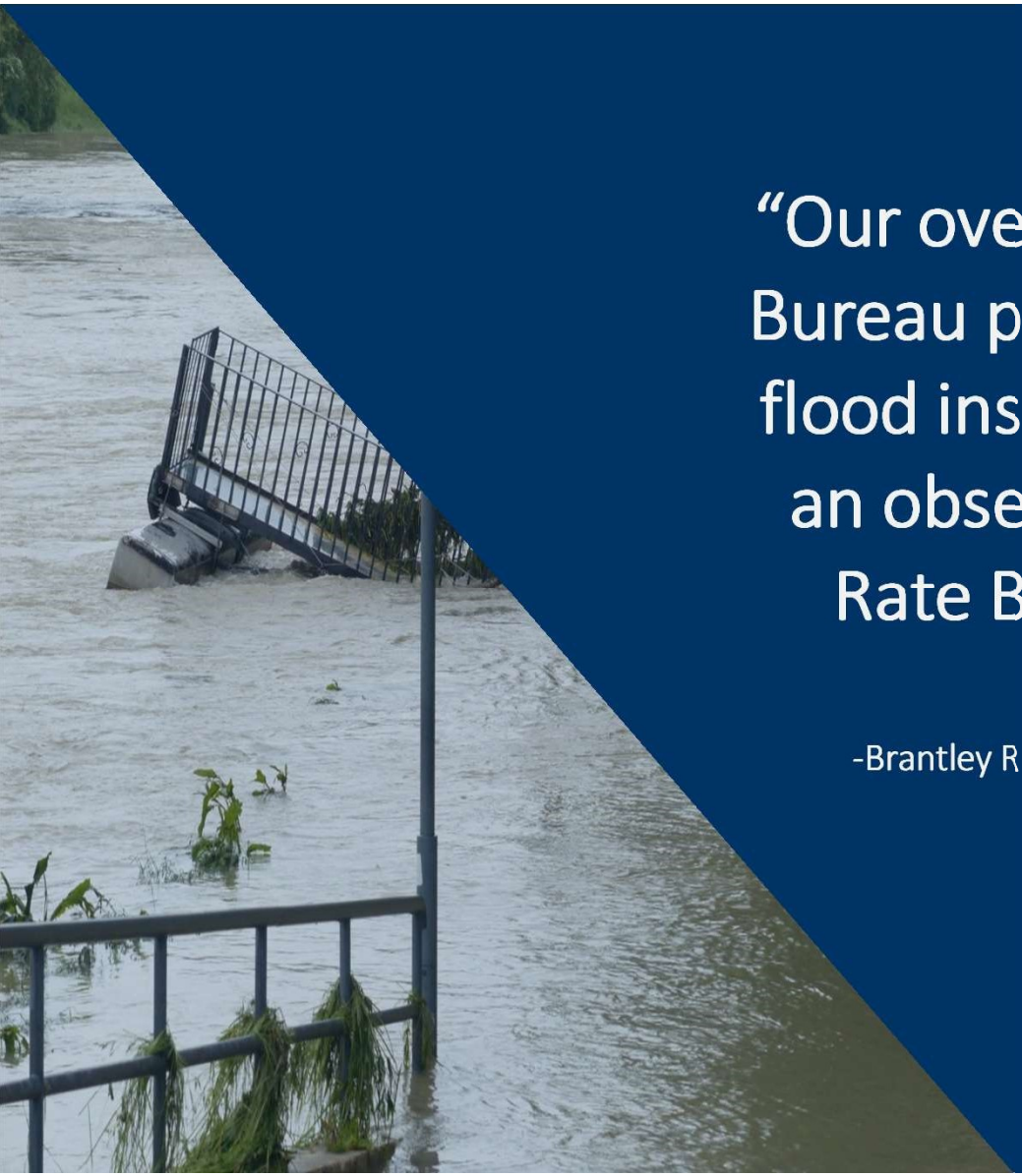
INDEPENDENT INSURANCE AGENTS OF NORTH CAROLINA

Trusted Choice®



"Our overall conclusion is that the Rate Bureau plan is a healthy addition to the flood insurance marketplace … We see an observable positive benefit of the Rate Bureau's plan to the State Of North Carolina"

-Brantley Risk and Insurance Center, Appalachian State University

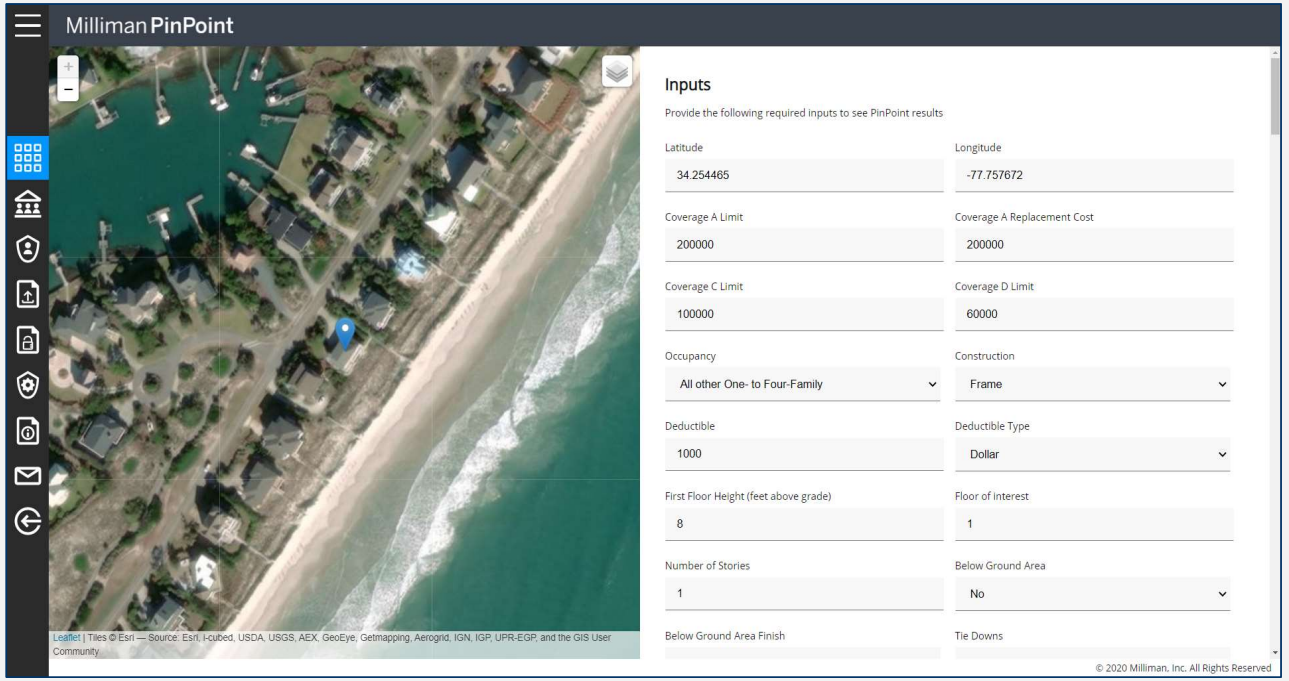
Steps for Company Implementation

Option 1

North Carolina Flood Tool (API)

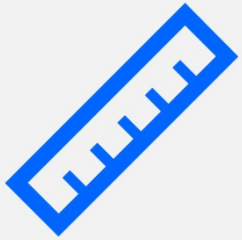
Option 2

Obtain from the Rate Bureau the entire set of data (140 million records)



Steps for Company Implementation

"Waiting Period" on obtaining insurance



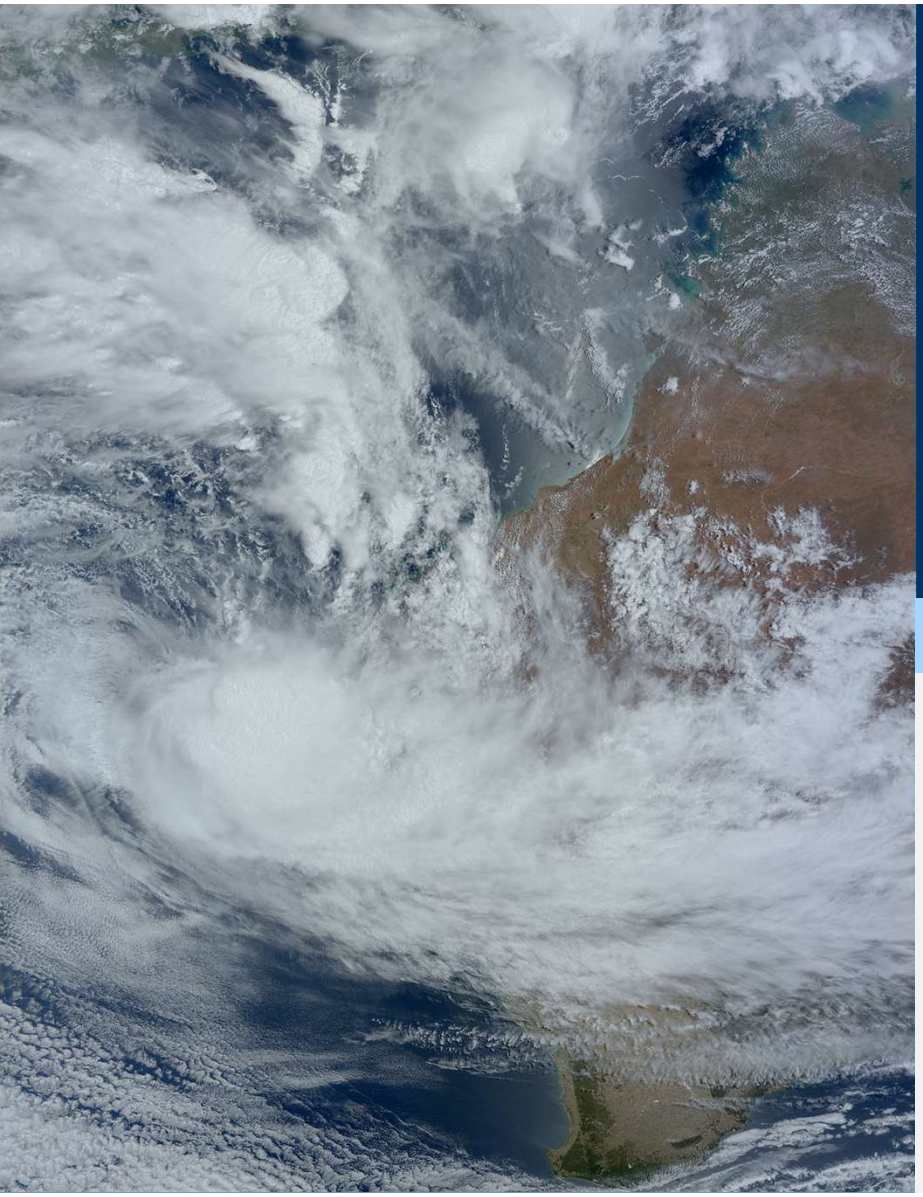
Determine first floor height

Cap coverage A limits, yes or no?

Determine whether to use rate deviations

Source for replacement cost for the property

Cover properties identified in the Coastal Barrier Resources Act



Any Questions?

NCRB-NCRF-NCIGA

KatRisk

ISO

Milliman