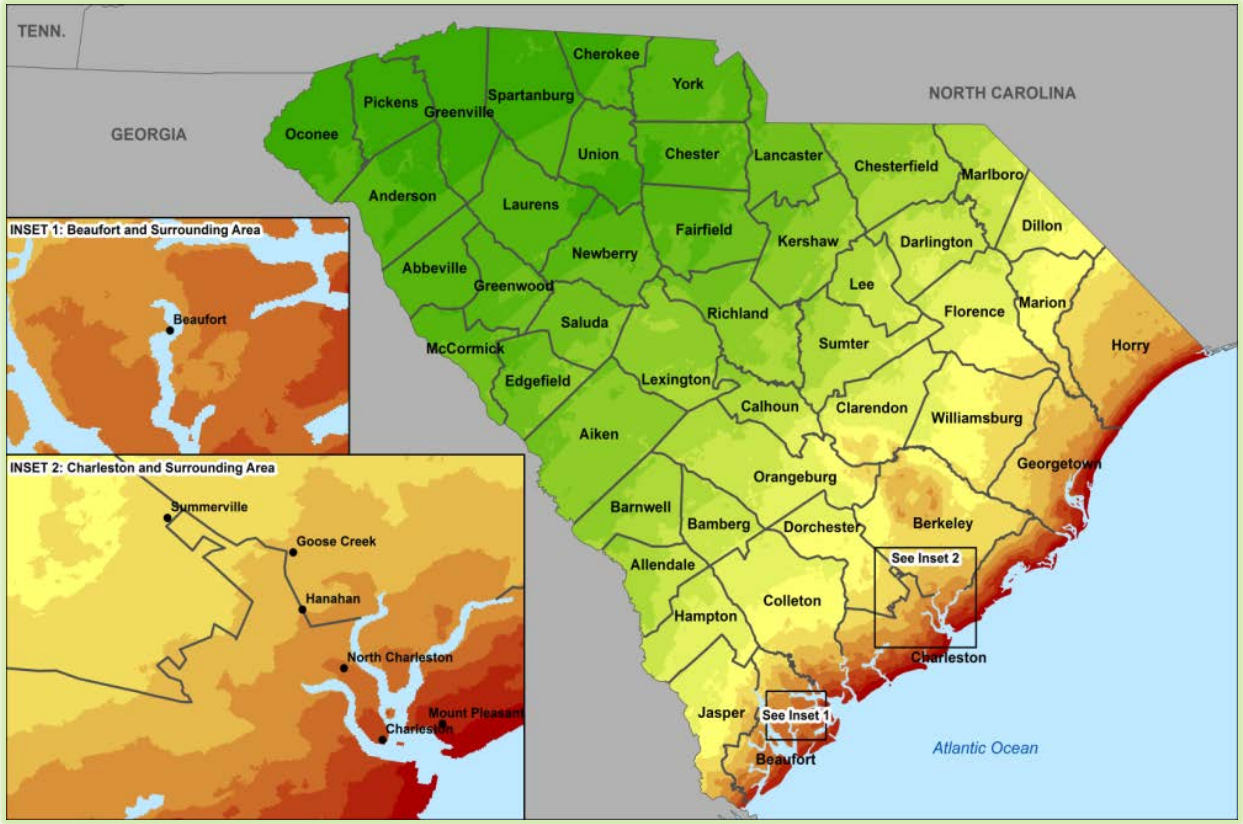
Modern Hurricane Ratemaking: Pricing at the Location Level



Severe Weather Workshop
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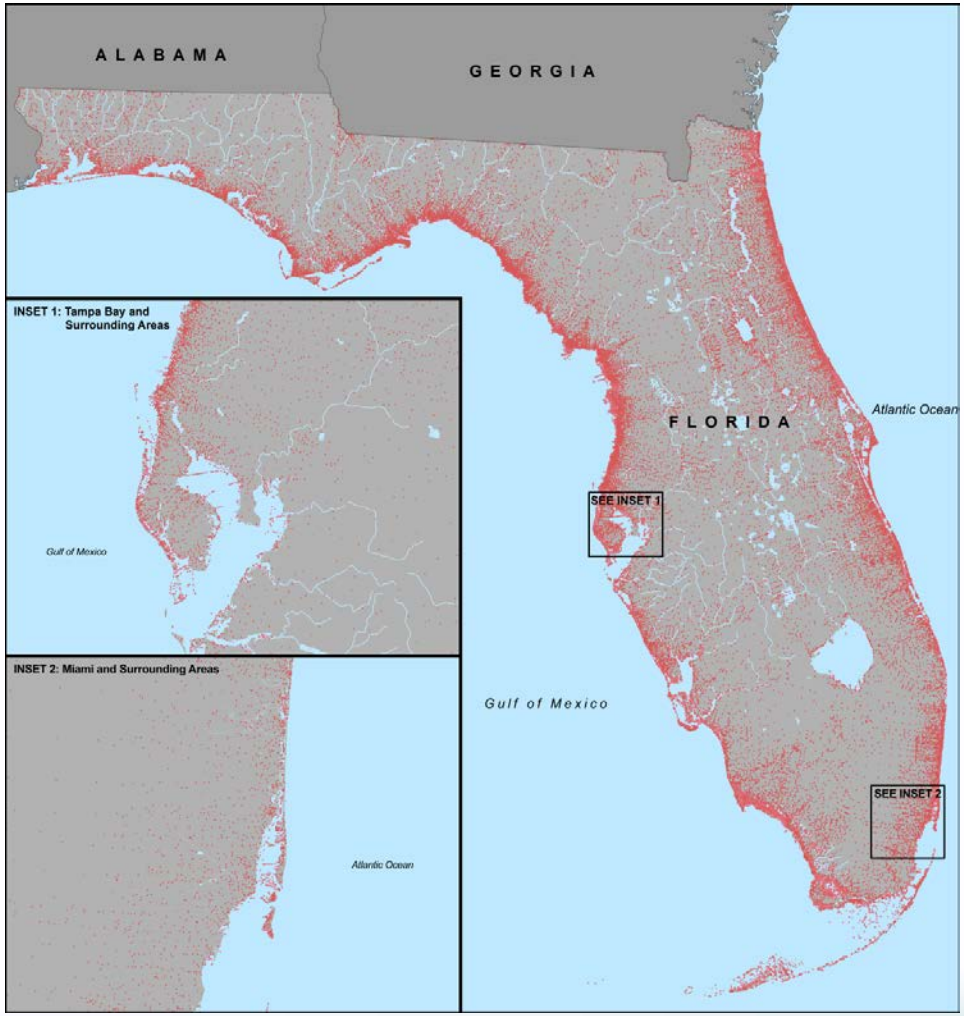
Notional Variable Resolution Grid

- Efficient use of locations
- Vary along multiple risk dimensions:
  - DTC
  - Surface roughness
  - Region
  - Elevation (?)
- Resolution of the catastrophe model



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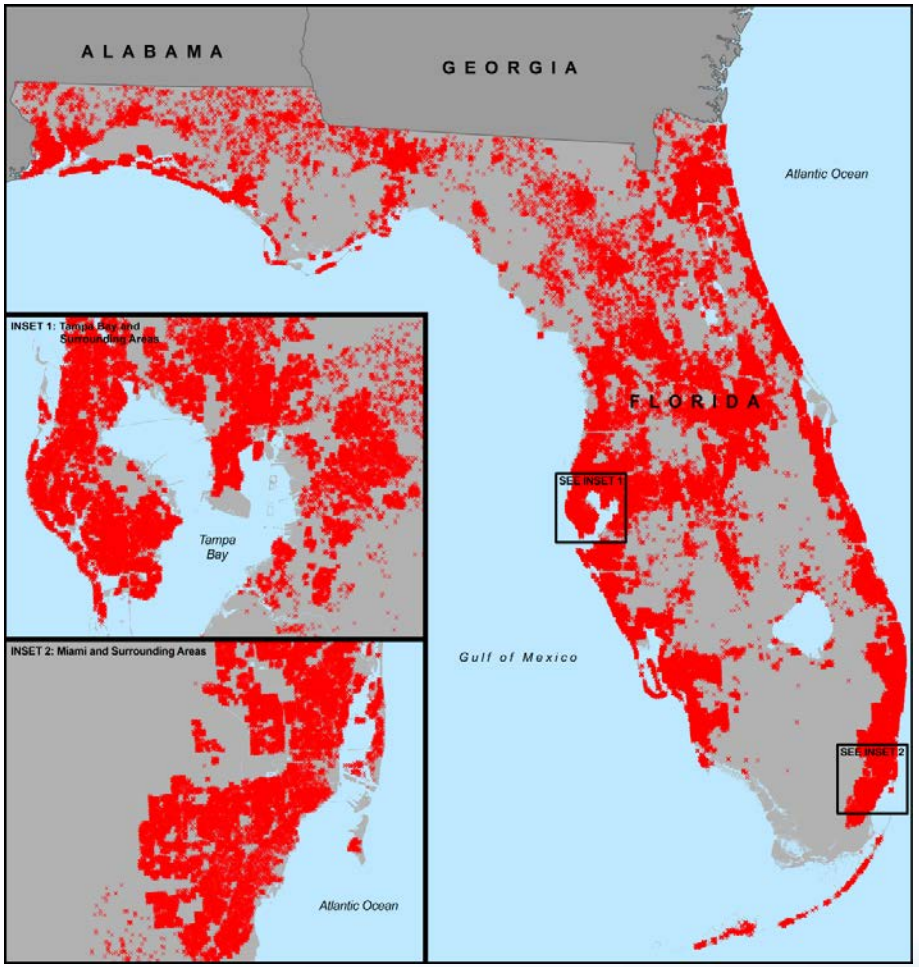
In-force book or Notional Market Portfolio

- Locations can be determined using:
  - Parcel data from county records
  - Allocation based on Census Data
- Imputation of other property characteristics, such as:
  - Year Built
  - Square Footage
  - Construction Type
  - Number of Stories
  - Wind Mitigation Features



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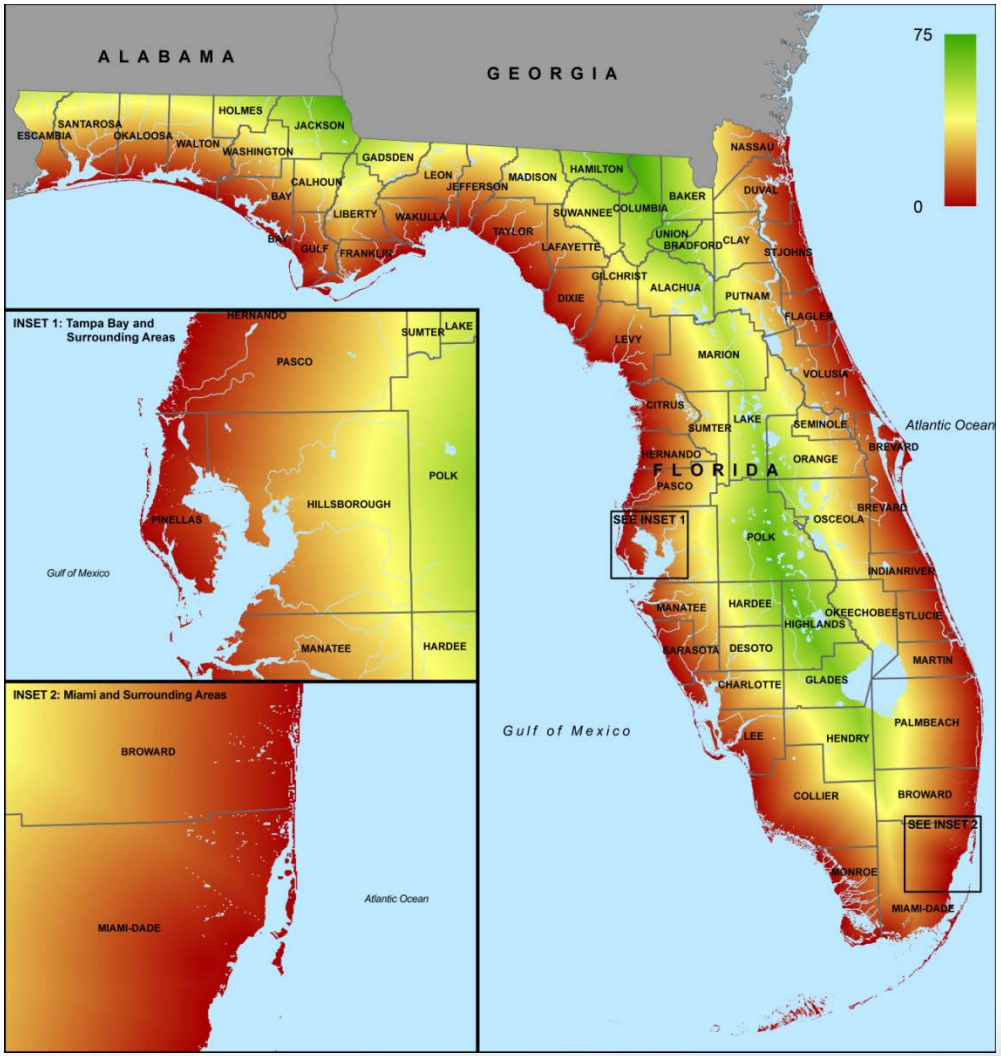
Geographic Elements of Hurricane Pricing for Homeowners Insurance

- This presentation focuses on states in the Southeastern United States with substantial Hurricane risk
- Similar approach can be used in some other regions and for some other perils
- Distance to Effective Coast
- Surface Roughness
- Storm Surge
- Flood

Distance to Effective Coast

- Motivation for using Distance to Coast
- Definition of coastline



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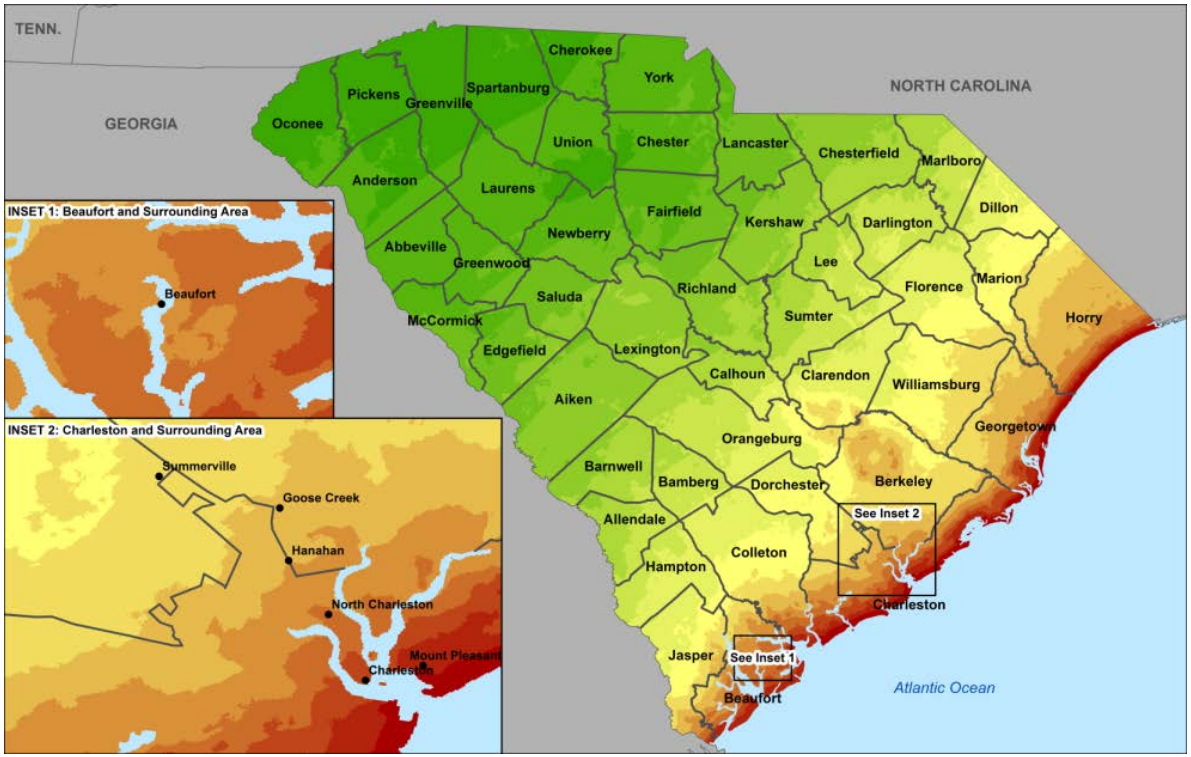
Improved Geographic Resolution

Moving from territories to physically-based rating variables



- Distance to coast
- Number of bins
- Regions
- Polynomial versus piecewise
- Surface roughness

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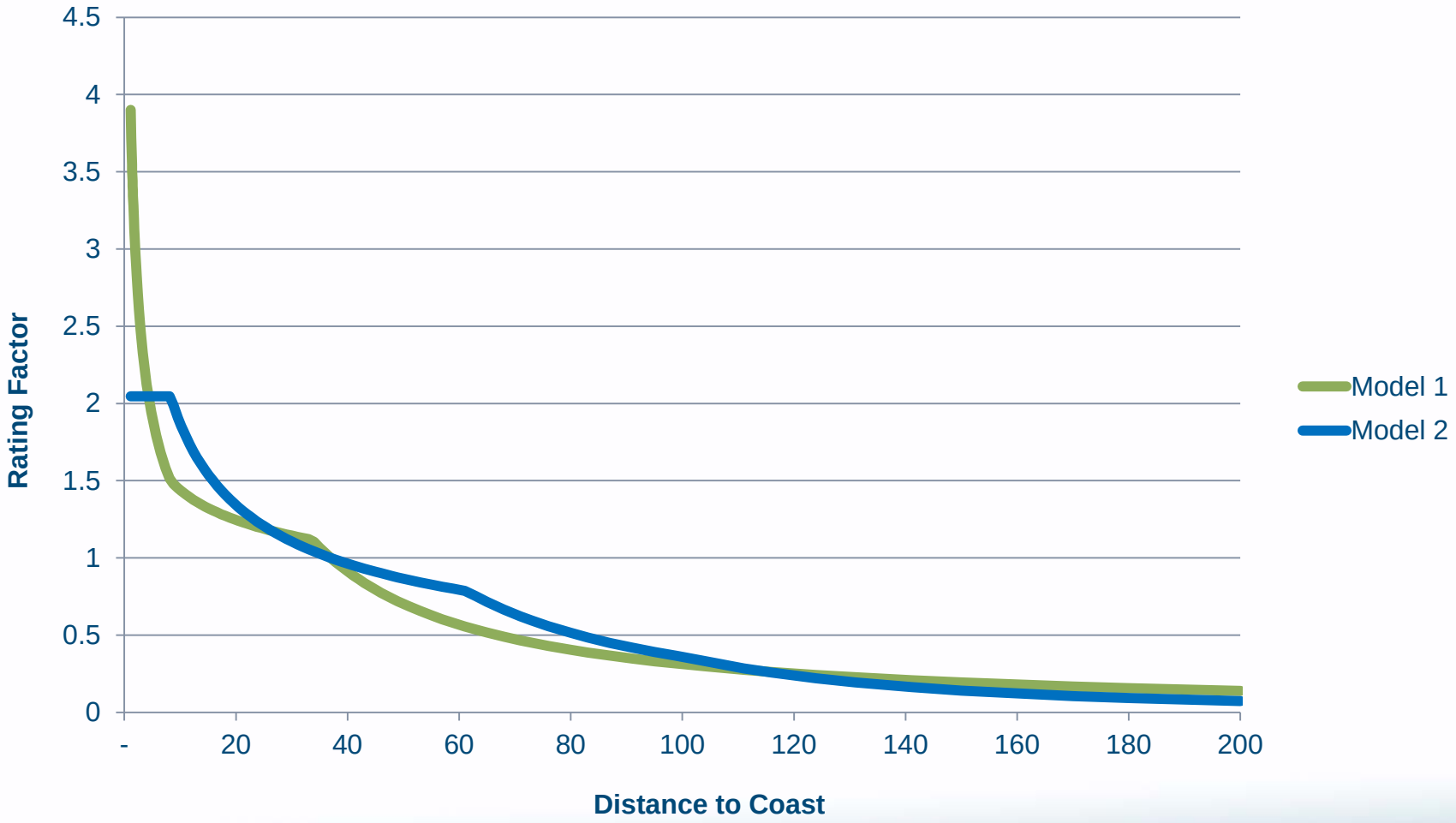
Distance to Effective Coast Curve



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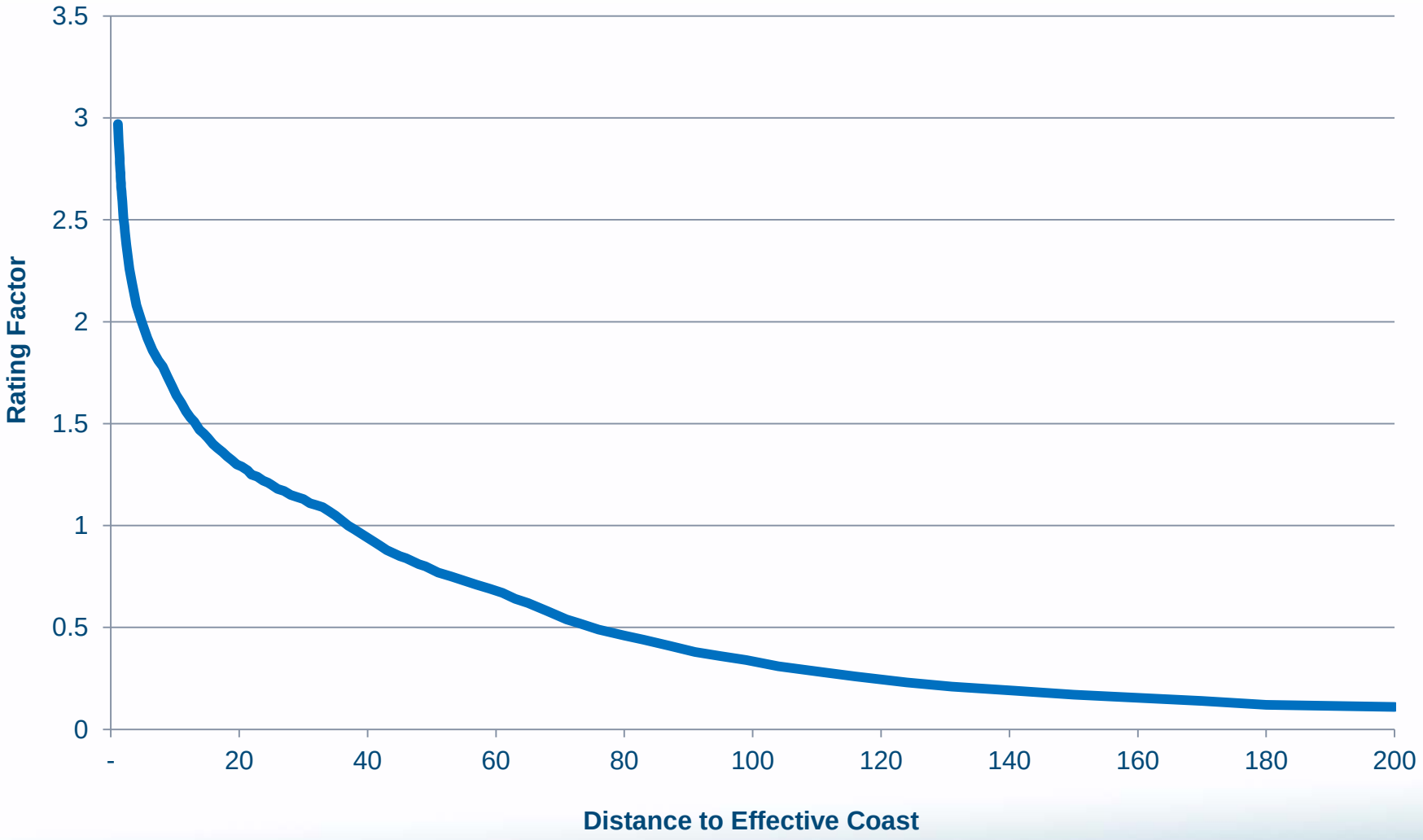
Example Selected Distance to Effective Coast Curve



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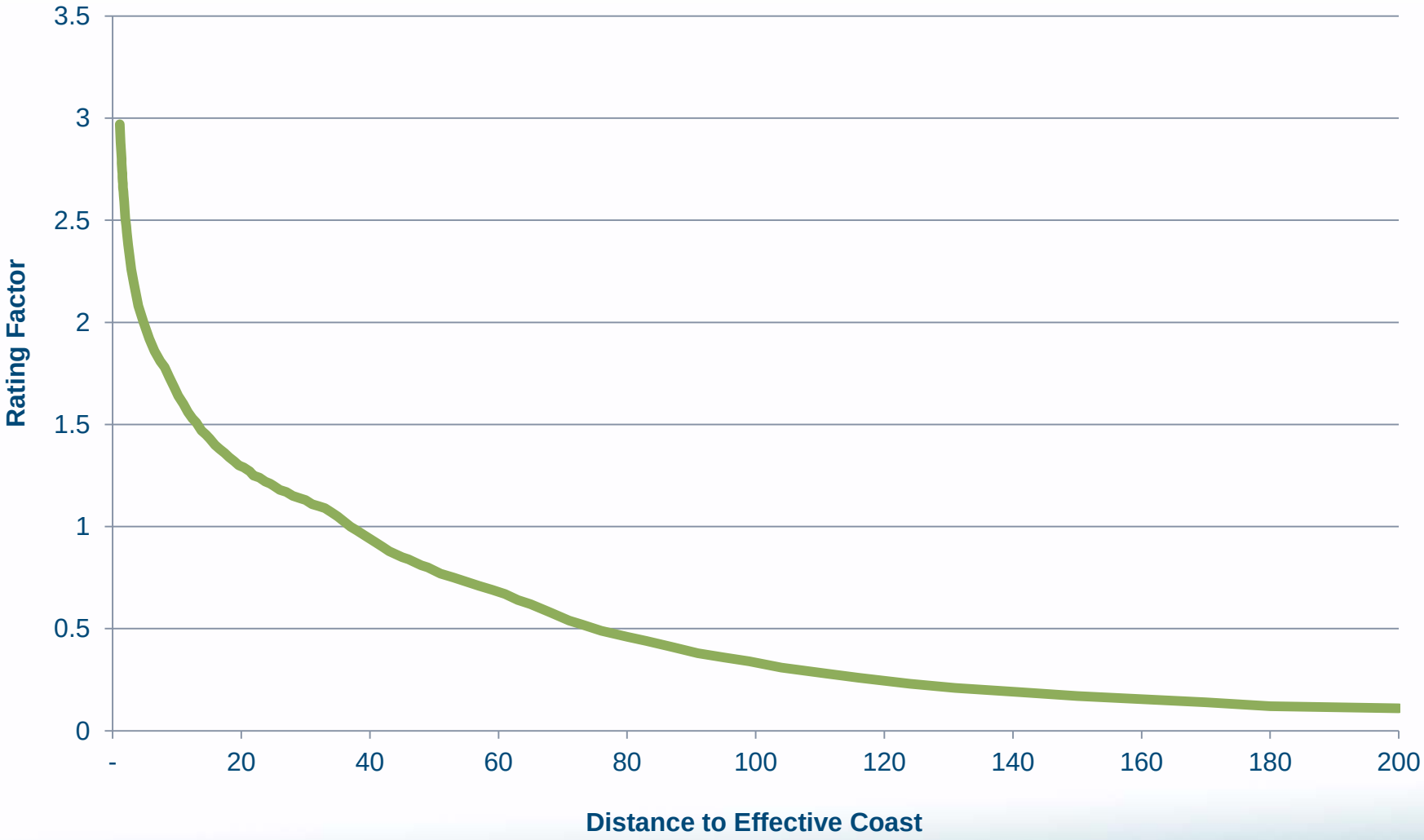
Example Selected Distance to Effective Coast Curve



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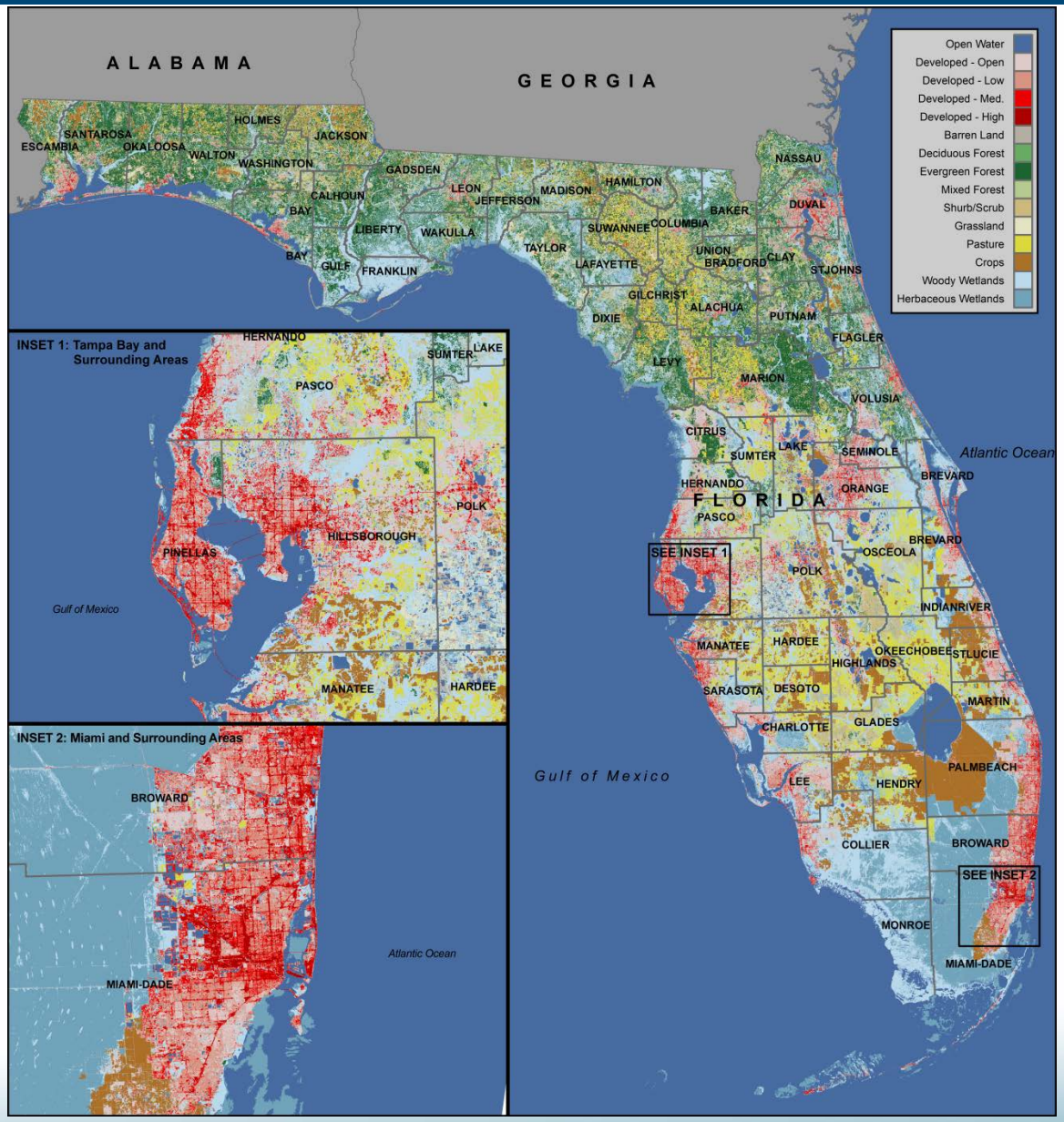
Land Use/ Land Cover in Florida



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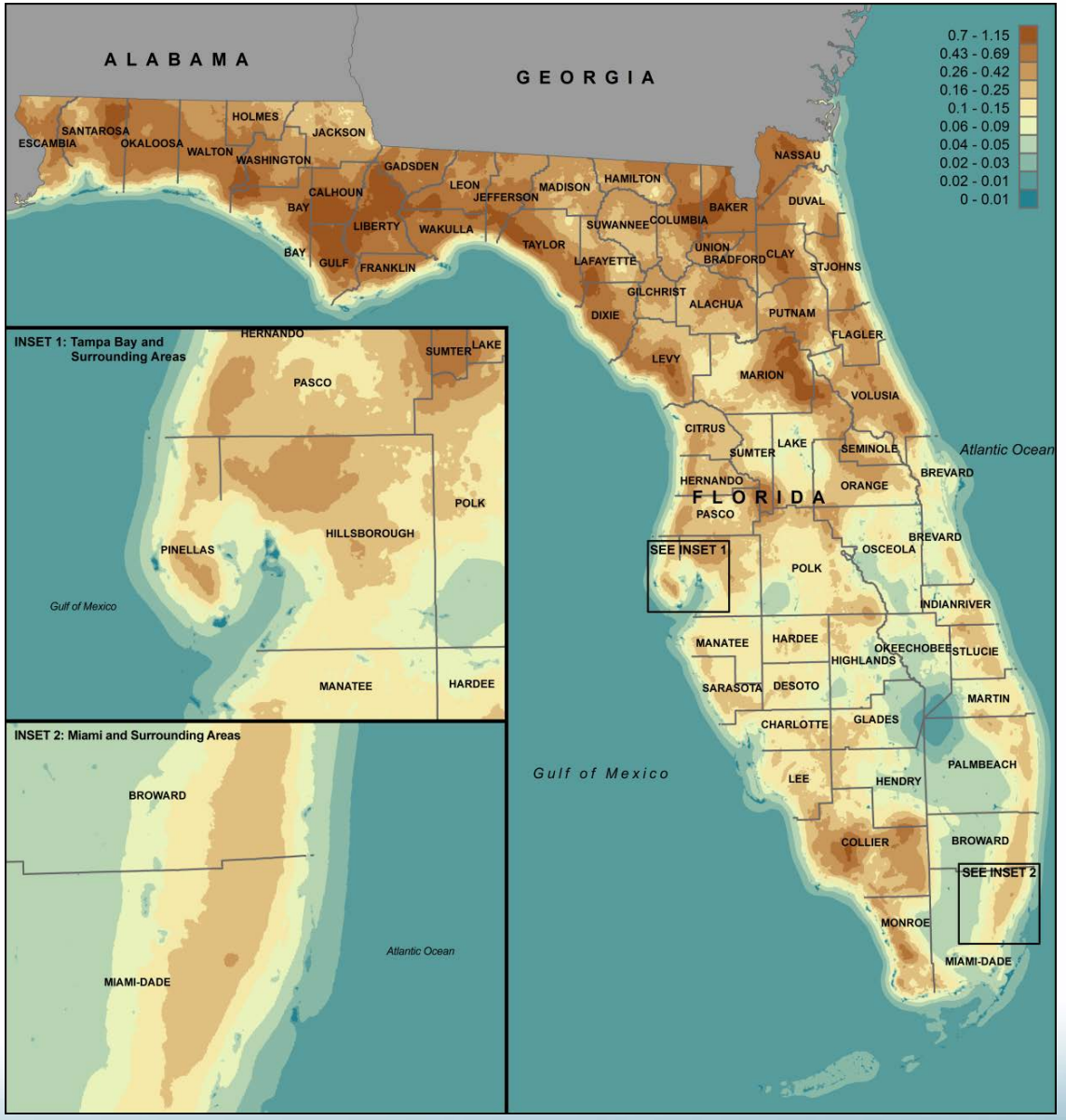
Effective Surface Roughness in Florida



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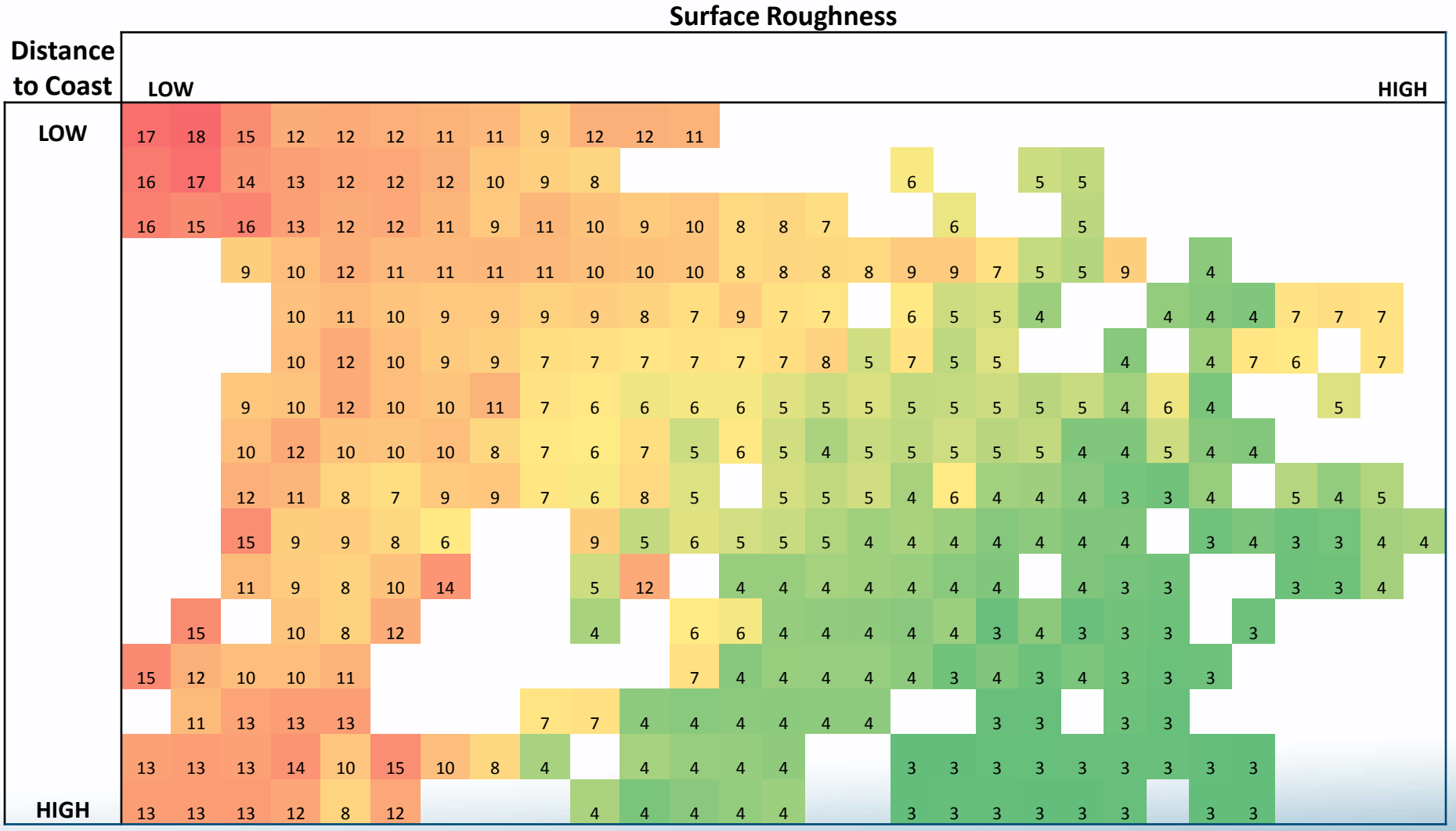
Is Distance to Effective Coast enough?



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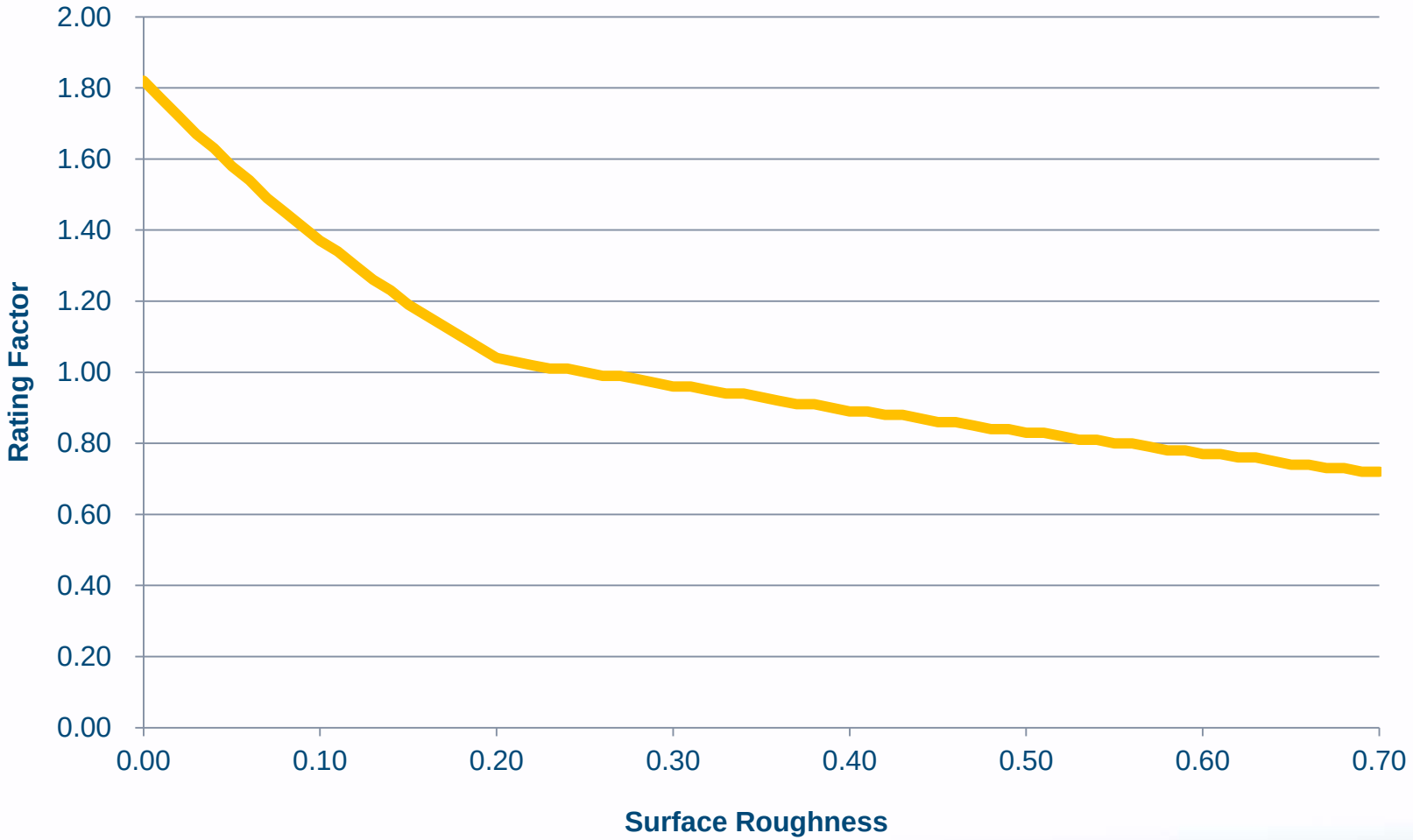
Example Selected Surface Roughness Curve



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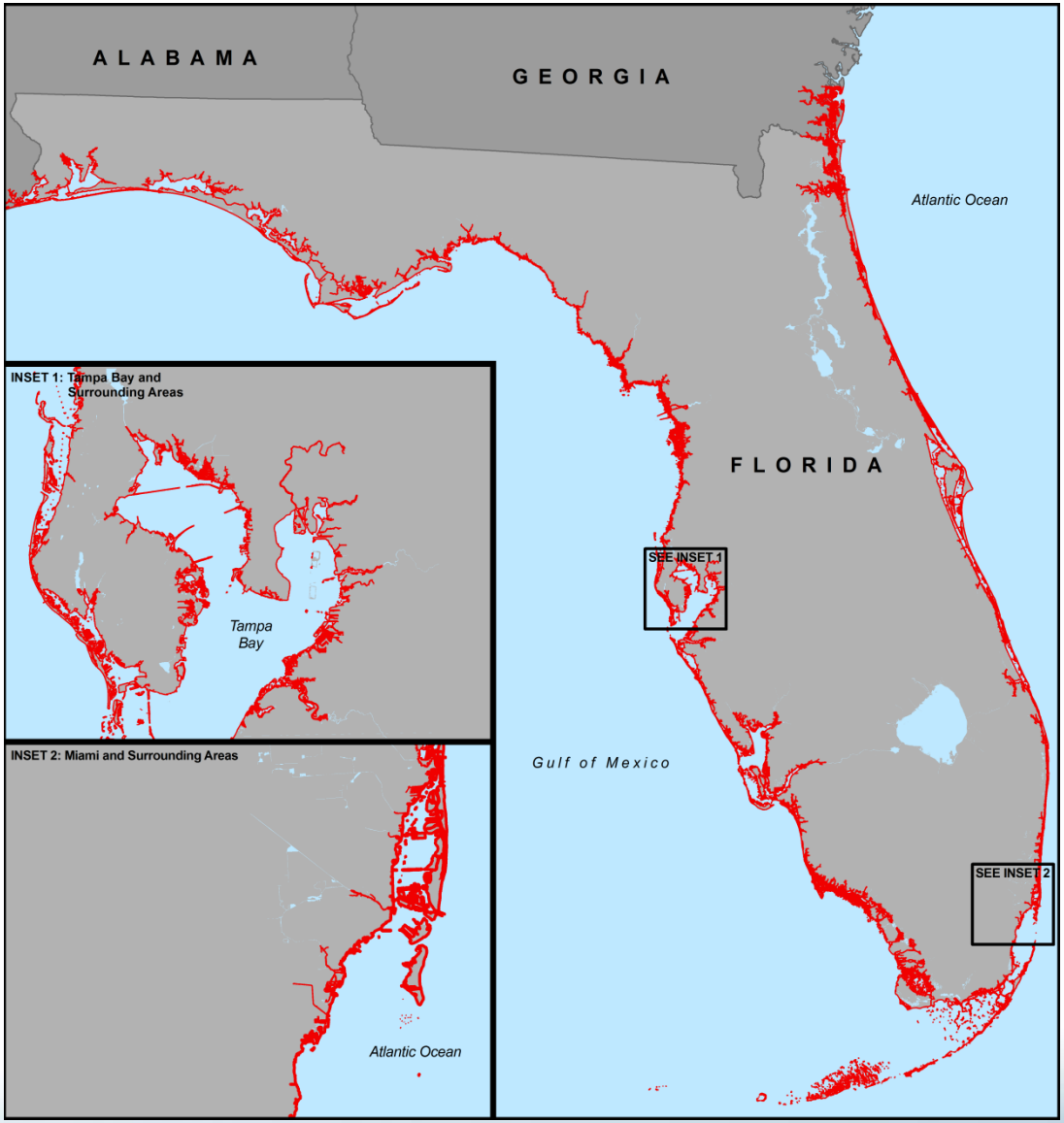
Storm Surge

- Storm Surge is not a covered peril under standard Homeowners insurance policies and premiums do not contemplate losses arising from storm surge
- It can be difficult to determine the cause of damage after an event, resulting in some non-covered losses being paid
- This risk can be mitigated through underwriting
- Old-fashioned restrictions: distance to tidal water or elevation
- New approach: a Minimum Permissible Elevation based on Zip Code and distance-to-tidal-water
- Another option is to offer flood coverage

Distance to Tidal Water

How does this differ from Distance to Effective Coast?



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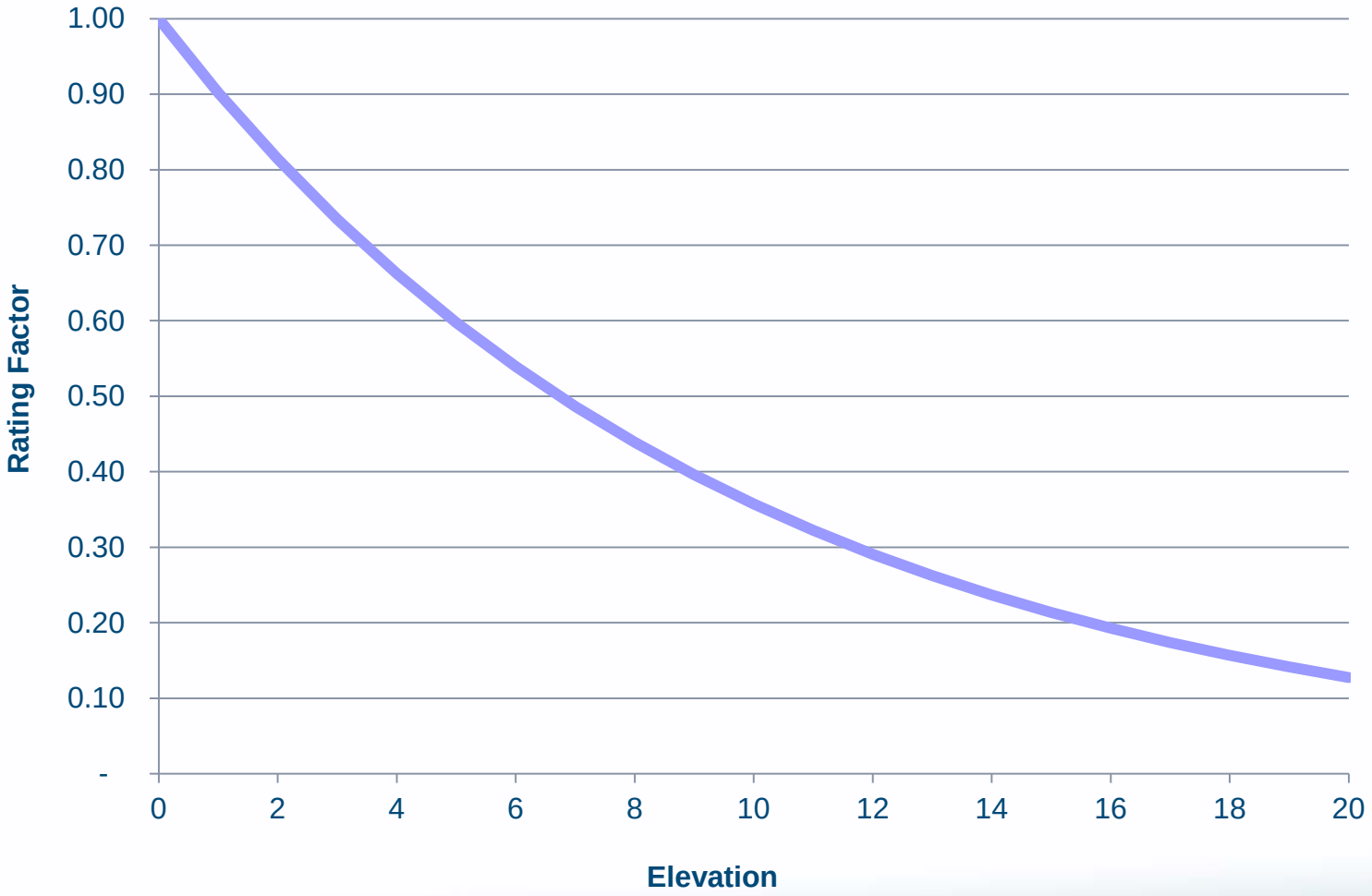
Storm Surge (Elevation)



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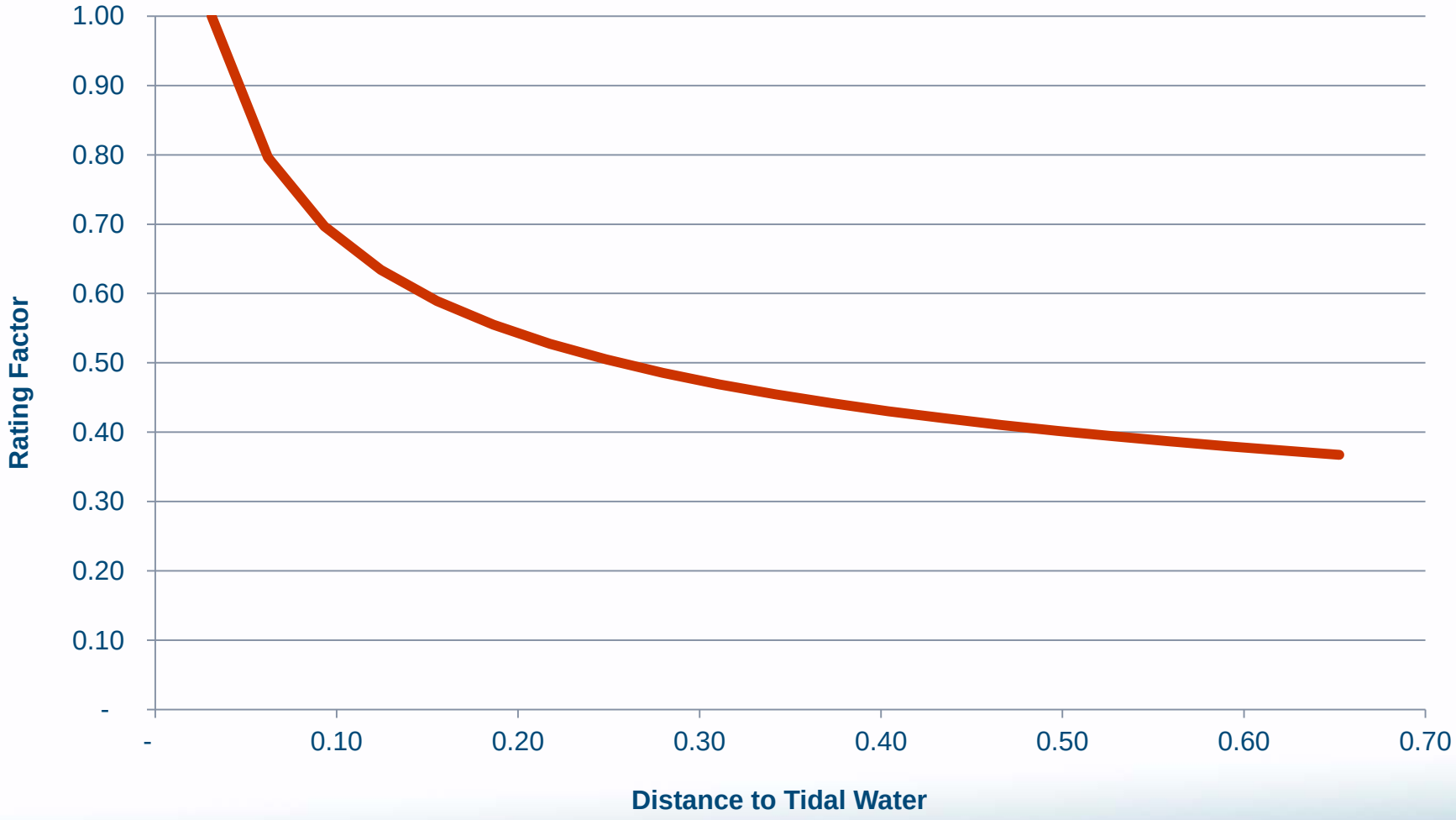
Storm Surge (Distance to Tidal Water)



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Examples of underwriting rules for Storm Surge

EXAMPLE OF OLD RULE:

INELIGIBLE

Any risk within 2,500 feet of the Gulf of Mexico or Atlantic Ocean. Any risk within 1,000 feet of any other large body of water. Any coastal risk located on land with an elevation less than 14 feet above mean high tide

EXAMPLE OF NEW RULE:

Distance to Tidal Water	Minimum Permissible Elevation
Less than 0.05	16
0.05 to 0.06	15
0.06 to 0.08	14
0.08 to 0.12	13
0.12 to 0.16	12
0.16 to 0.22	11
0.22 to 0.30	10
0.30 to 0.40	9
0.40 to 0.55	8
0.55 to 0.76	7
0.76 to 1.04	6

EXAMPLE OF NEW ZIP-CODE BASED RULE:

	DISTANCE TO TIDAL WATER									
Zip Code	<0.025 miles	0.025 to 0.05 miles	0.05 to 0.075 miles	0.075 to 0.1 miles	0.1 to 0.15 miles	0.15 to 0.25 miles	0.25 to 0.5 miles	0.5 to 1 miles	1 to 4 miles	4 to 5 miles
32033	8	7	6	5	4	3	1	0	-1	-2
32034	22	20	19	19	18	16	15	13	12	10
32046	23	21	20	20	18	17	15	14	12	11
32080	19	17	16	16	15	13	12	10	9	7
32081	9	8	7	6	5	4	2	1	0	-1
32082	12	10	9	9	8	6	5	3	2	0
32084	11	9	8	7	6	5	3	2	0	0
32086	10	8	7	7	6	4	3	1	0	-1
32095	12	10	9	8	7	6	4	3	1	0
32118	18	17	16	15	14	13	11	9	8	6
32127	9	8	7	6	5	4	2	0	0	-2

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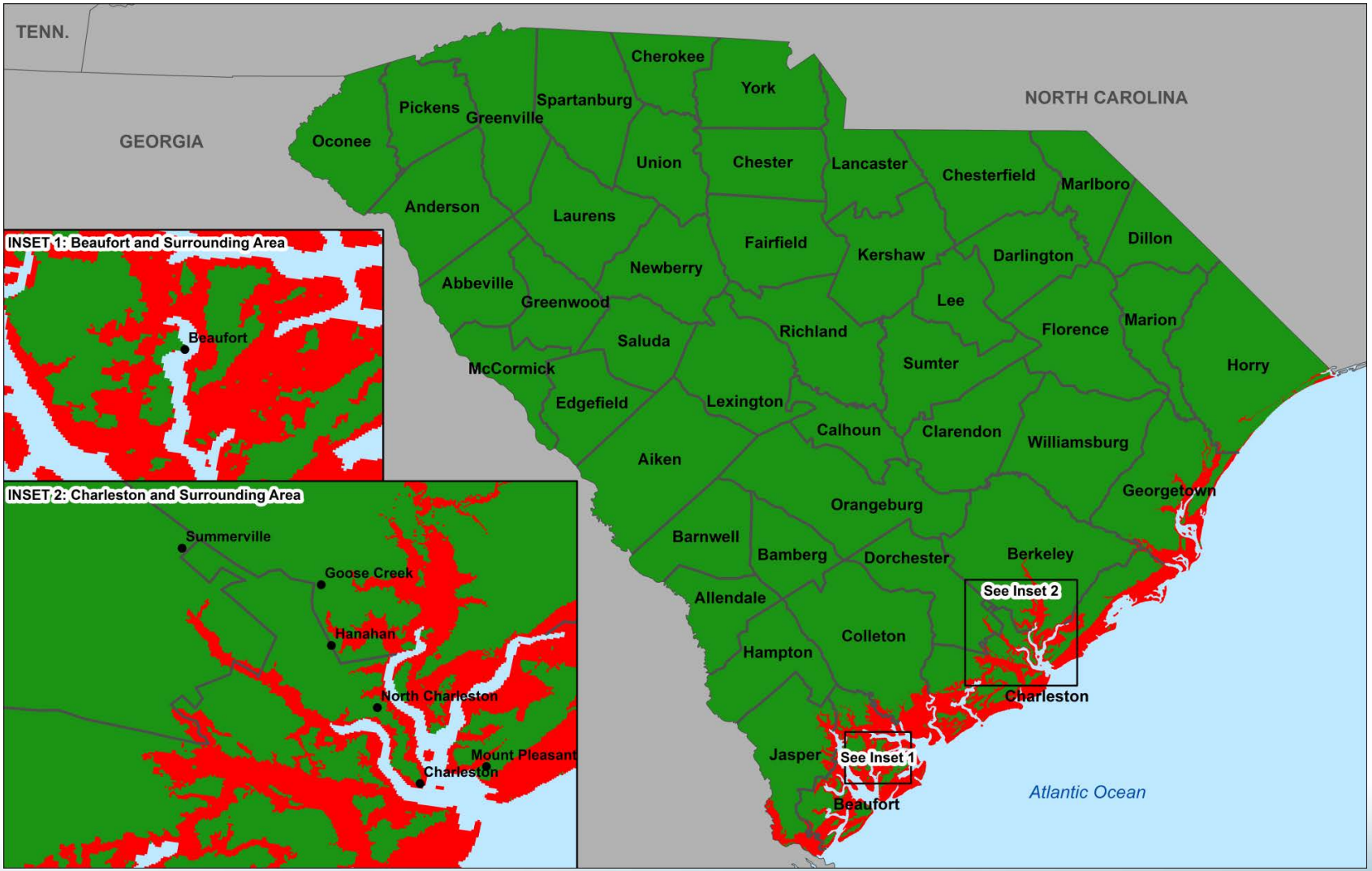
Example of Underwriting Rule for Storm Surge



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Managing Storm Surge risk through rating: Flood Insurance

Current Flood Rating:

- Subsidized
- Not very granular
- Mostly based on flood zone (VE, A, X, X500…)
- Uses other property characteristics
- Elevation relative to Base Flood Elevation is used in some areas

Private Flood Insurance?

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Private Flood Insurance

- Private Excess already available
- Primary flood insurance
- Future developments

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Examples of Applications outside of the United States

- Hurricane in the Caribbean and Central America
- Flood Insurance in the Europe
- For example, there are only four Zürs zones in Germany.
- Typhoons in Asia and Australia
- Distance to Effective Coast and Surface Roughness
- European Windstorm?

Questions?

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