

# Finding Waldo: Geospatial Solutions to Cat Risk

Presented by: Dan Zitelli, CCRMP

# Opening Poll

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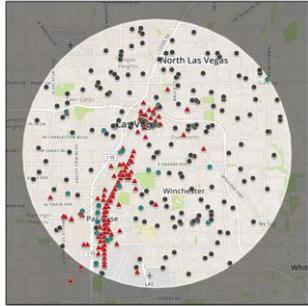
How do you use Geospatial Tools / Mapping in your normal workflow?

- A. Not at all
- B. I create Maps/Geospatial Analyses to share my work
- C. I consume Maps/ Geospatial Analyses to enhance my understanding
- D. Both B and C
- E. I don't use it personally, but my colleagues do

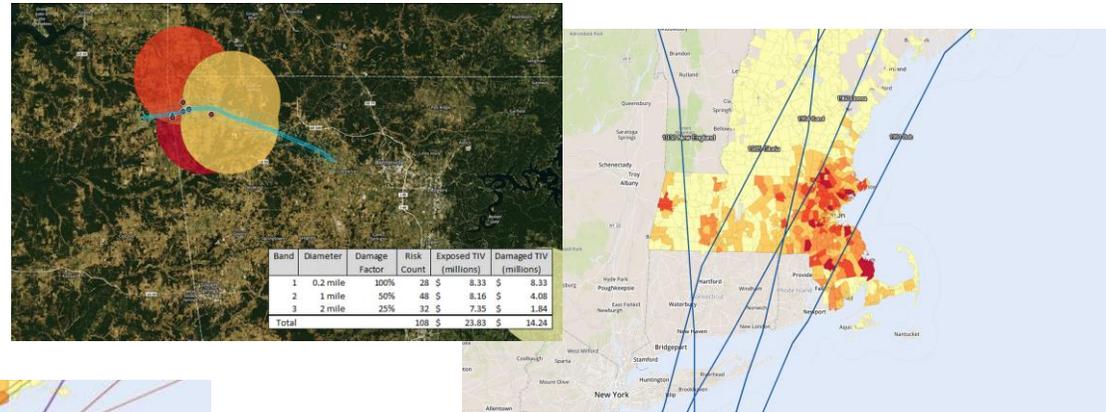


# Leveraging Geospatial Technology for Portfolio Management

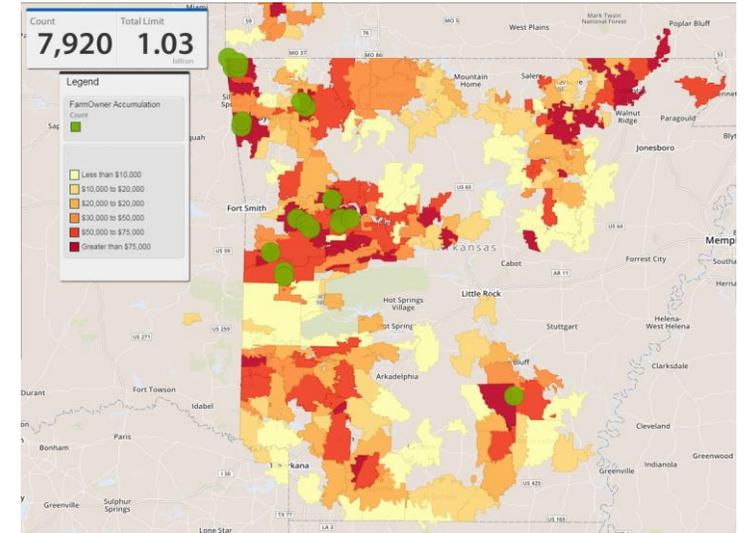
## UNDERWRITING



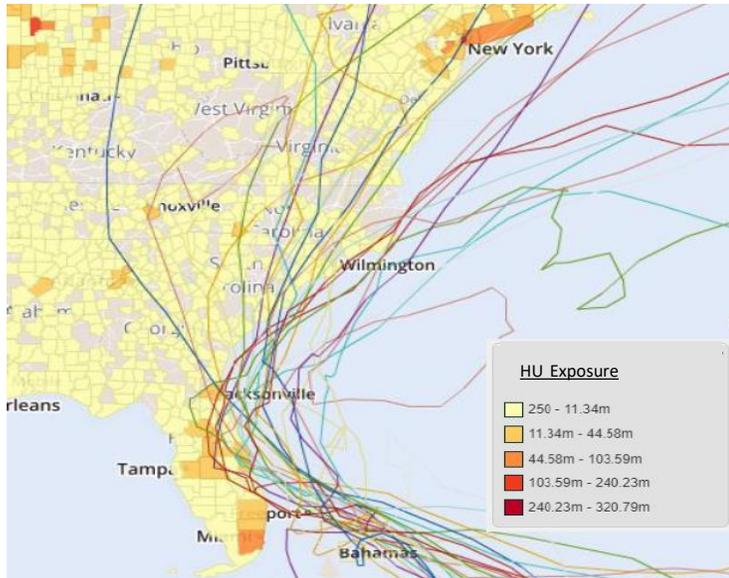
## REAL TIME AND "WHAT IF" CAT MANAGEMENT



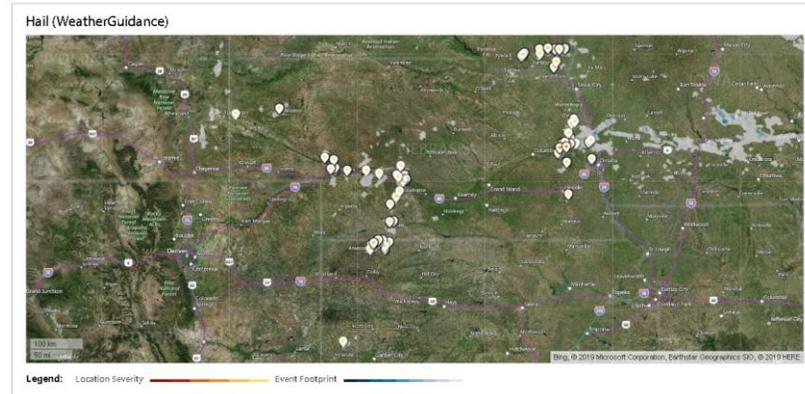
## ACCUMULATION MAPPING



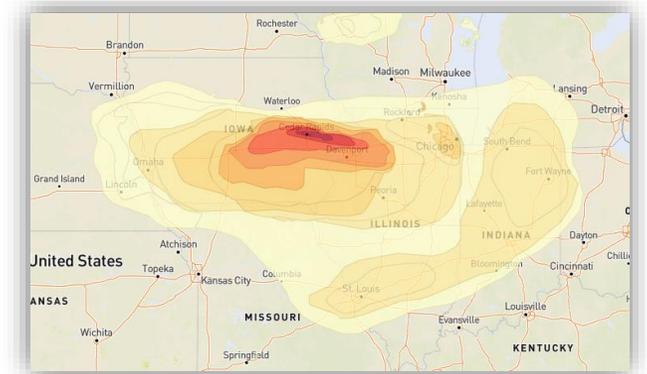
## VENDOR CAT MODEL EVALUATION



## EVENT NOTIFICATIONS



## DETERMINISTIC HISTORICAL EVENT REPORTING



# Poll - Map Creation

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When you create maps and geospatial analyses, who are the intended audience?

- A. C-Level Executives/Management who only need 'Big Picture' level details
- B. Map Nerds
- C. People a little slow on the uptake
- D. Anyone looking for a different point of view on data
- E. People who consider themselves 'Visual Learners'
- F. Both A and C



# Evaluating Accumulations



## Exposure = Risk

- Unknown hazards can strike anywhere.
- Usually, exposures that are geographically close to one another have a high correlation of loss in the same hazard.



## The Radius Problem

- What size radius accumulation should I be looking at?
- If Hazard is unknown, then its footprint is also unknown

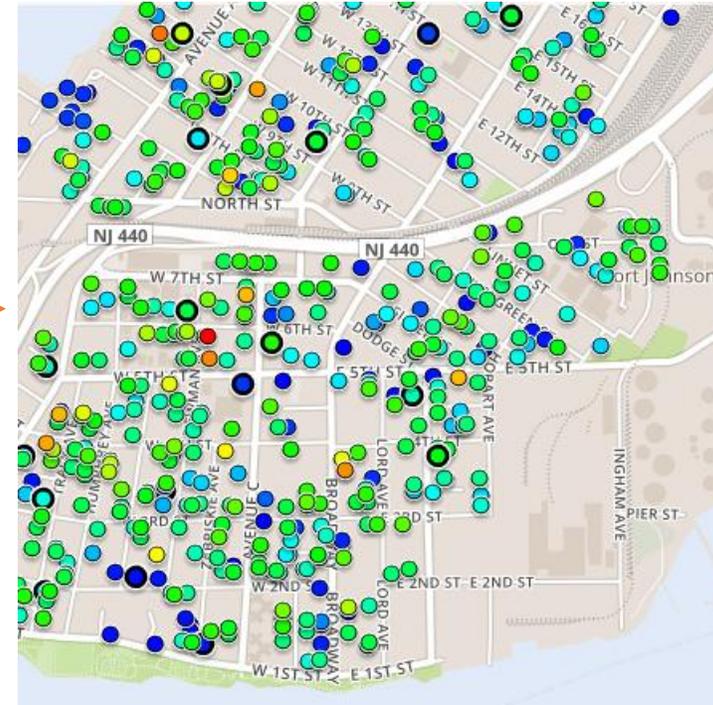
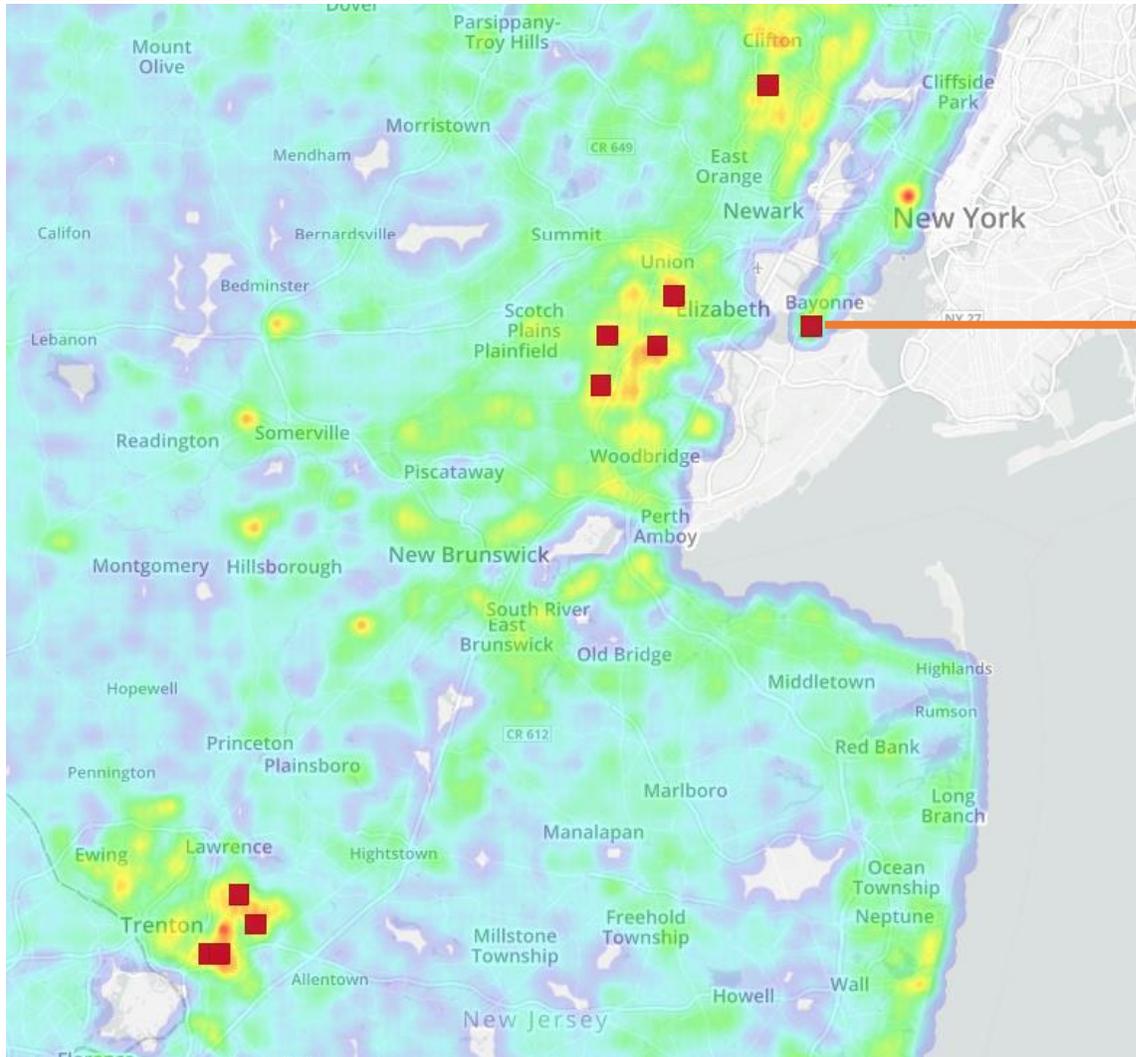


## Start Small

- Larger radius concentrations are usually located around smaller radius concentrations
- There is usually a reason for localized successful underwriting



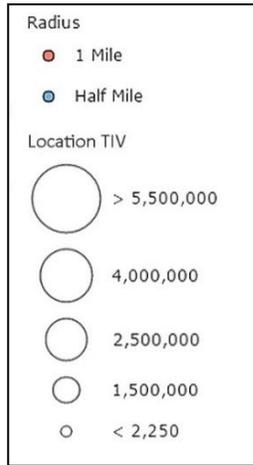
# Current Exposure Concentration Top 10 1-Square Mile Accumulations of TIV



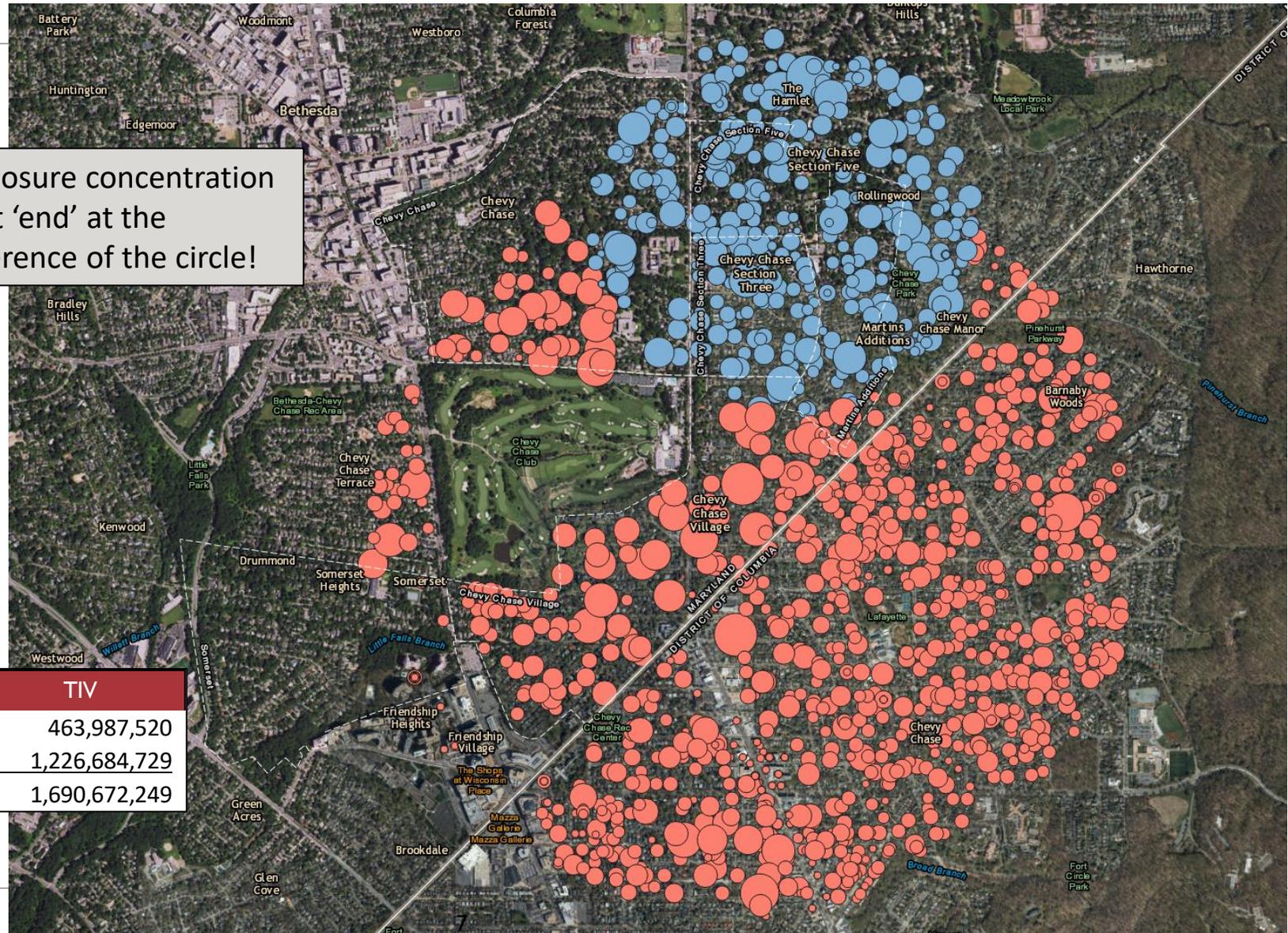
1 Mile Concentration – Bayonne, NJ \$314M



# You Don't Have to Pick Just ONE Radius!



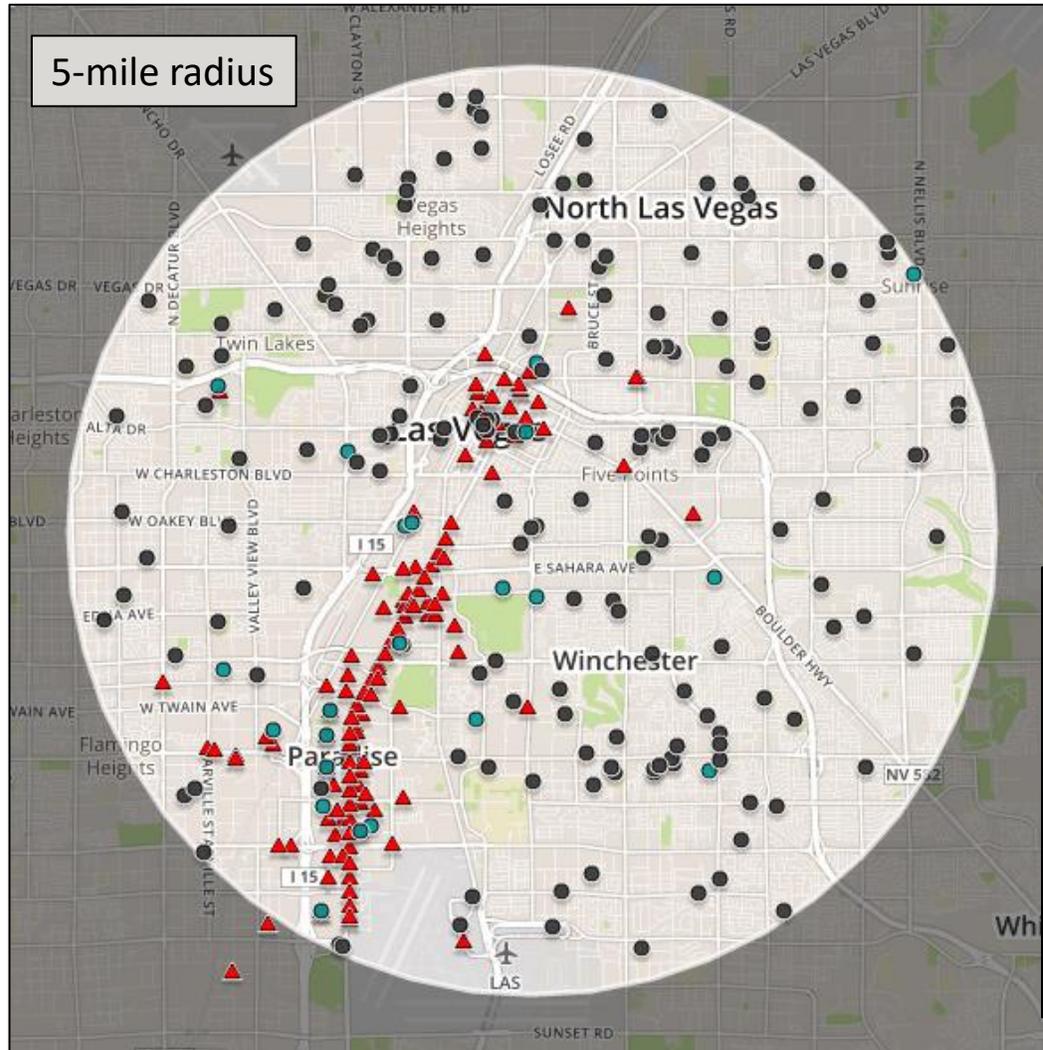
Your exposure concentration does not 'end' at the circumference of the circle!



Radius	Risk Count	TIV
Half Mile	320	463,987,520
1 Mile (excl Half)	1,230	1,226,684,729
<b>Total</b>	<b>1,550</b>	<b>1,690,672,249</b>



# Accumulations Around Points of Interest – Las Vegas



Terrorists don't publish their lists of potential targets.

**Terror Target List**

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**Segment**

- Property
- Work Comp



# Managing Catastrophe Exposure Risk

## Identify Concentration Risk Areas

- **Exposure Concentration:** TIV per Square Mile
- **Catastrophe Risk Concentration:** Allocated Cat Load per \$100 TIV
- **Catastrophe Loss Concentration:** Moderate Catastrophe Losses By ZIP
- **Catastrophe Pricing Mismatch:** Catastrophe Load per Premium



## Mitigate Areas of Concentration

Put in place mitigation actions which could be:

- **Pricing adequacy:** i.e. 90% profit adequacy using company specific metrics, like return on UW capital
- **Growth reduction:** County TIV growth rate < Countrywide
- **PML Restrictions:** Using risk scores and rating guidelines as part of U/W

**Capital Management / Corporate Governance / Reporting to Support Concentration Risk Assessment**



### Pro Tips

- Use metrics / areas of concern that are intuitive
- Incorporate multiple interpretations of concentration risk
- Develop clearly defined thresholds



# Poll - Map Consumption

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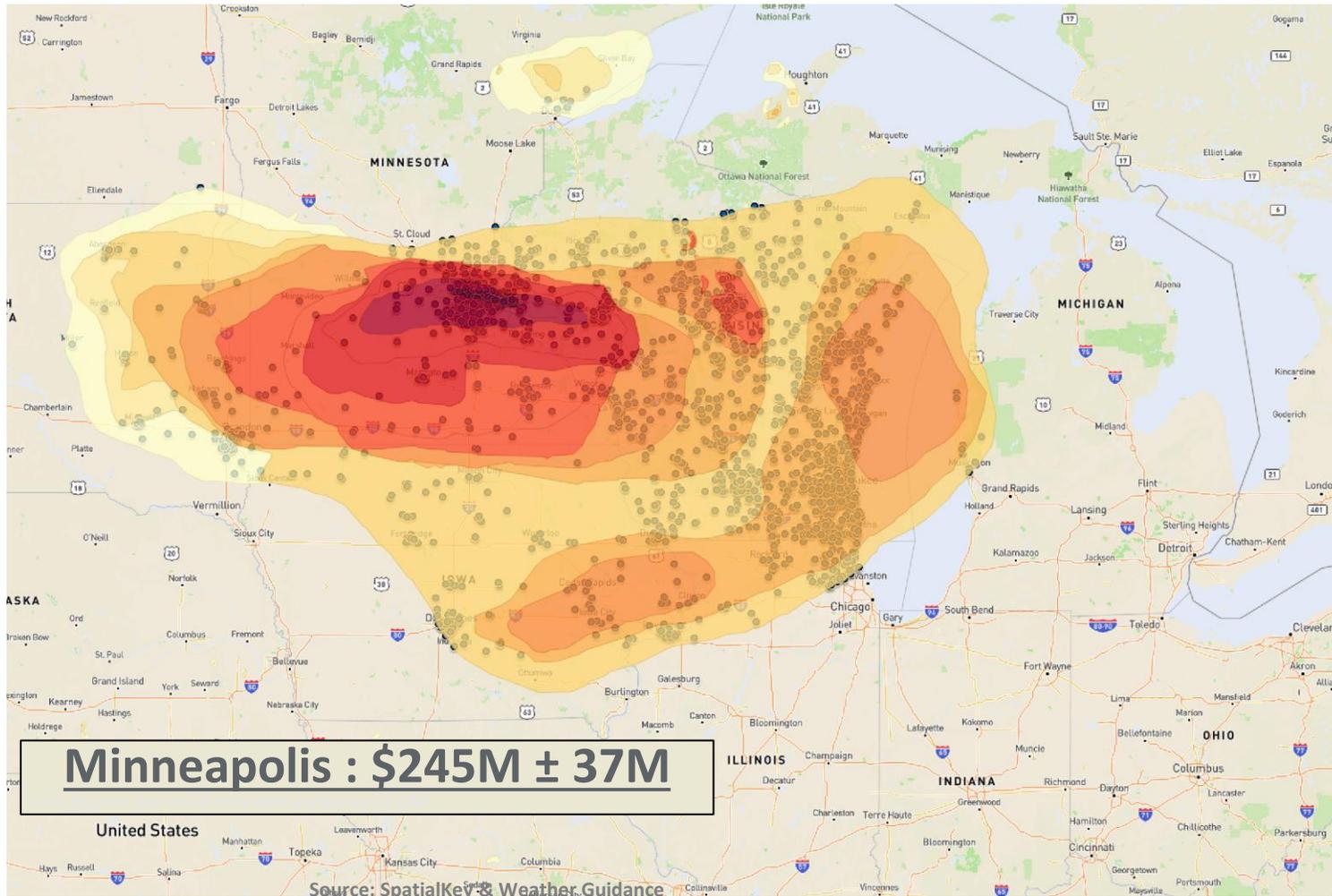
When you consume maps and geospatial analyses, what are the usual subject matter?

- A. Event Response (i.e. NOAA Hurricane Cone of Uncertainty)
- B. Exposure Maps
- C. Single Event Maps (i.e. deterministic events- not real time)
- D. Geographic Data Trends (i.e. Census Data, COVID maps)
- E. Modeled Loss / Claims Data
- F. Something Else

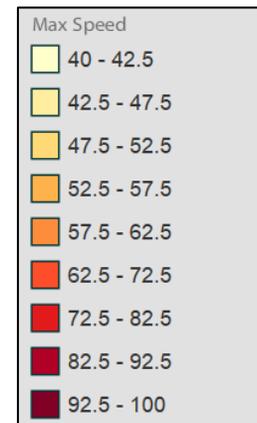




# DETERMINISTIC EVENT | MINNESOTA DERECHO



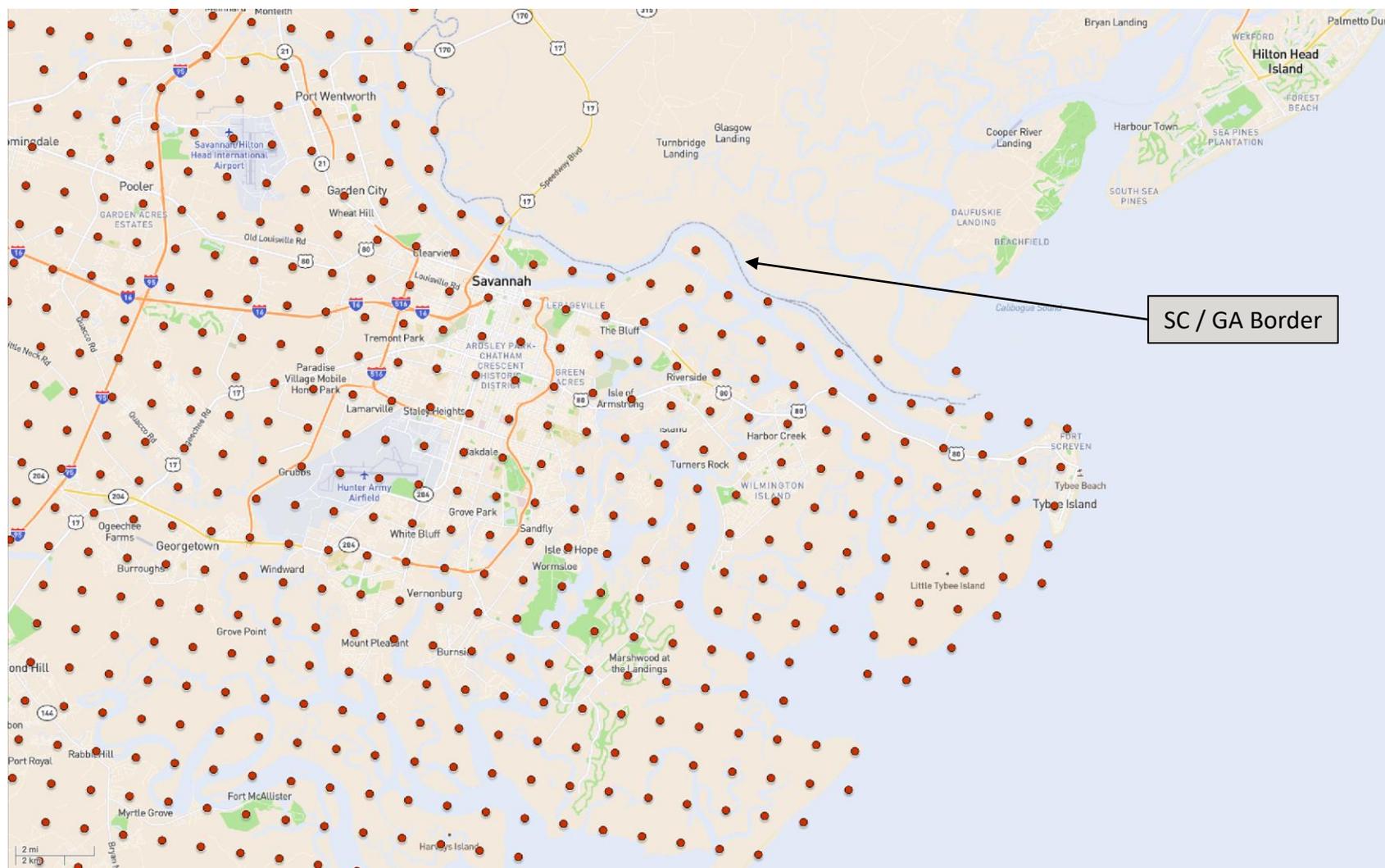
Wind Speed	Risk Count	TIV
40	1,940	1,393,637,113
45	293	198,693,017
50	25,924	18,454,371,390
55	72,123	52,475,854,218
60	25,923	17,125,520,896
65	1,991	1,393,480,012
70	3,637	2,578,559,262
75	2,713	1,914,928,163
80	5,070	3,597,831,552
85	6,145	5,832,902,523
90	5,071	4,301,204,638
95	2,684	2,426,312,603
100	319	274,676,710



Damage ratios are specific to YOUR business and underwriting guidelines, and so can be more predictive than an off-the-shelf product.



# Underwriting – Using Notional Portfolios

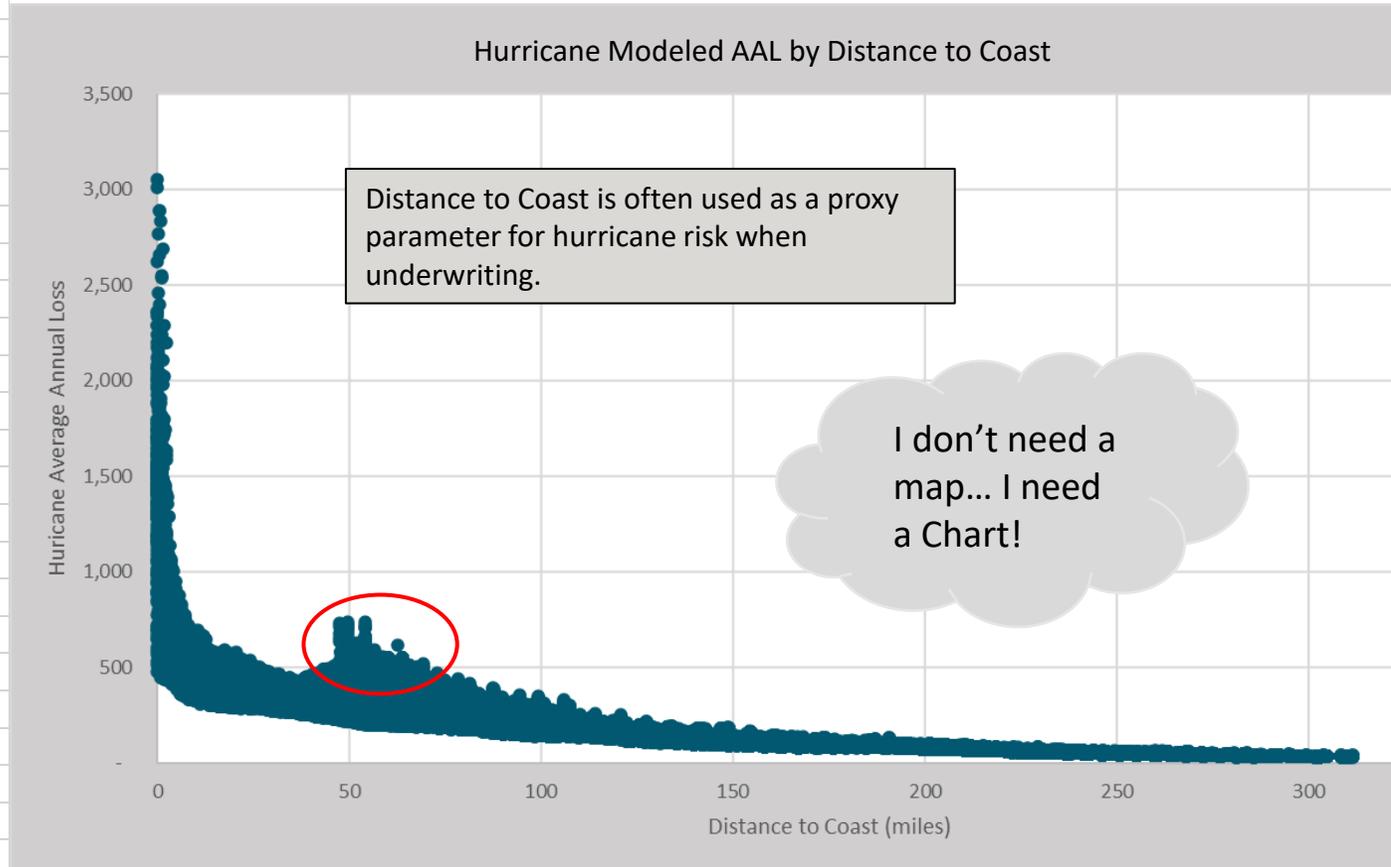


- Notional Portfolios can be excellent tools to evaluate impacts of growth
- Evaluate impacts of potential underwriting guidelines
- Understand hazard variability inside the vendor cat models



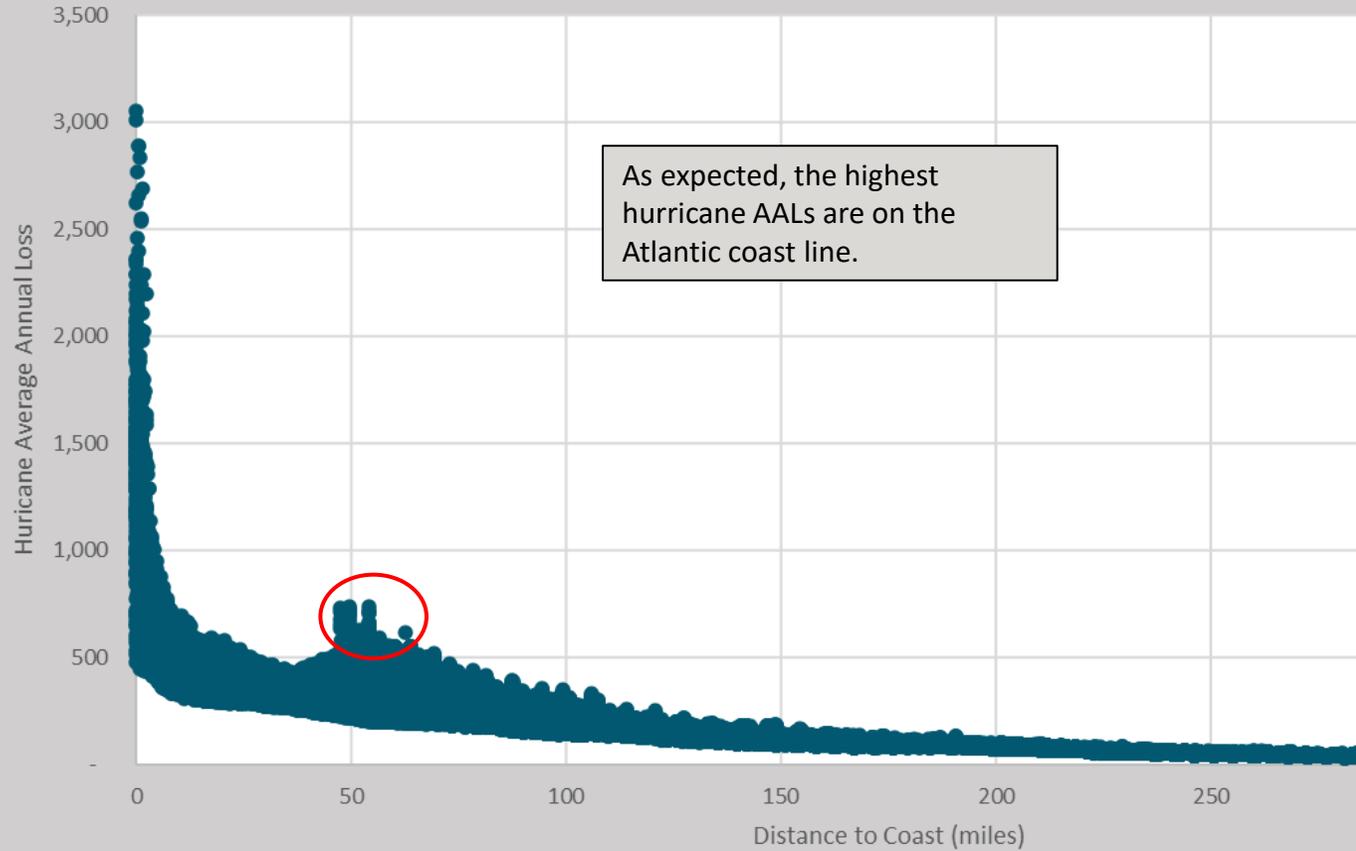
# Underwriting – Distance to Coast

State	County	Dist to Coast	TIV	Model HU AAL	f(x) D2C→AAL
GA	COWETA	210.64	1,650,000	72.88	2.324
GA	BULLOCH	49.71	1,650,000	325.86	1.696
GA	WHITE	237.30	1,650,000	50.44	2.375
GA	BARROW	208.29	1,650,000	70.99	2.319
GA	LIBERTY	21.13	1,650,000	352.24	1.325
GA	ECHOLS	69.87	1,650,000	291.27	1.844
GA	JENKINS	77.87	1,650,000	234.10	1.891
GA	MCINTOSH	9.85	1,650,000	327.79	0.993
GA	MURRAY	282.89	1,650,000	44.85	2.452
GA	WEBSTER	131.23	1,650,000	175.19	2.118
GA	TOOMBS	83.33	1,650,000	180.72	1.921
GA	MORGAN	184.99	1,650,000	85.04	2.267
GA	FRANKLIN	203.47	1,650,000	83.69	2.309
GA	RABUN	234.13	1,650,000	54.99	2.369
GA	TALIAFERRO	140.19	1,650,000	105.30	2.147
GA	WORTH	112.72	1,650,000	195.26	2.052
GA	EARLY	89.47	1,650,000	315.51	1.952
GA	LEE	118.65	1,650,000	206.96	2.074
GA	WILKES	148.65	1,650,000	94.53	2.172
GA	MORGAN	169.58	1,650,000	89.10	2.229
GA	JEFF DAVIS	80.84	1,650,000	195.67	1.908
GA	SPALDING	209.97	1,650,000	86.29	2.322
GA	BURKE	82.50	1,650,000	212.74	1.916
GA	OGLETHORPE	161.91	1,650,000	89.46	2.209
GA	IRWIN	118.36	1,650,000	180.21	2.073
GA	LEE	118.65	1,650,000	200.99	2.074
GA	HANCOCK	137.63	1,650,000	105.99	2.139

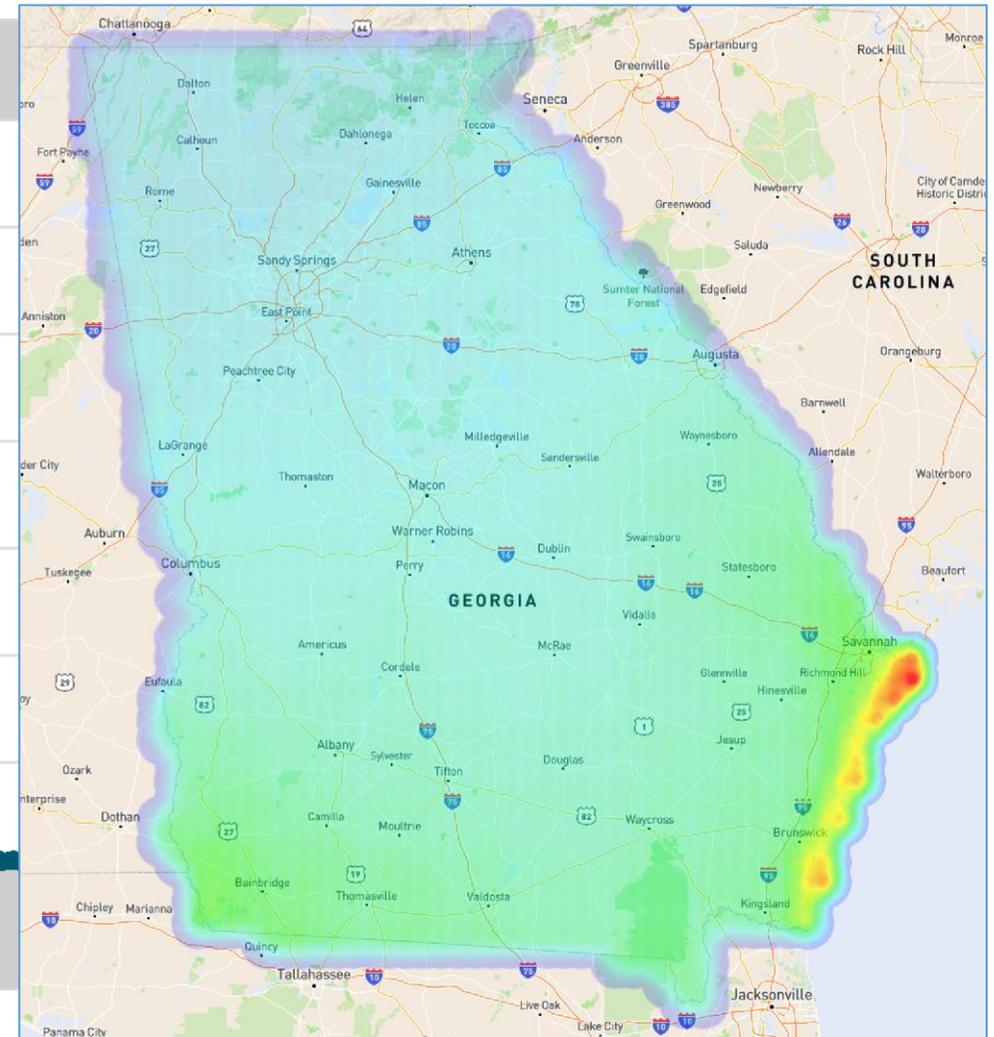


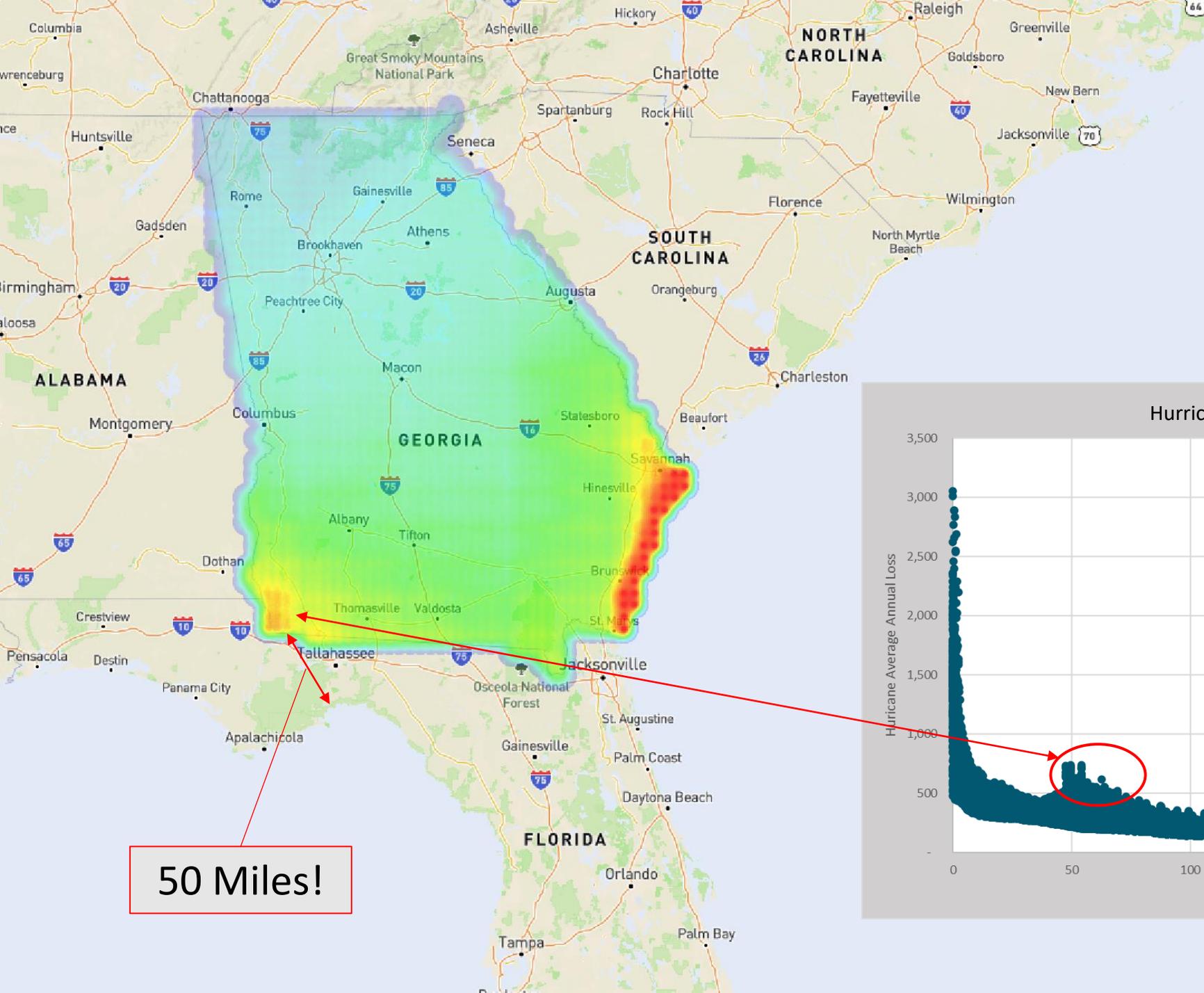
# Underwriting – Distance to Coast

Hurricane Modeled AAL by Distance to Coast



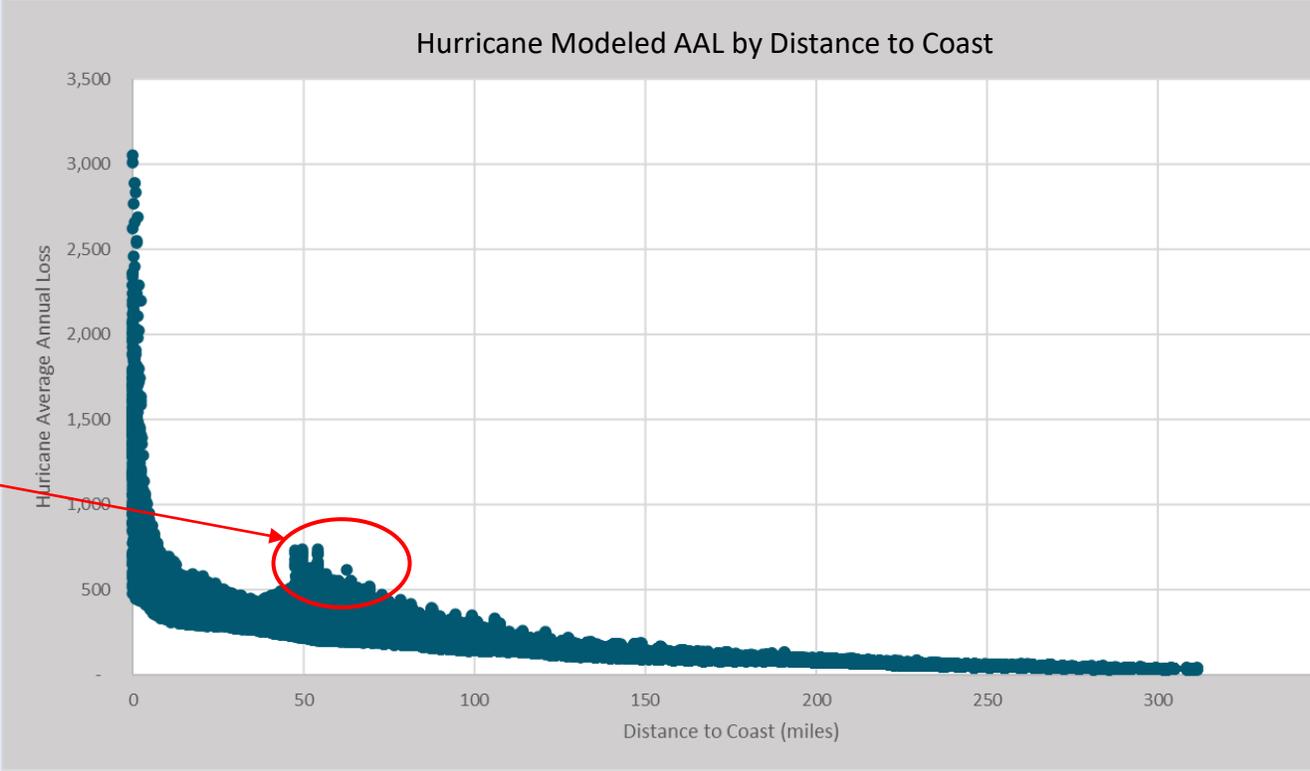
As expected, the highest hurricane AALs are on the Atlantic coast line.





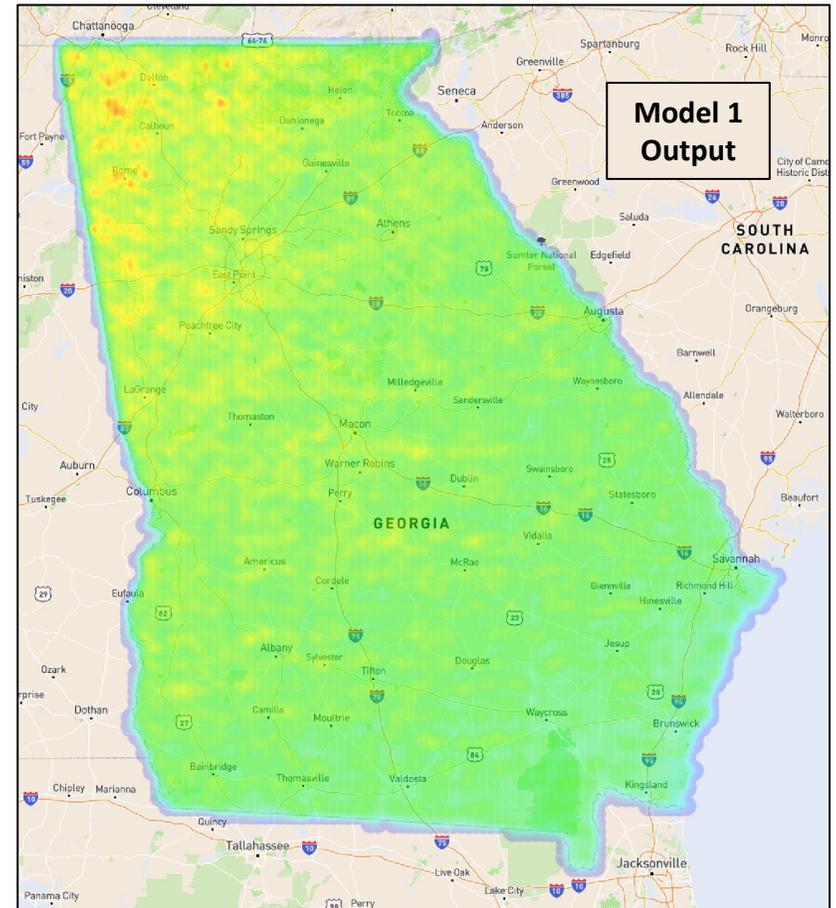
The scale of AAL in the legend has been expanded so the red color begins at a lower AAL dollar threshold.

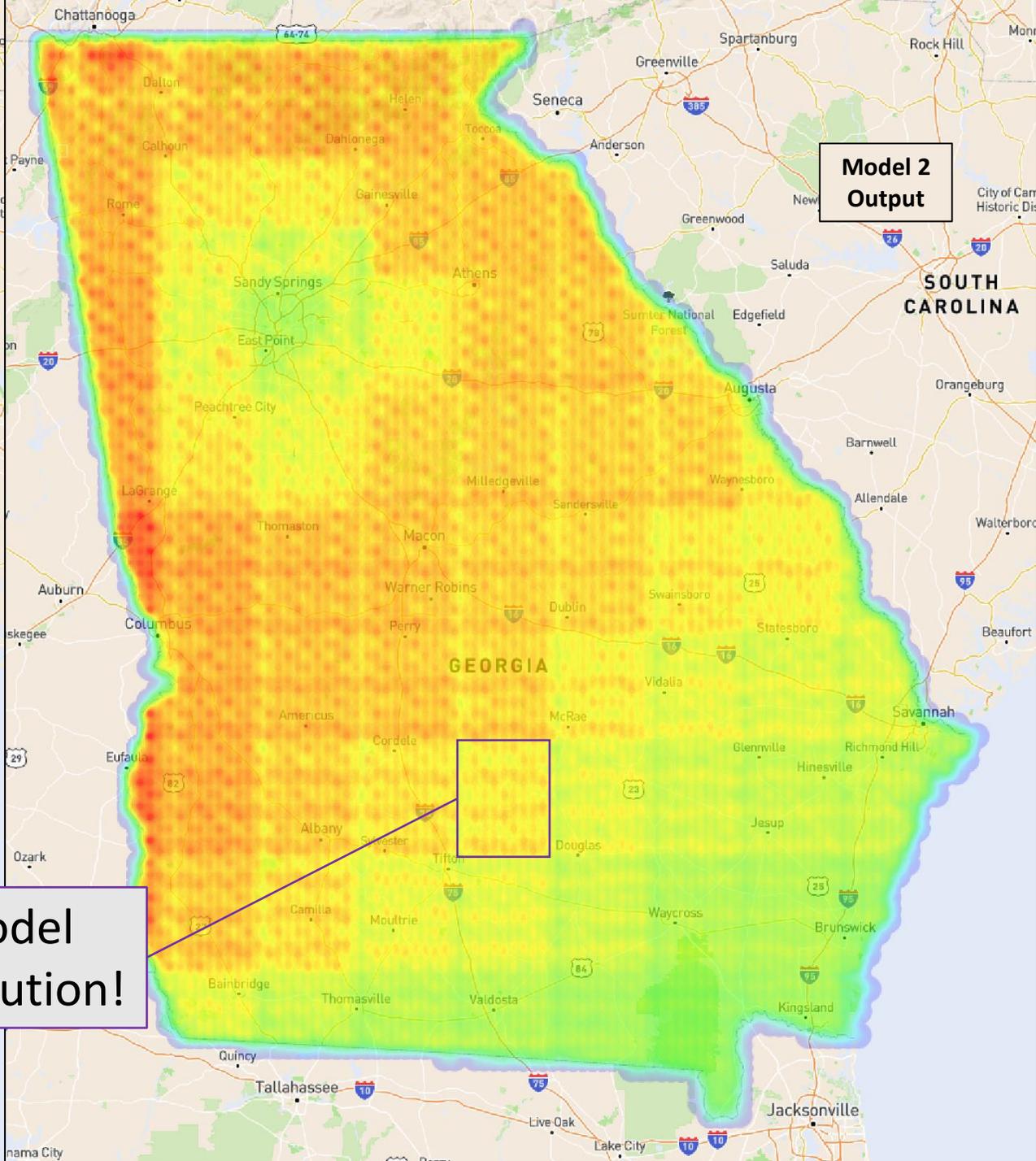
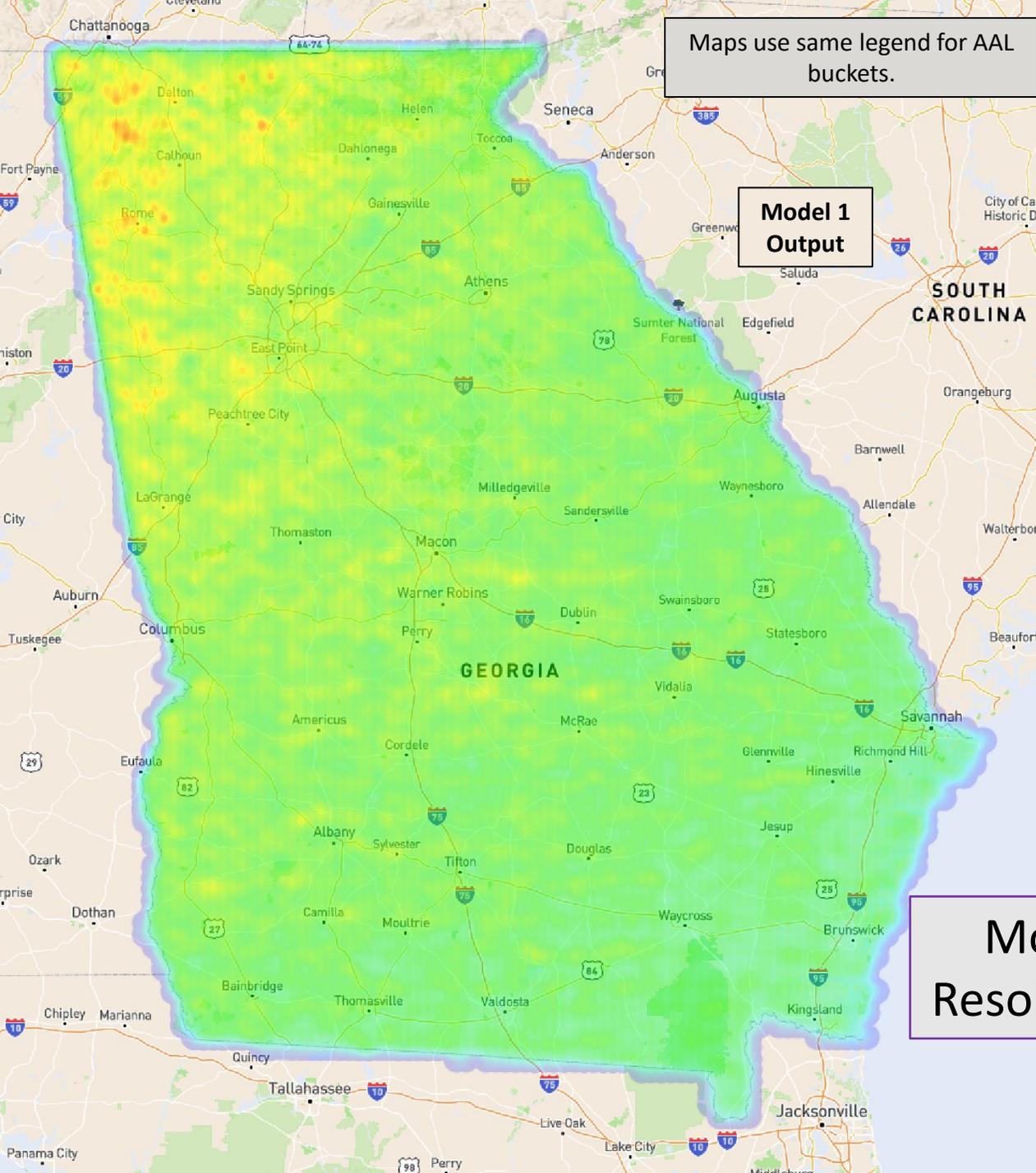
50 Miles!



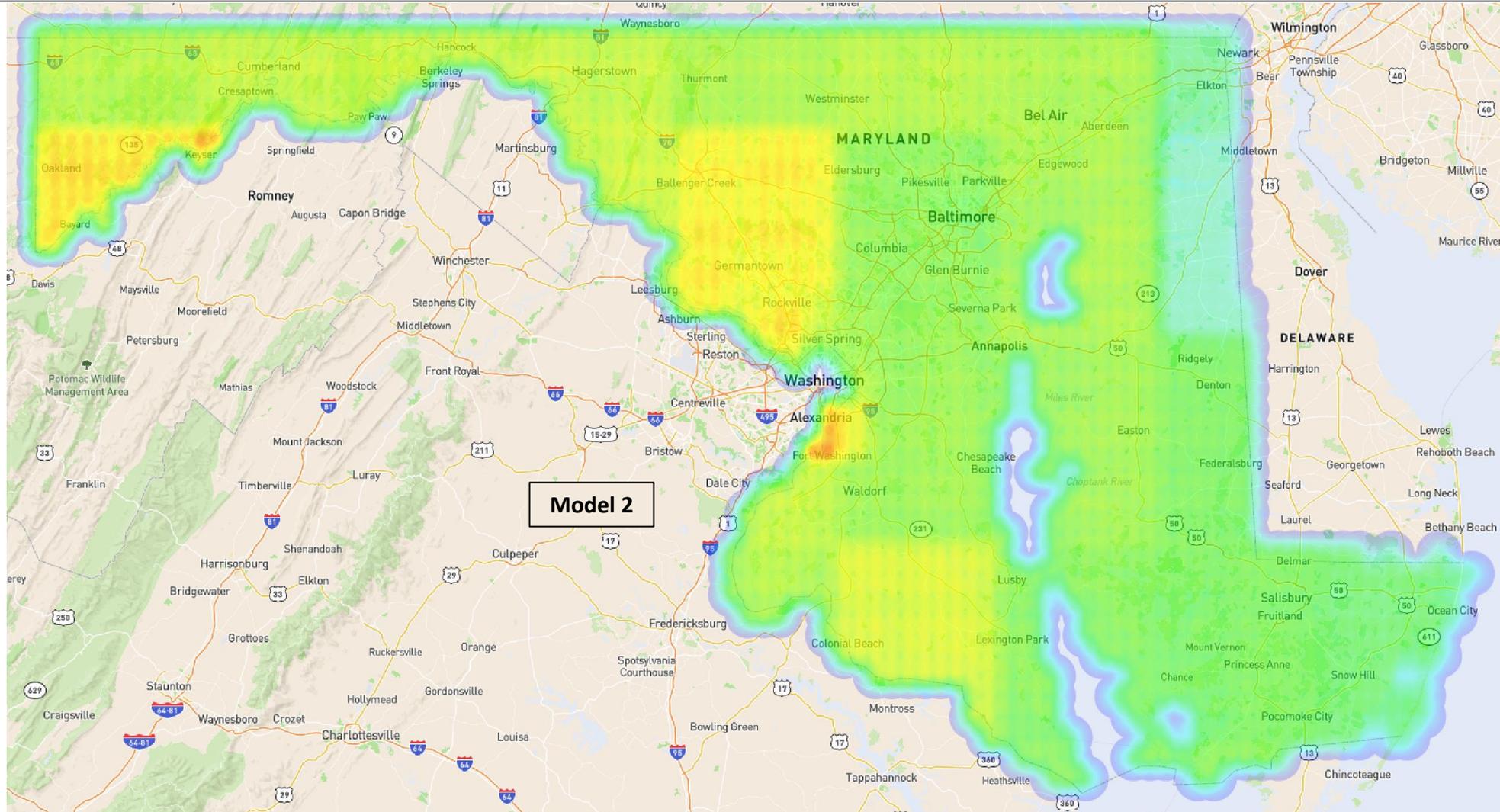
# Catastrophe Model Evaluation – SCS AAL

- Notional Portfolios also work well to evaluate a Catastrophe Model Hazard
- Putting the same risk across the state gives data showing geographical differentials in potential hazard
- This process can be repeated in different vendor models so that their outputs can be compared in better context
  - When comparing model output on real exposures, knowing the difference in geospatial hazard between the Cat Model Vendors will lead to a greater understanding of why those results differ.



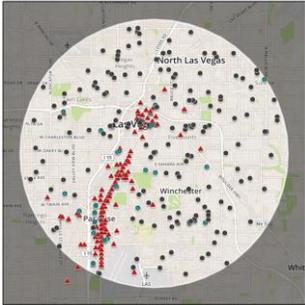


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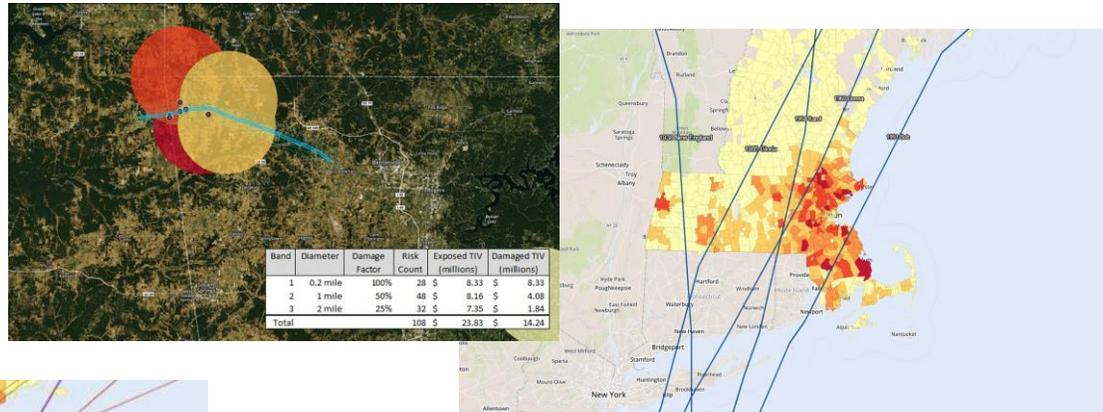


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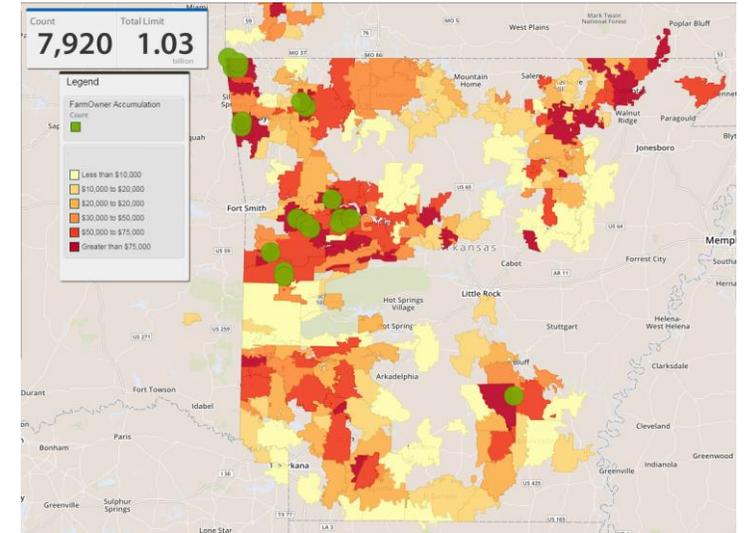
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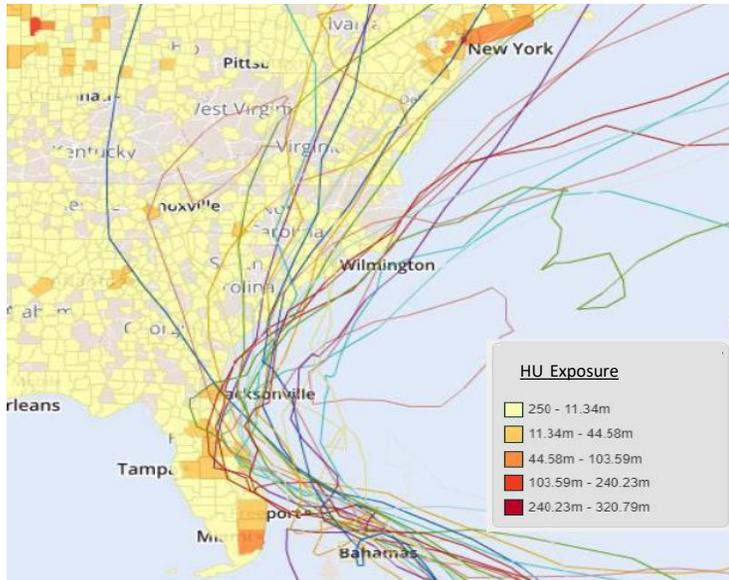
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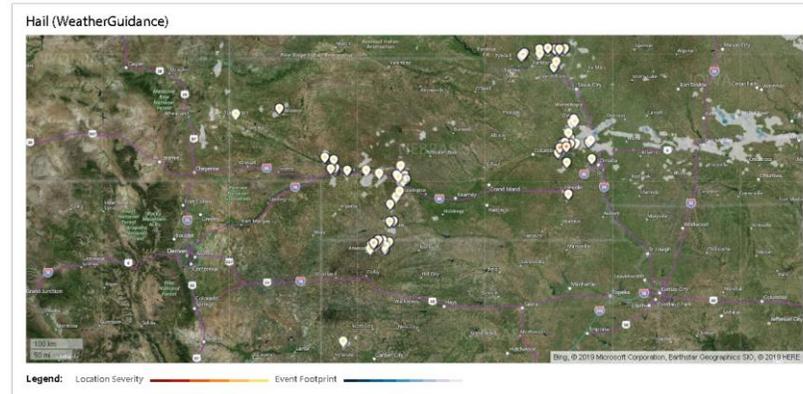
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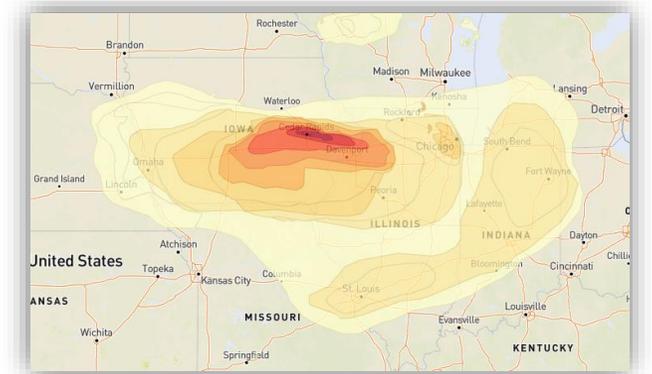
## VENDOR CAT MODEL EVALUATION



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Thank You!

