KatRisk

ICFM

July 2025 Texas floods:

Understanding and Addressing Flash Flood Risks

August 5th, 2025

Hello!

Brandon Katz

EVP Strategy

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Agenda

01 Event Overview

02 Event Reconstruction

03 Emergency Management

04 Questions

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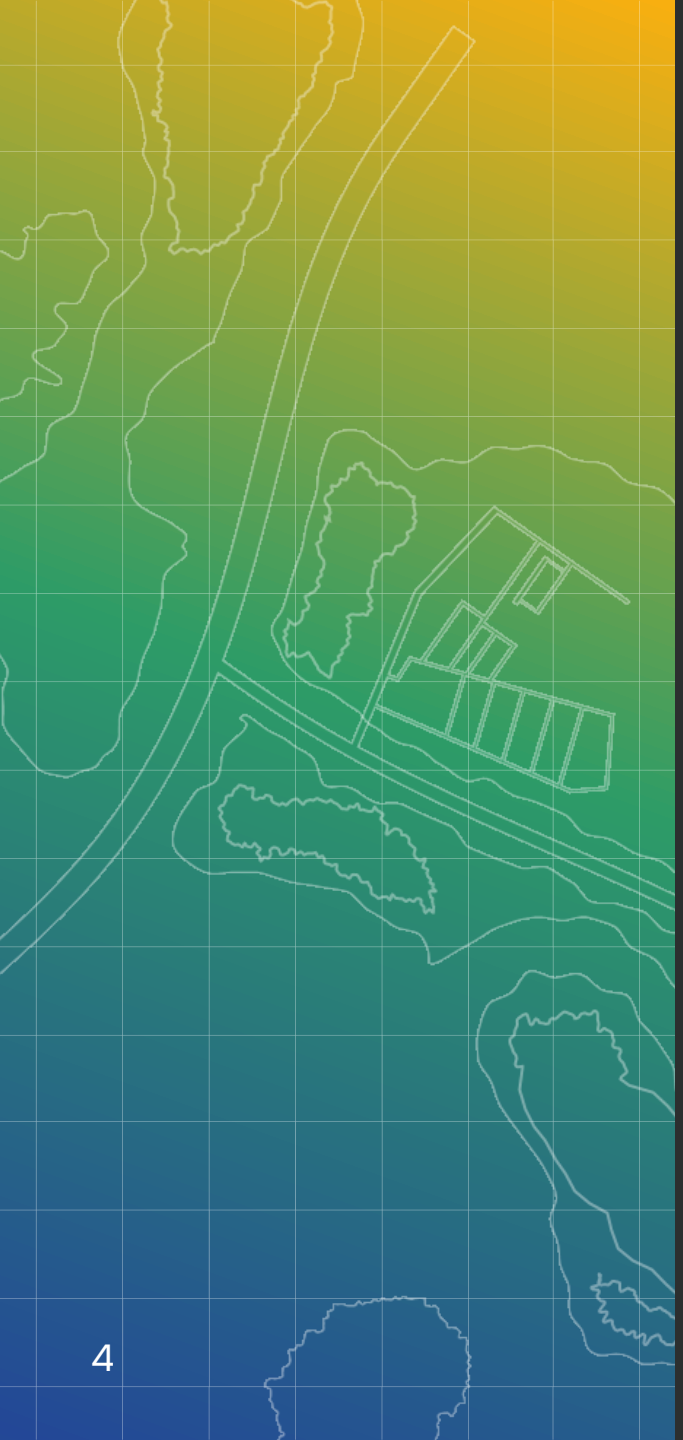

01 Event Overview

Where, When, What and the Aftermath

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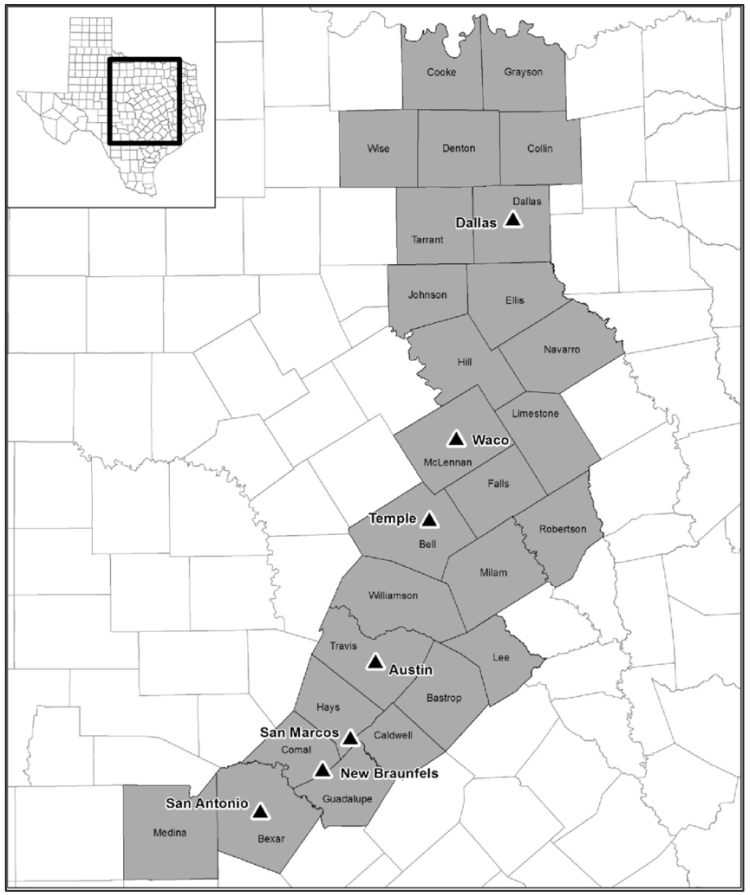
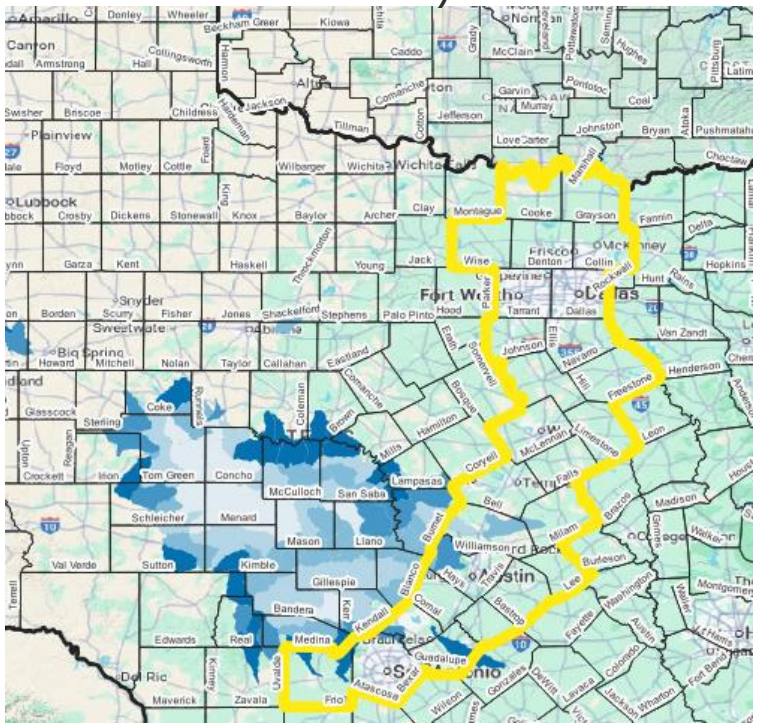
The Where

- The Event occurred in the “Hill Country” of Central Texas in the United States
  - This area is within and neighboring to an area known as “Flash Flood Alley,” known for its dangerous floods
- The most effected areas were in Kerr and Hunt Counties

Flash Flood Alley



Flood Return Period By Catchment (flash flood alley shown in yellow outline)



Shah, Vaidehi & Kirsch, Katie & Cervantes, Diana & Zane, David & Haywood, Tracy & Horney, Jennifer. (2017). Flash Flood Swift Water Rescues, Texas, 2005-2014. Climate Risk Management. 17. 10.1016/j.crm.2017.06.003.

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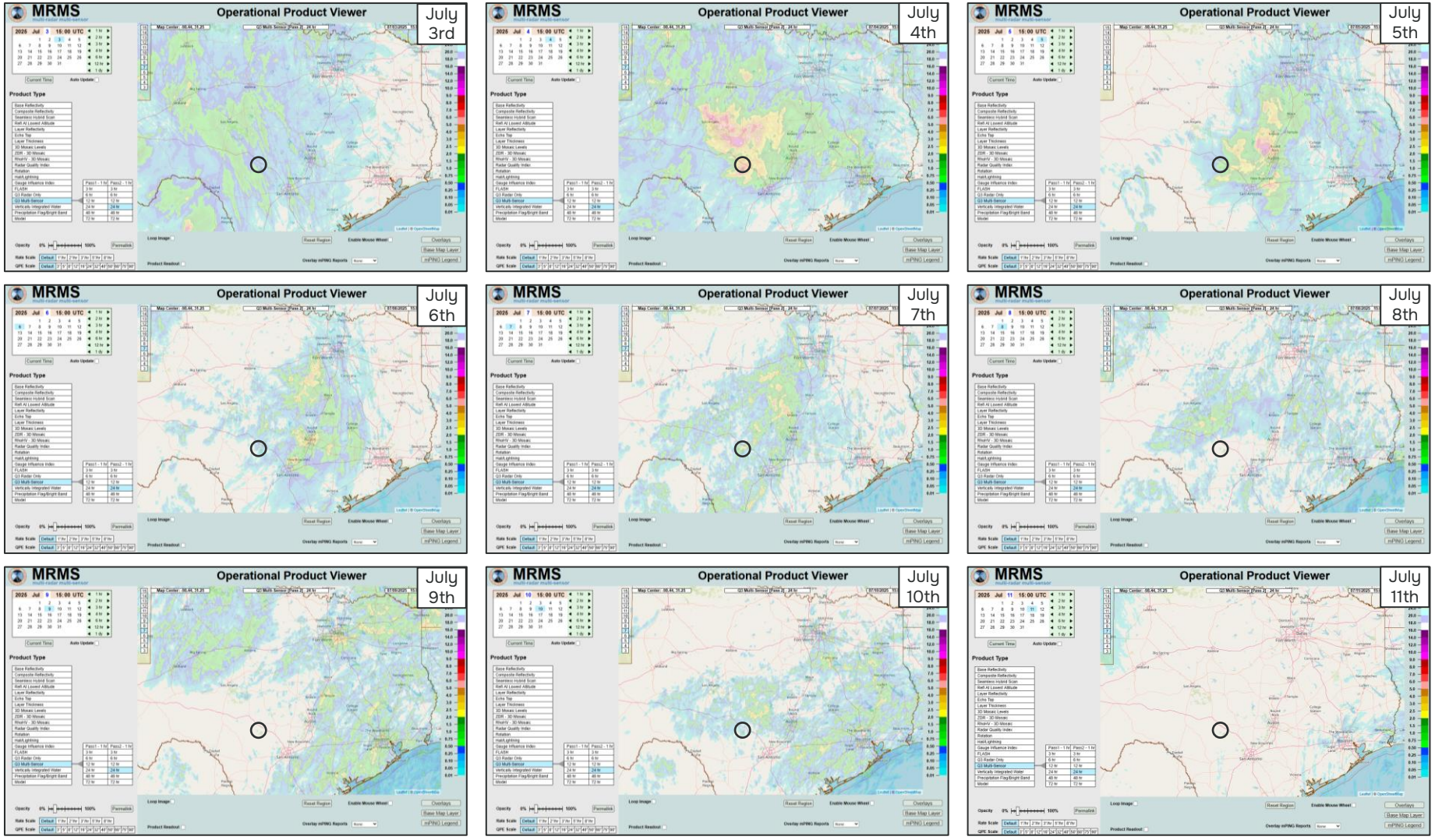
The When

- The main flooding occurred overnight from July 3rd into July 4th.
- Rescue efforts were hampered by continuing rainfall which did not entirely abate until July 11th

Camp Mystic



https://mrms.nssl.noaa.gov/qvs/product_viewer/

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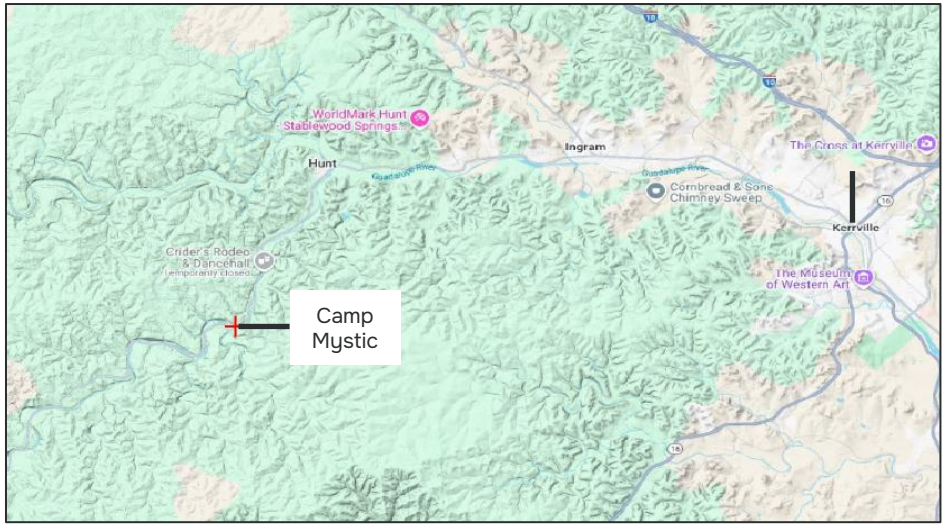
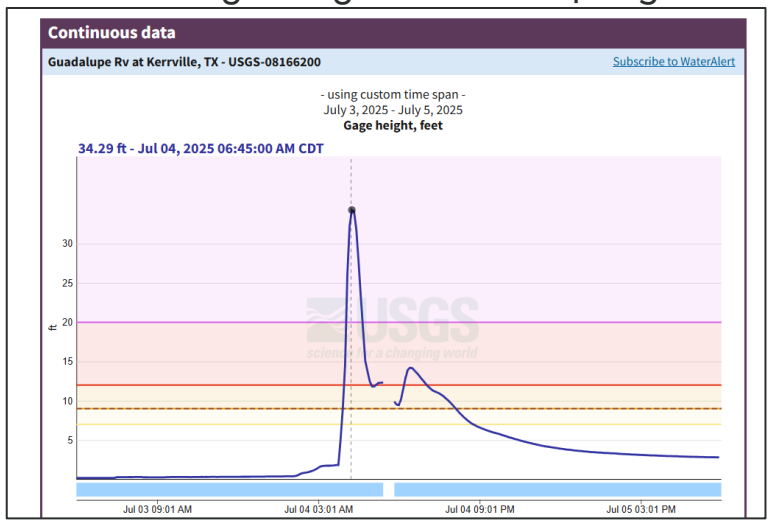
The What

- Flood gauge height in Kerrville reached nearly 35ft within < 2 hours
  - 5:15am: 1.82 ft [0.56 mm]
  - 6:45am: 34.29 ft [10.45 mm]
- Within approximately four hours, the equivalent of 4 months of rain fell the Texas Hill Country (max of 20.33 in [516 mm])
- Many other areas saw similar flooding, but the greatest tragedies occurred in the Kerrville and Hunt areas

Area around Camp Mystic



River Guage Height Near Camp Mystic



https://waterdata.usgs.gov/

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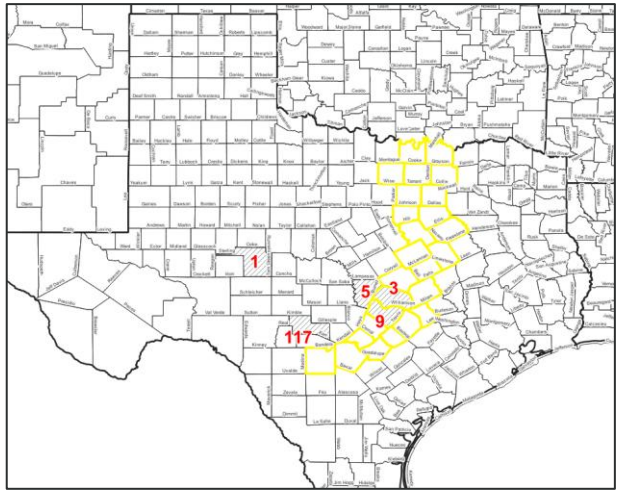
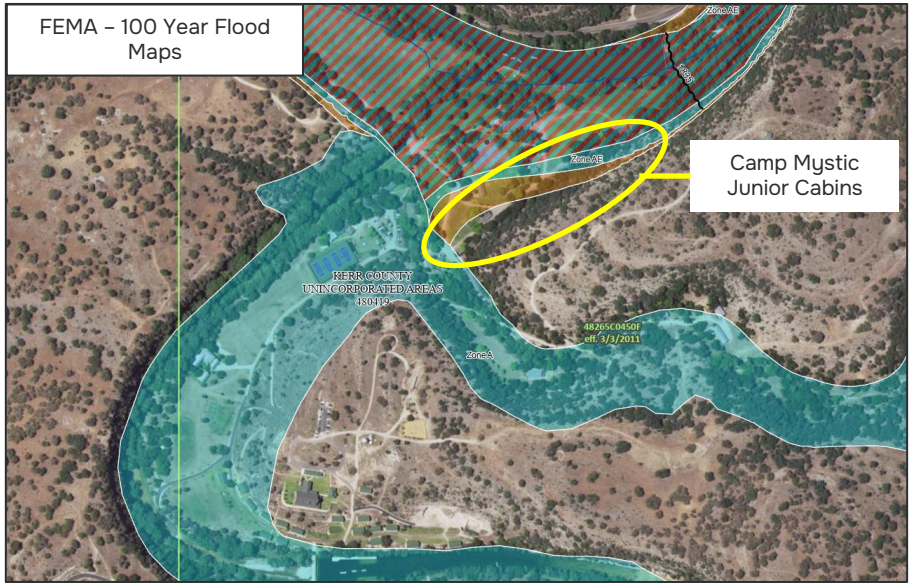
The Aftermath

- To date, 135 fatalities, 117 of those in Kerr County alone
- Camp Mystic Girls Camp
  - Hosts ~ 750 Campers
  - 27 Campers and Counselor Fatalities
- Number of missing stands at three

Casualties by County



https://hazards-fema.maps.arcgis.com/



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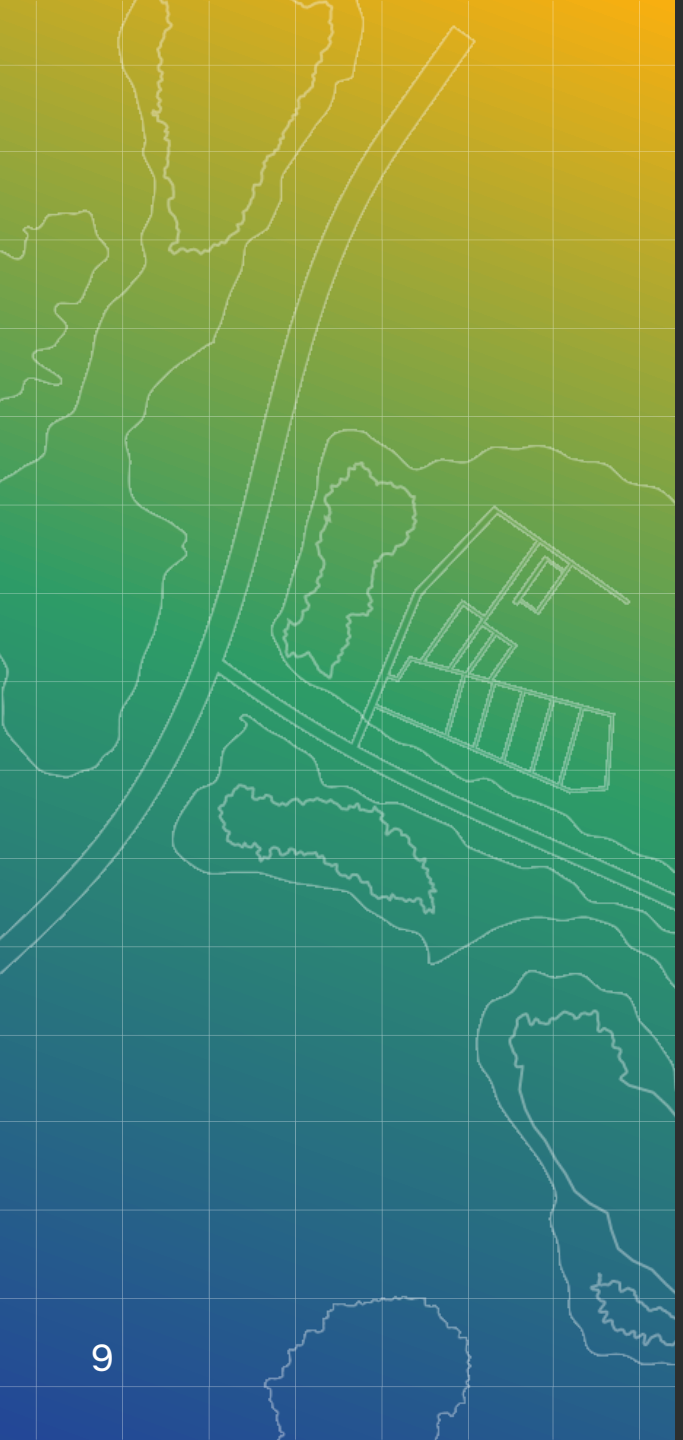

02 Event Reconstruction

Where did it flood and how bad was it?

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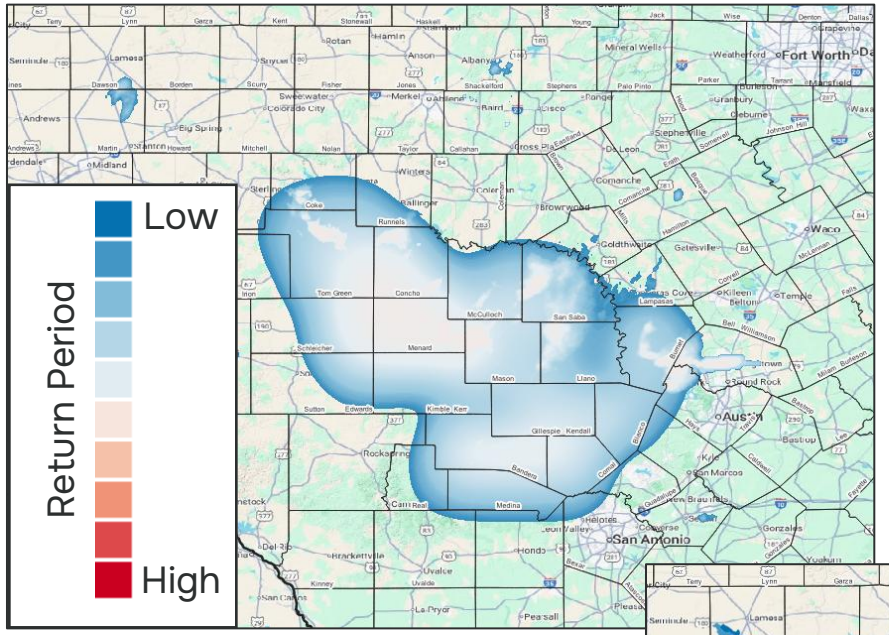
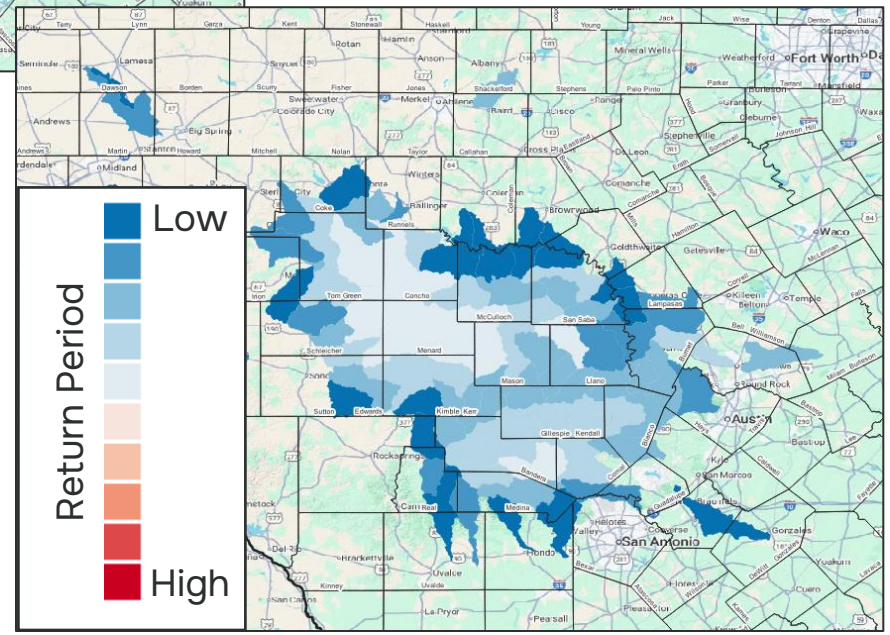
Precipitation

- As mentioned previously, precipitation fell intensely and quickly
- Data Sources:
  - KatRisk Libraries of grid-level pluvial flood vs precipitation return period
  - CPC precipitation data (In the US)
  - MRMS radar derived precipitation return period data
  - USGS streamflow data
  - KatRisk return period flood maps (10, 20, 50, 100, 200, 500 year)
- Step 1: Compute Precipitation to Pluvial and Fluvial Return Period maps

Pluvial Flood Return Period



Fluvial Flood Return Period



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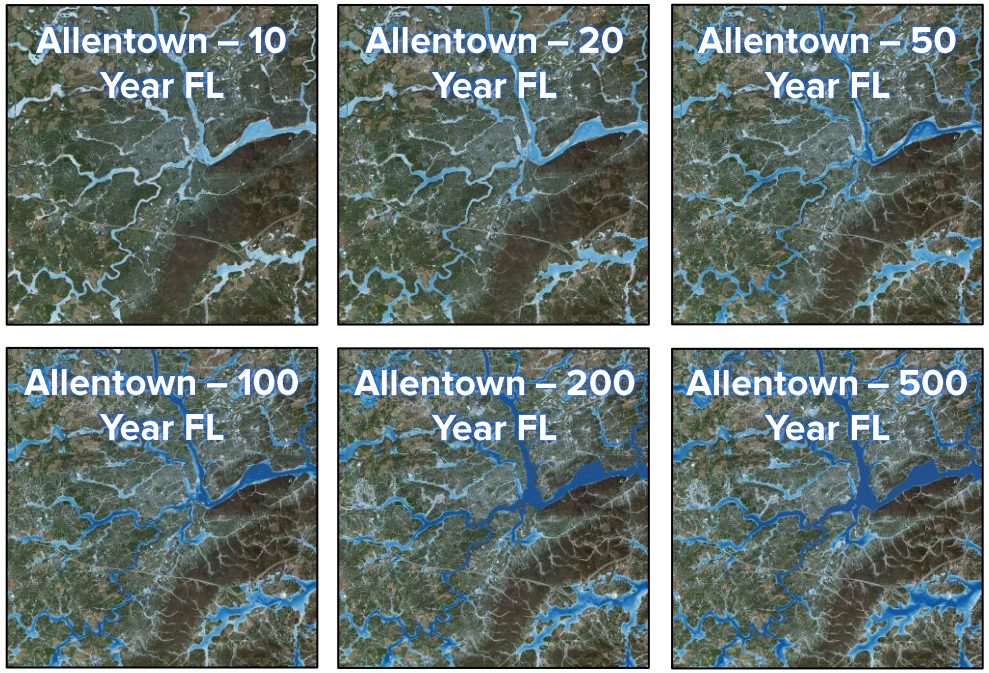
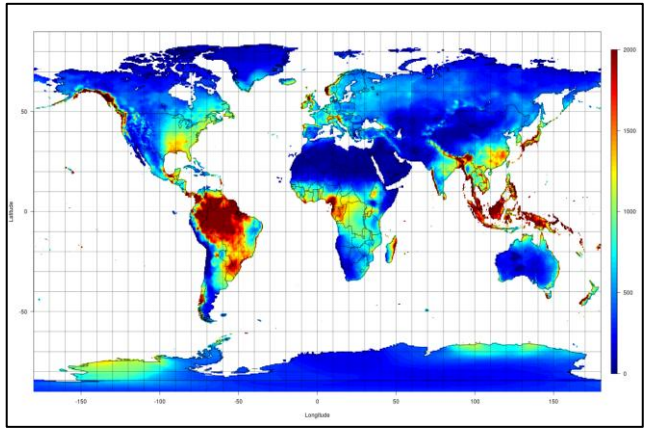
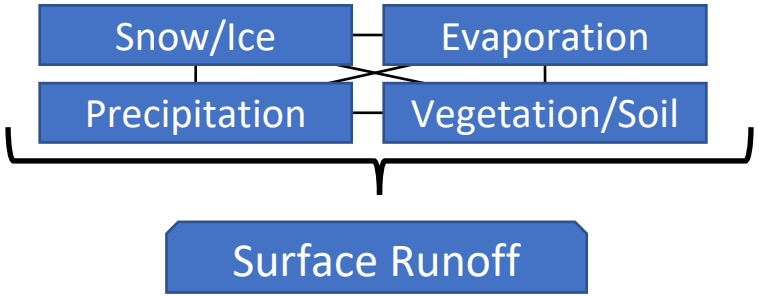
Inundation

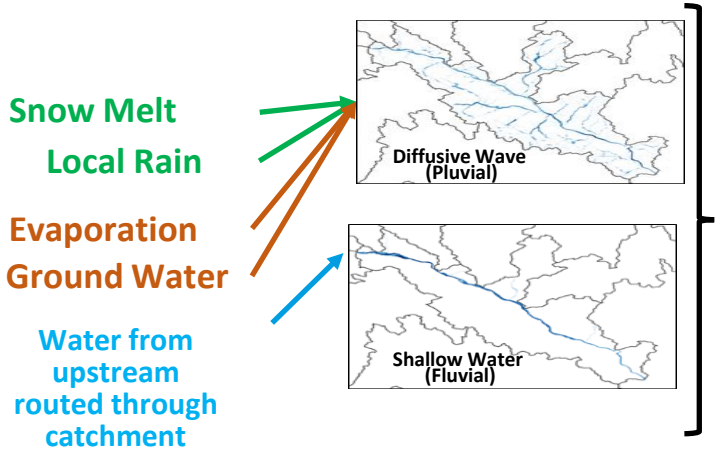
- Utilizing KatRisk return period flood maps for pluvial and fluvial flooding (at 10 x 10 meter resolution)

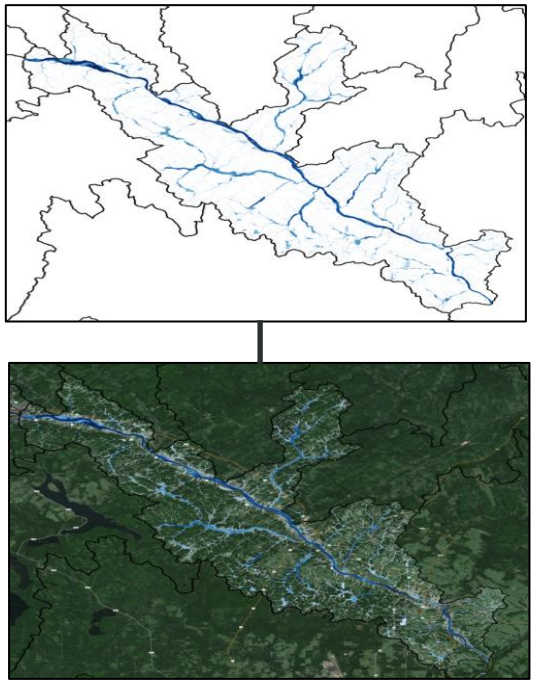


Global Precipitation Climatology









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Inundation

- Significant computational resources necessary to run physics-based calculations at high resolution
- Calculation resources supplied by the Oak Ridge National Laboratory under U.S. Department of Energy Contract No. DE-AC05-00OR22725

OAK RIDGE National Laboratory | LEADERSHIP COMPUTING FACILITY

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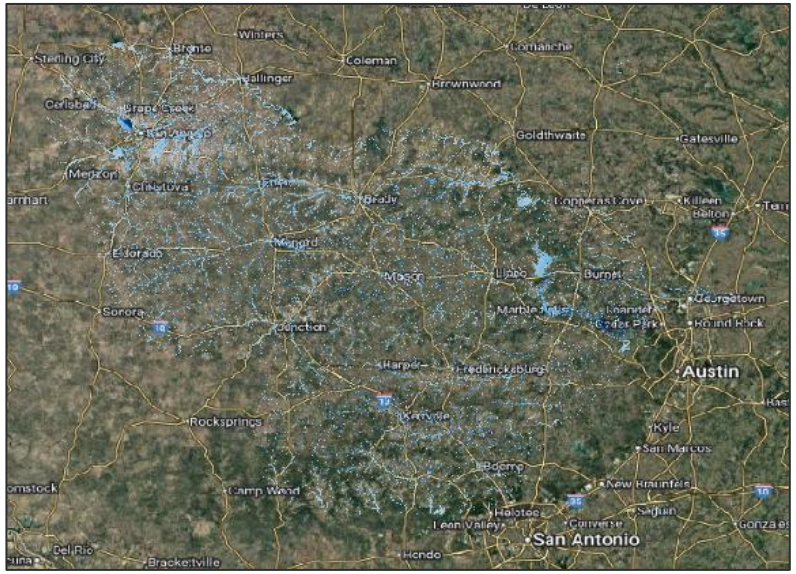
Inundation

- Step 2: Create event footprint files at 10m resolution
  - Camp Mystic area ~ 103 year RP

Pluvial + Fluvial Flood



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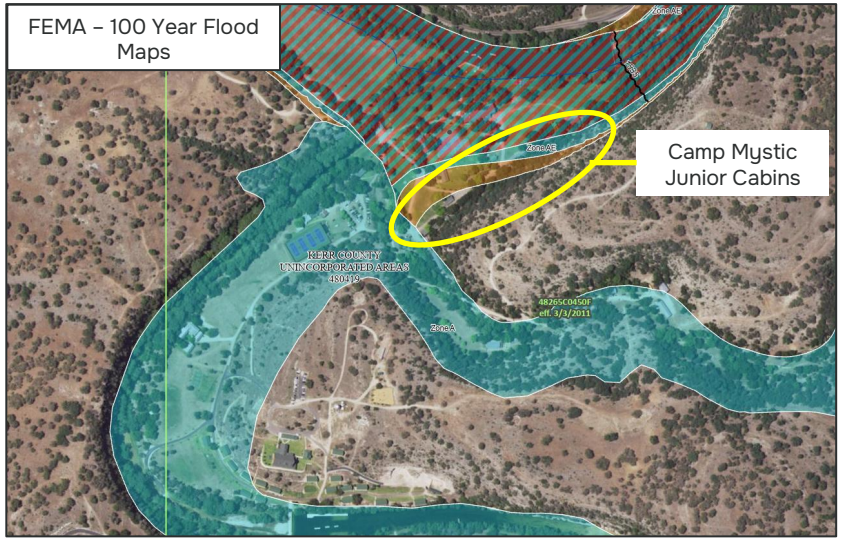

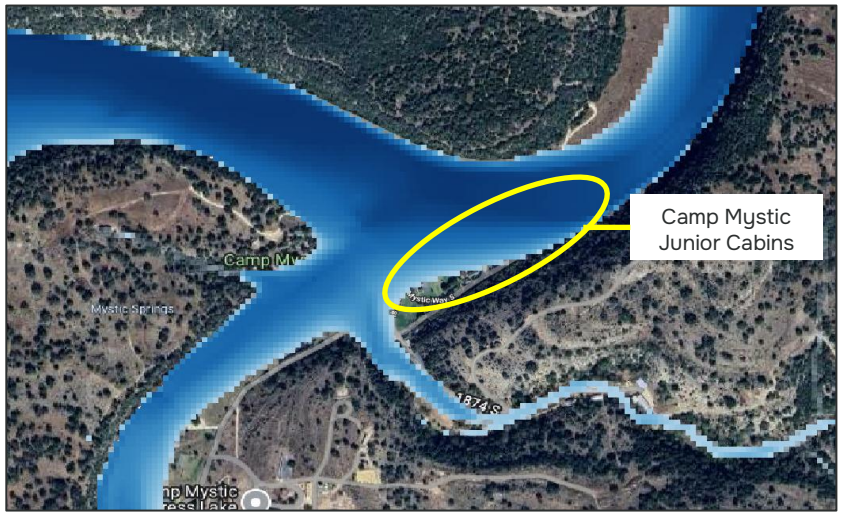

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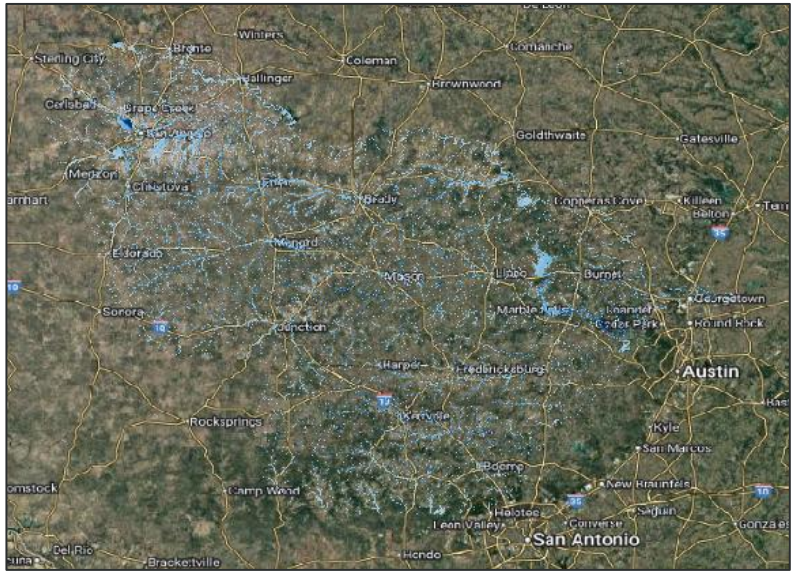

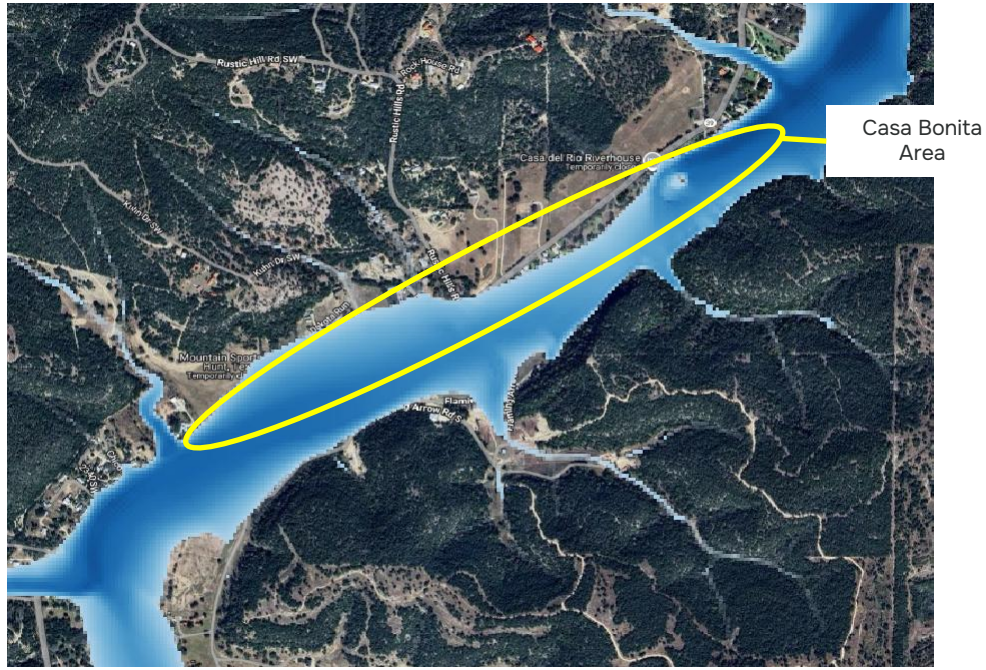

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Inundation

Camp Mystic

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Camp Mystic (103-Year Flood)

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Hunt, TX

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Hunt, TX (100-Year Flood)

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Blue River Oak RV Park

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Blue River Oak RV Park (103-Year Flood)

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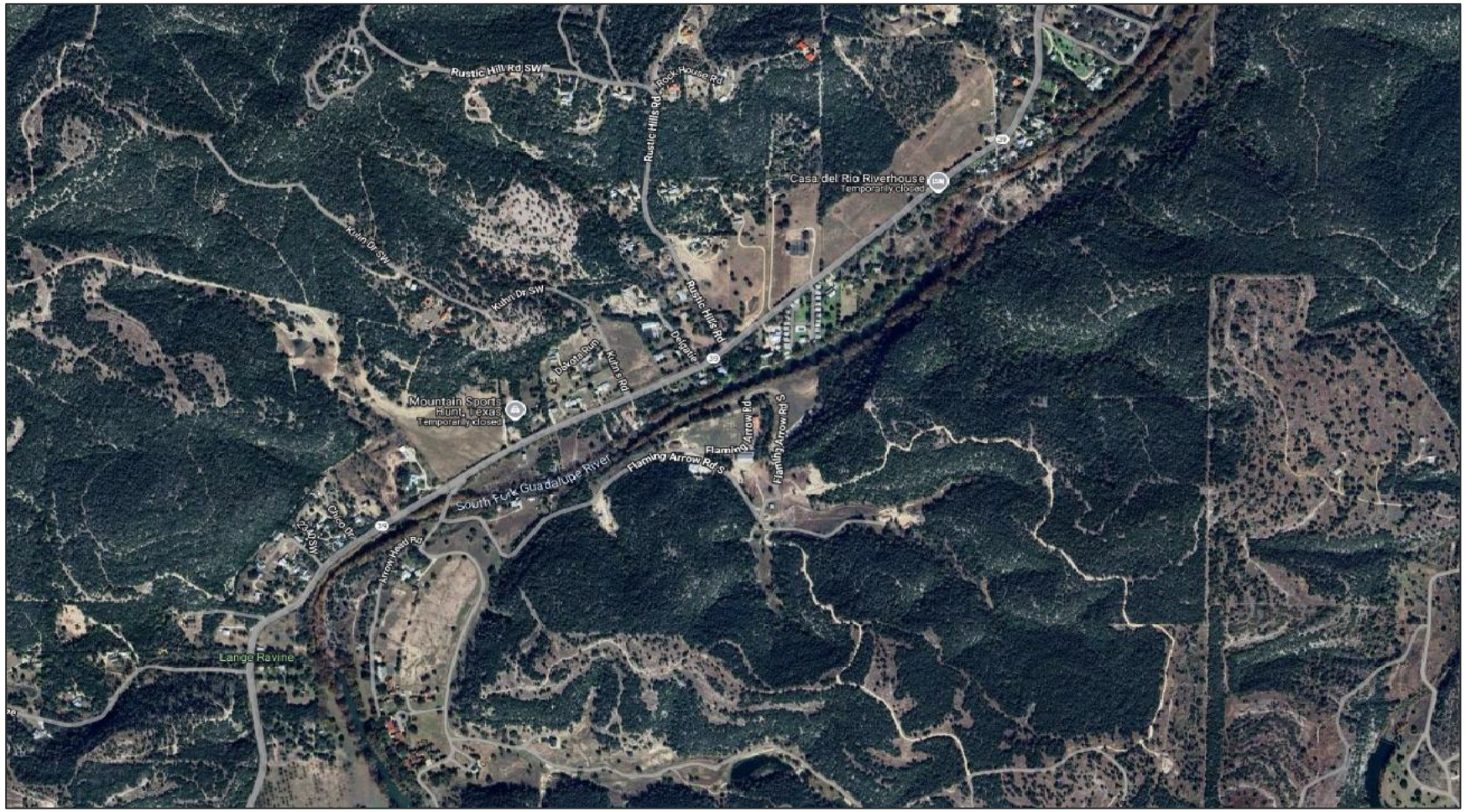
Casa Bonita Area South of Hunt, TX



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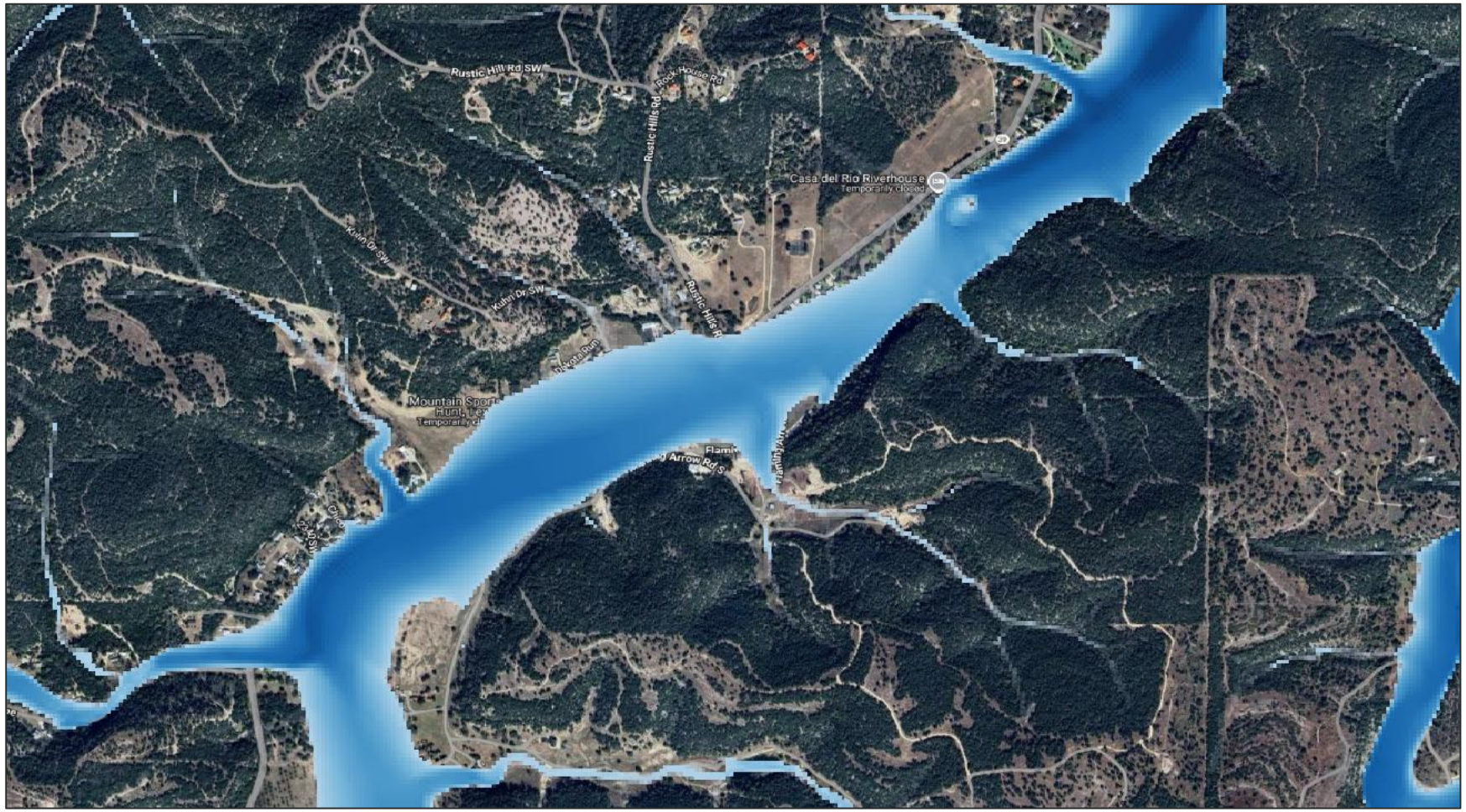
Casa Bonita Area South of Hunt, TX (109-Year Flood)



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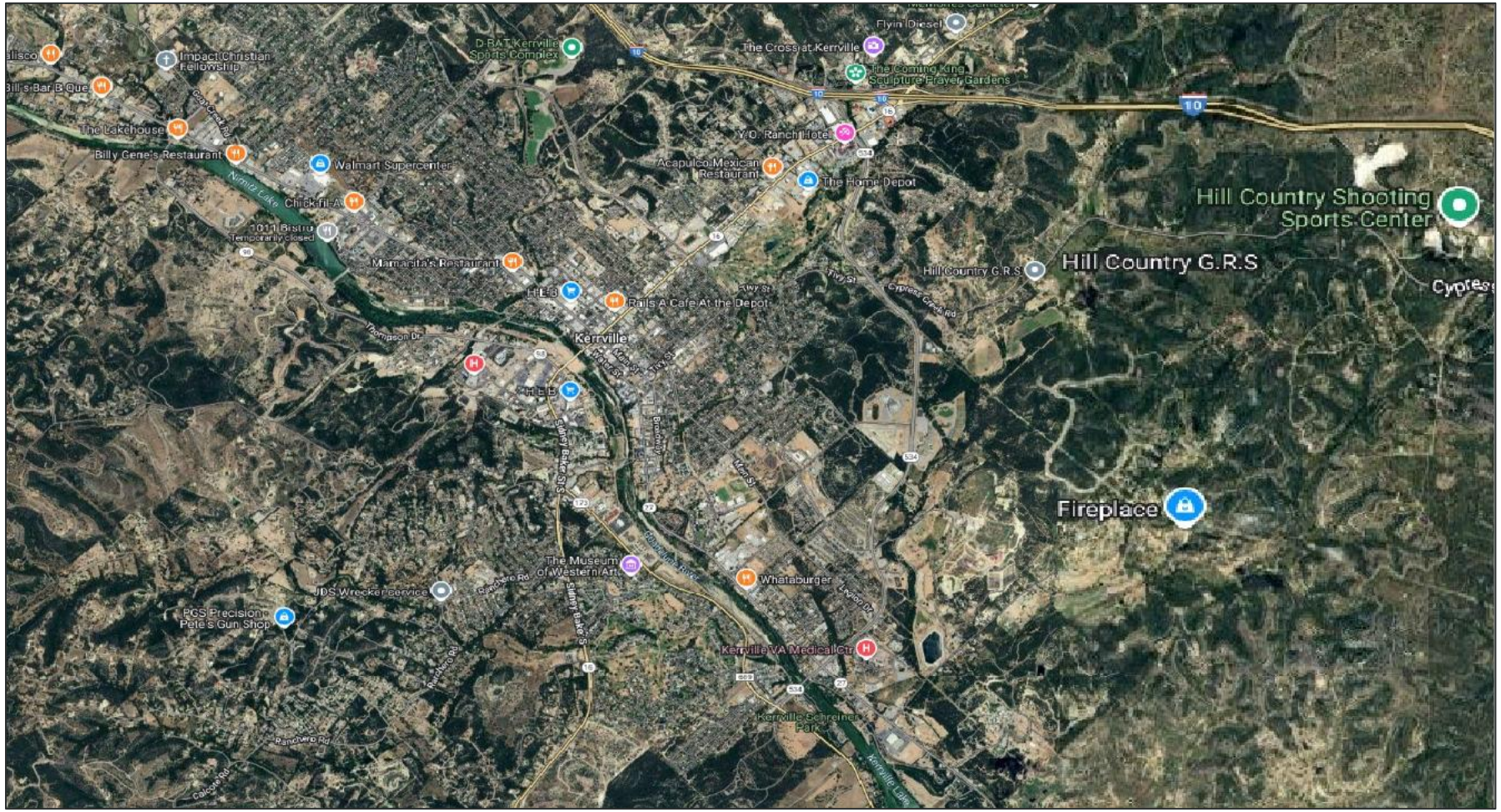
Inundation

Kerrville, TX



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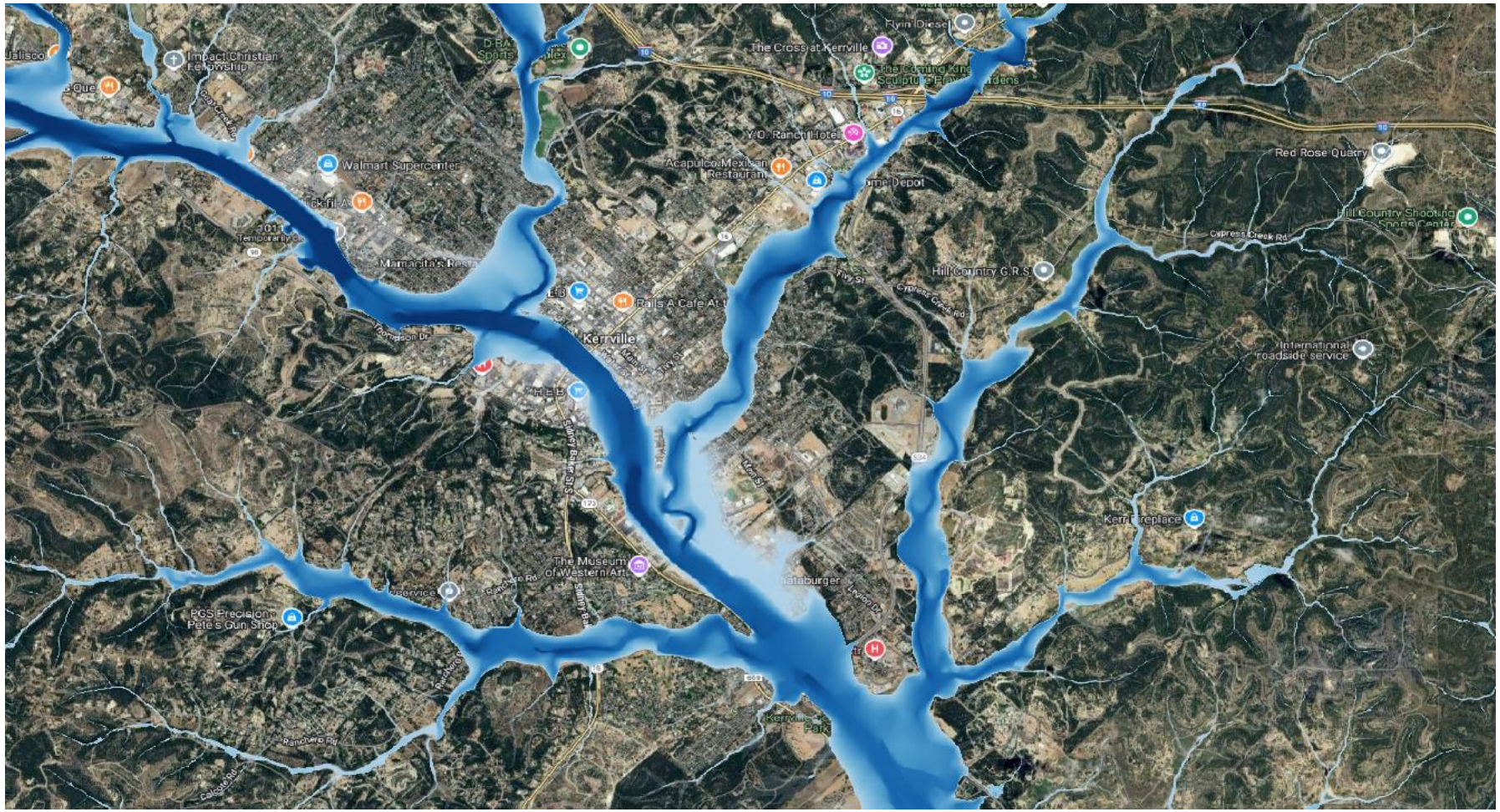
Kerrville, TX (110-Year Flood)



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Inundation

Georgetown, TX

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Inundation

Georgetown, TX (212-year Flood)

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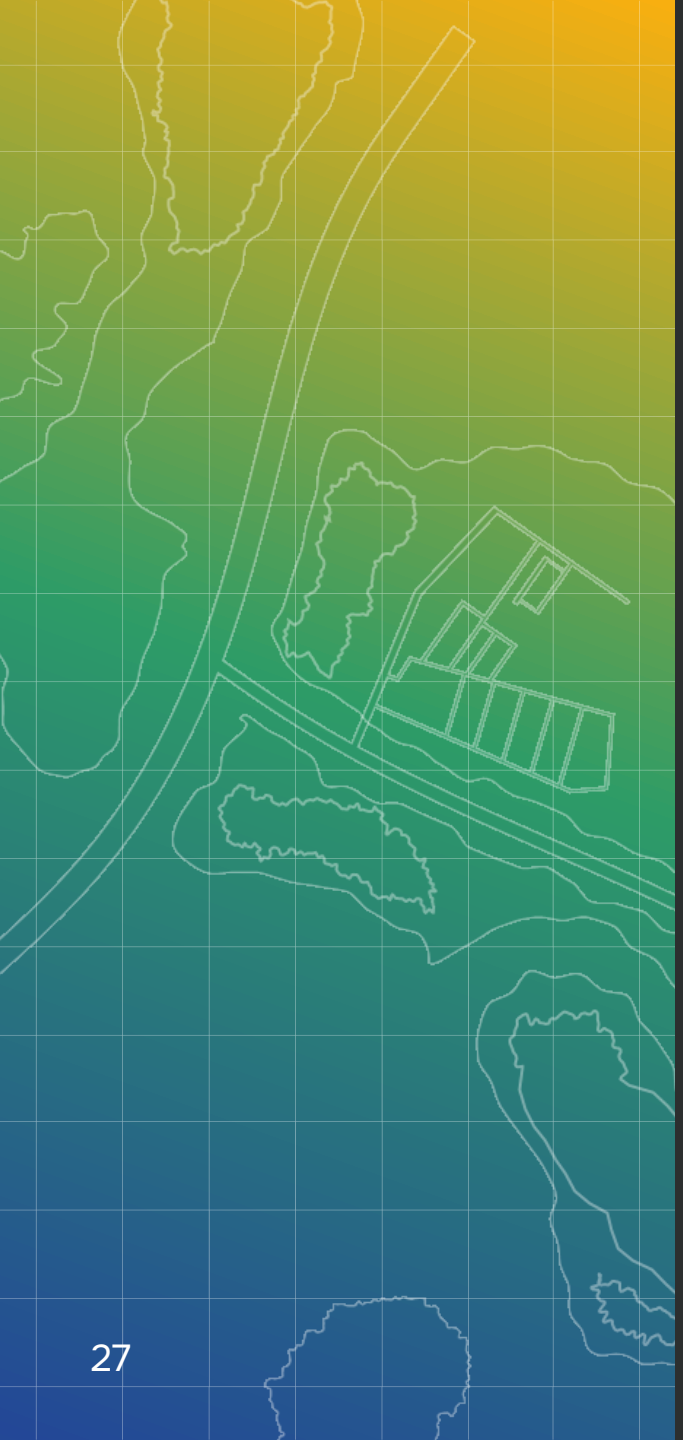

03 Emergency Management

What can we do before the next big event?

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Know Your Risk

Risk Tolerance

Decide how much risk you are comfortable with for a given situation

- At what point does this risk load become unacceptable

Risk Identification

Utilize a risk identification tool or data provider

- Determine risk at every location in your portfolio of responsibilities

Risk Mitigation

For those areas with high risk, make a plan

- Pre-determine evacuation criterion
- Plan for future flood/peril defenses

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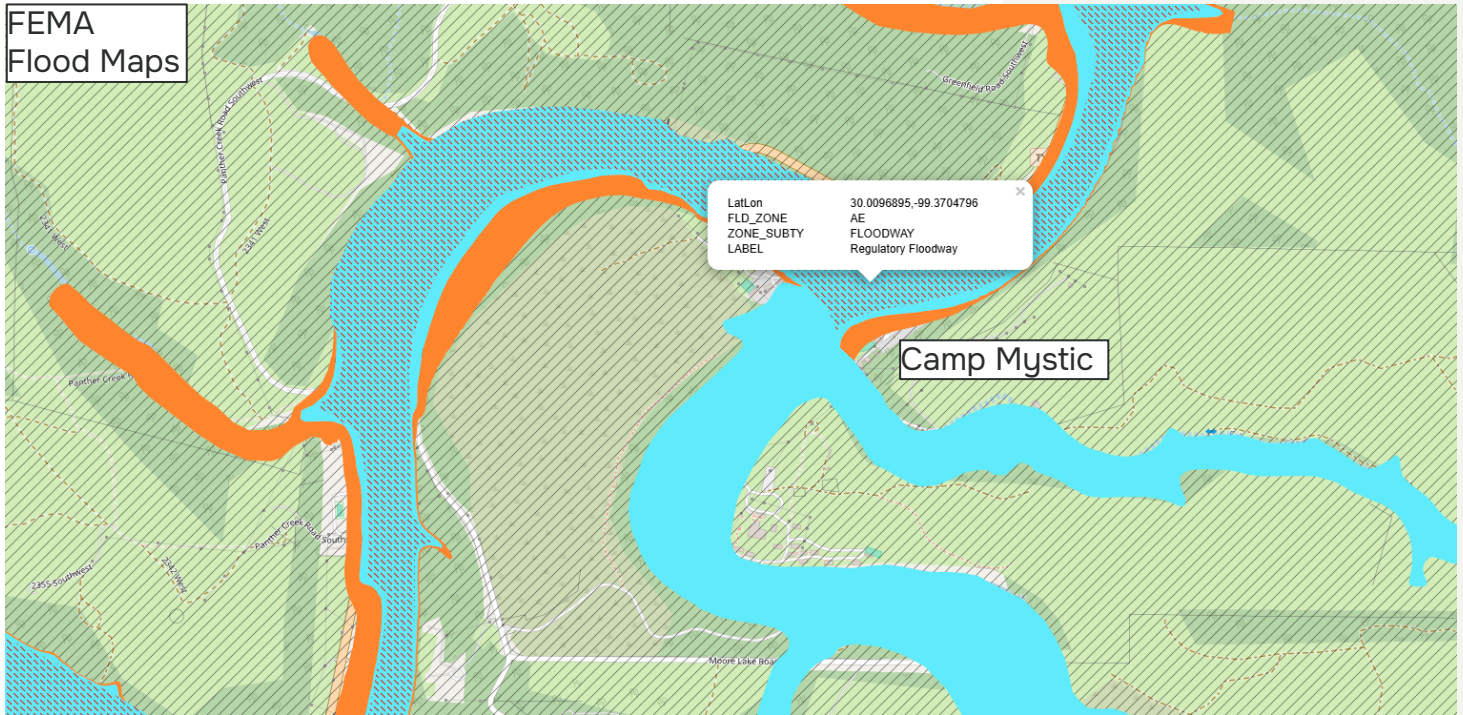
Risk Tolerance

- Determine your critical asset classes and where they are
  - Governmental Buildings
  - Vulnerable Comminutes
  - High Value Assets
  - Vital Roadways
  - Etc.
- Determine at thresholds for action, and the appropriate action

Risk Identification

- Utilize data or tools to determine, for your risks, at what their current risk level is?
  - In the US, FEMA provides 100-year RP and above flood maps
    - Limited in most states to fluvial only
  - In other countries, tools like KatRisk's or others (Verisk, Moody's, JBA, Cotatlity) work well
- Utilize Forecasting tools which provide information before an event



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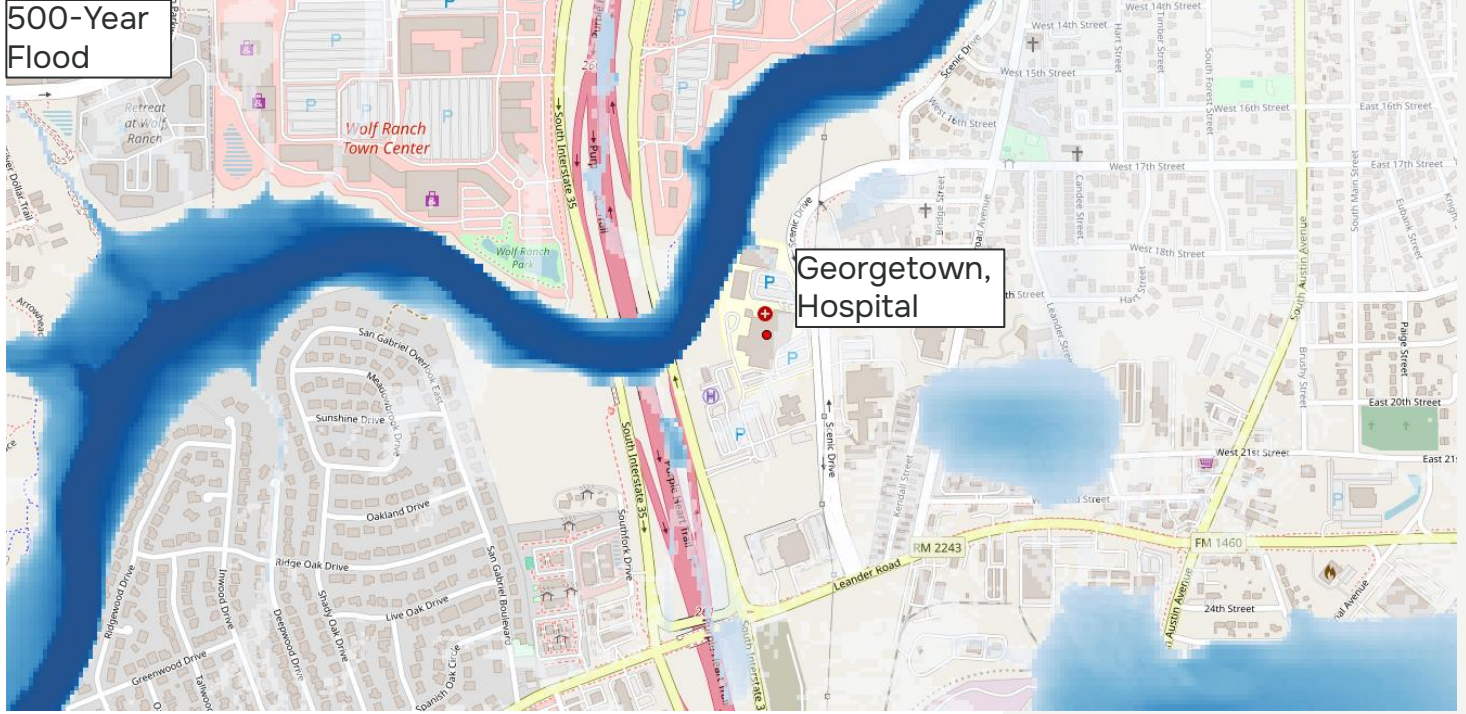

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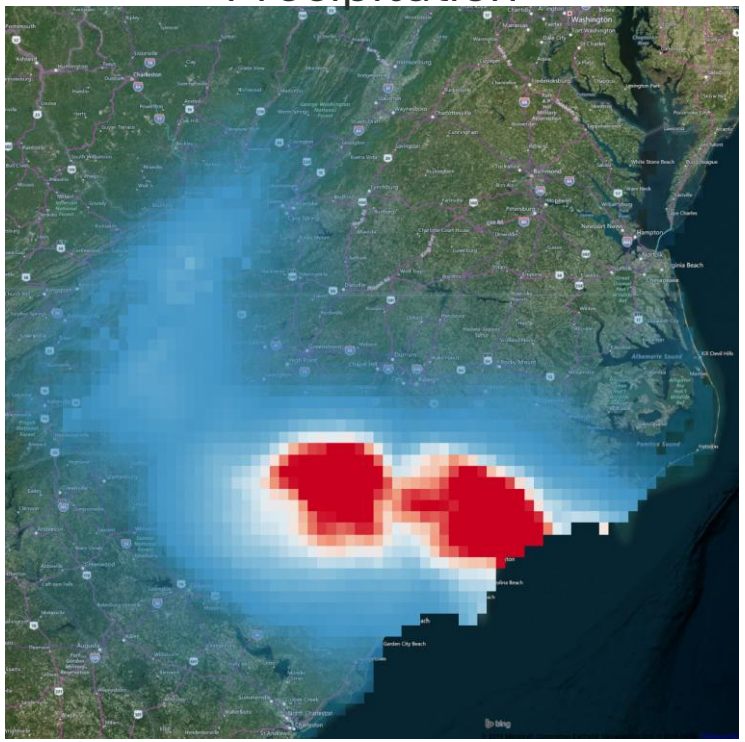
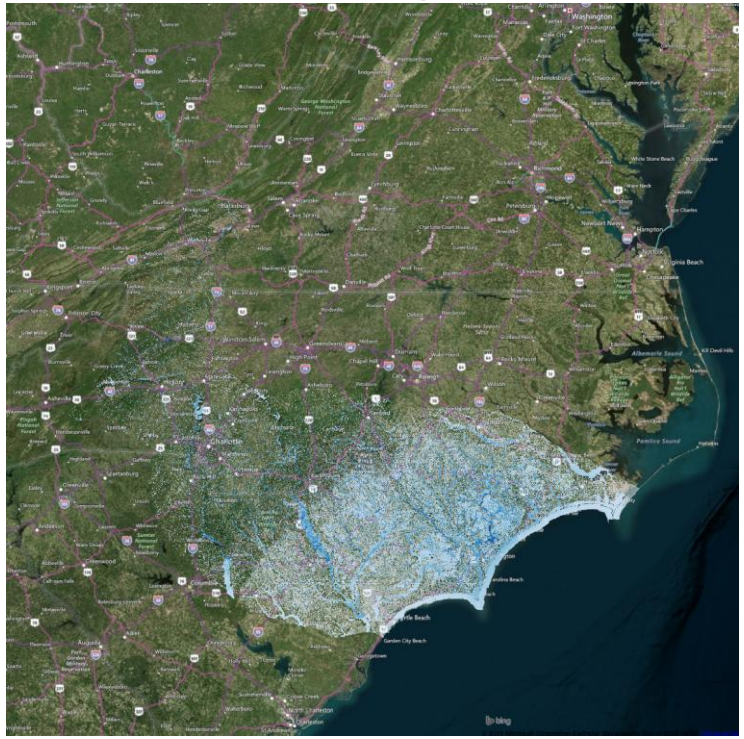
Hurricane Florence

4 Days before landfall, using only forecasted precipitation from Sept 14th

Precipitation



Food Depths



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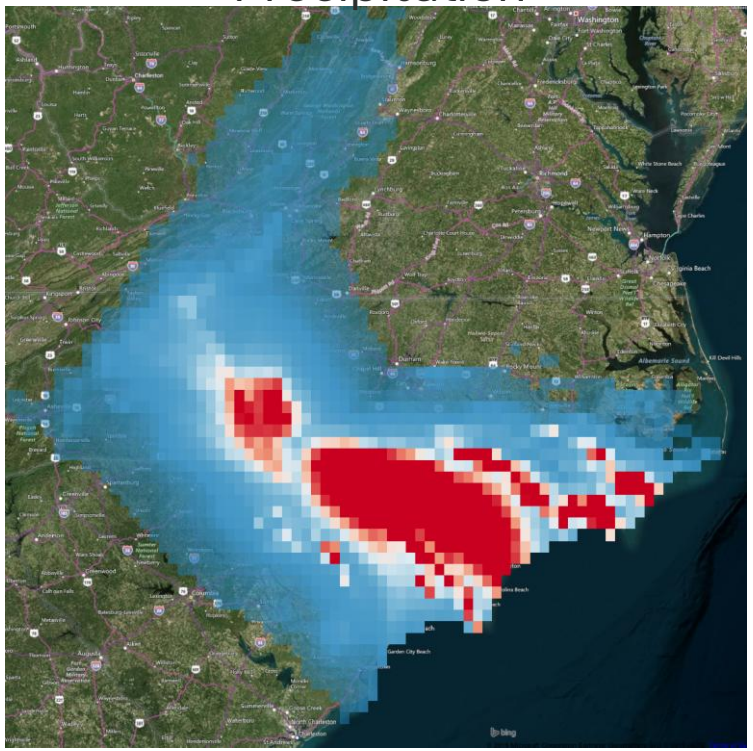
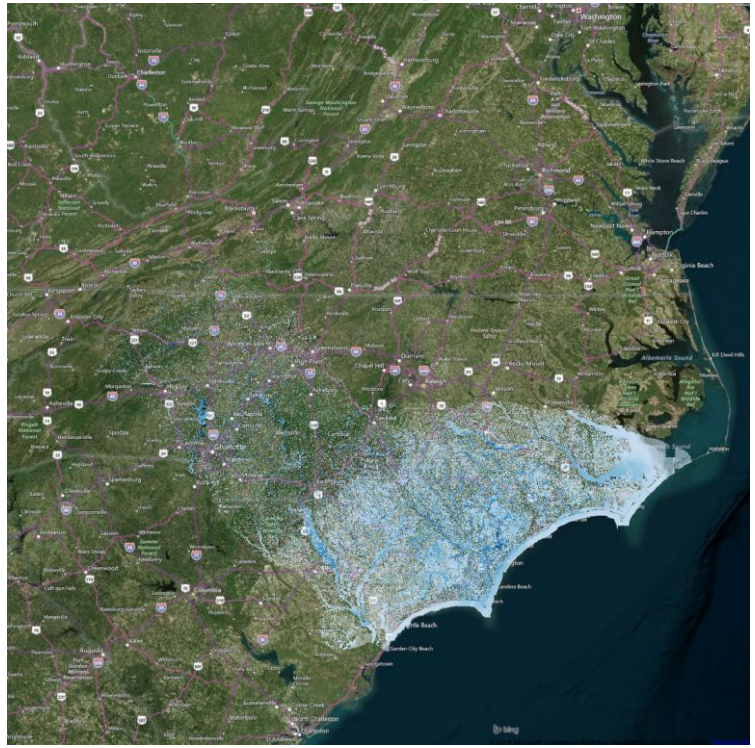
Hurricane Florence

2 Days before landfall, using only forecasted precipitation from Sept 16th

Precipitation



Food Depths



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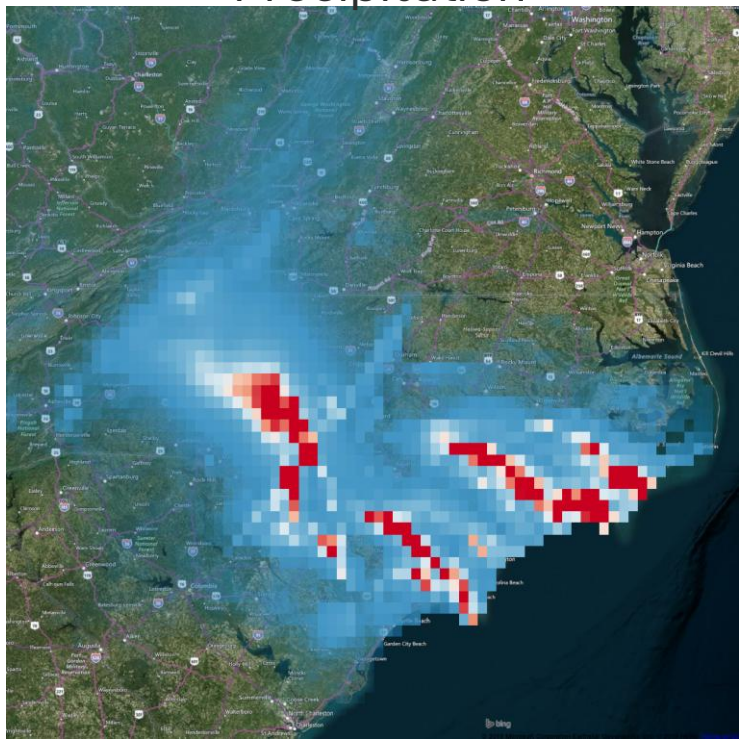
Hurricane Florence

Post landfall

Precipitation



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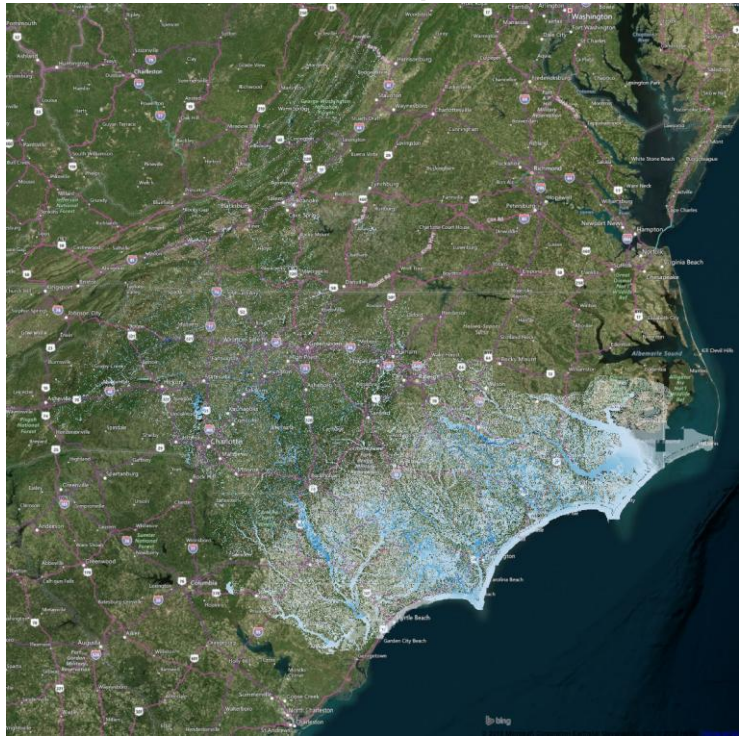

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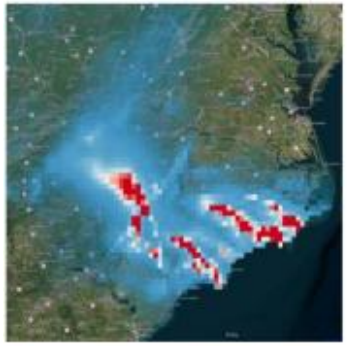
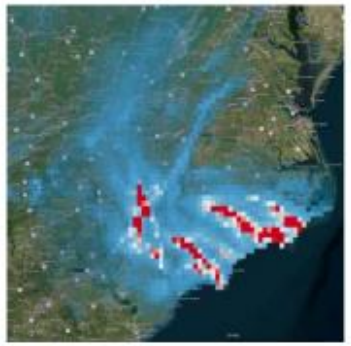
Risk Identification


4 Days Before
% Effected TIV: 0.56%
GU/Effected TIV: 0.019


2 Days Before
% Effected TIV: 0.73%
GU/Effected TIV: 0.023




1 Day Before
% Effected TIV: 0.58%
GU/Effected TIV: 0.010




Post Event
% Effected TIV: 0.66%
GU/Effected TIV: 0.099

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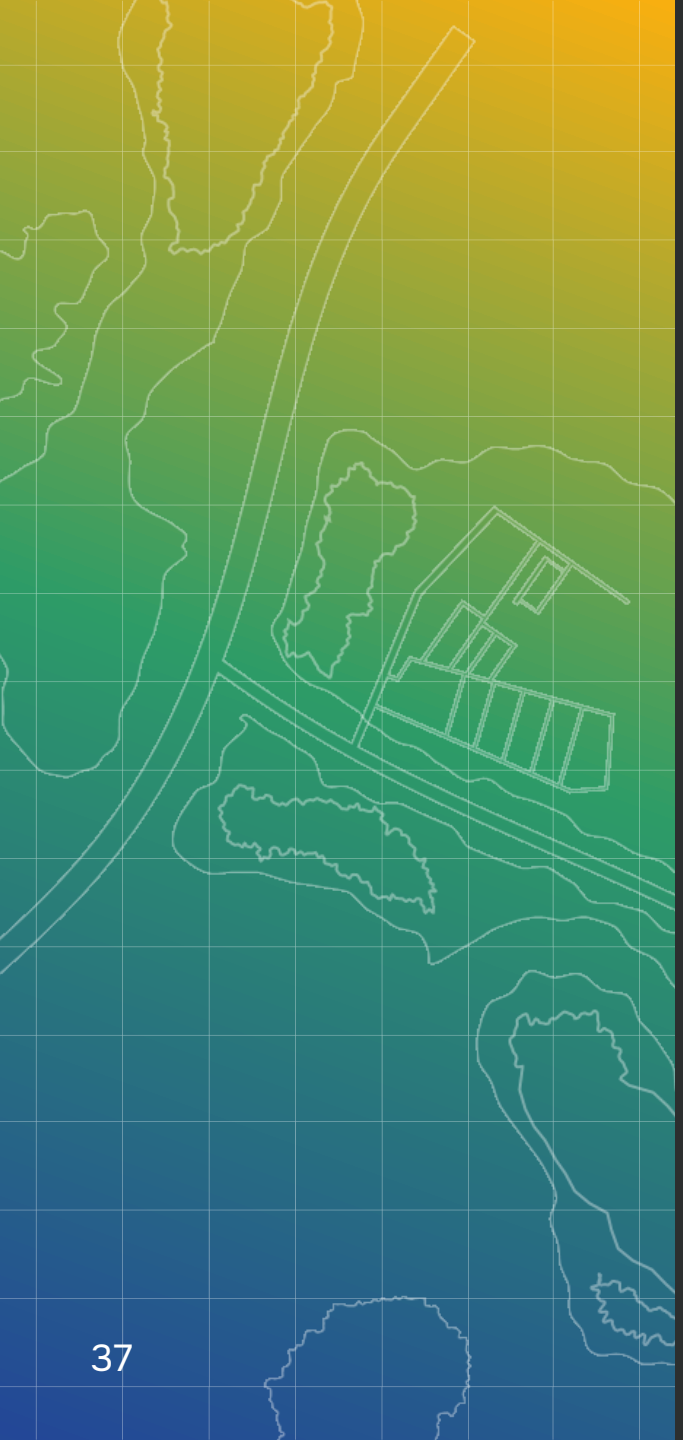
Risk Mitigation

- Defend those areas for which any risk is intolerable
- Utilize the risk identification tools to determine Levee heights and design standards for Dams



04 Questions?

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Contact Information

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Austin, TX

https://www.katrisk.com/