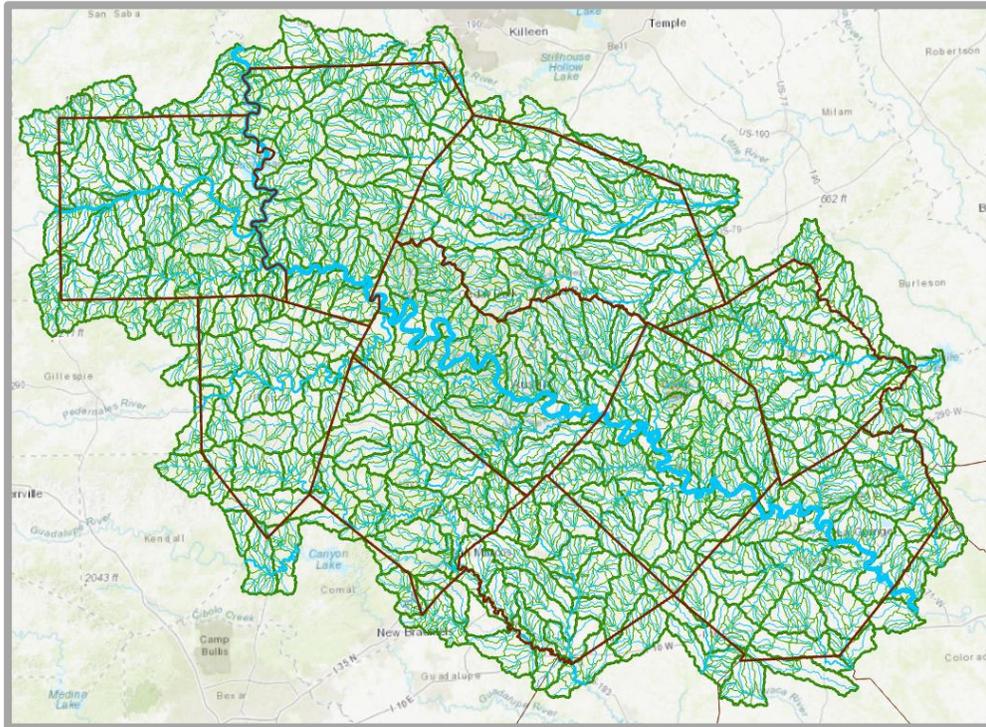


# Economic Resilience from Flooding

Craig Eissler, GIS Program Manager

Flood Risk Management: Initiative



**Austin American-Statesman**  
Saturday, January 5, 2019

BELOW: San Antonio firefighters Fernando Gutierrez, left, and Lt. Doug Wood search a flooded neighborhood in Kleinfelder on Oct. 16. (LAV JAMES/AMERICAN-STATESMAN)

ABOVE: Steve Ray Vaughan's statue at Lady Bird Lake sports a life vest in October in anticipation of flooding in the area. (MICHAEL S. BRAZZELL/AMERICAN-STATESMAN)

## RAINFALL IN 2018 MADE HISTORY

By Mary Huber  
mhuber@statesman.com

From drought to floods to powerful hailstorms, 2018 was a remarkable year in Texas weather. In particular, meteorologists agree that the torrential September and October rainfall in Central Texas, which caused unprecedented flooding along the Colorado River, will go down as the state's most notable weather event last year. It was a story that dominated news headlines for at least two weeks in October, when flooding rains caused Lake Travis to swell to near-record levels. The water got so muddy that treatment plants weren't able to filter it quick enough, prompting a six-day boil water notice for Austin Water customers, the first in its history. In total, 11.7 inches of rain fell in the Austin area in September and October, making that two-month period the seventh-wettest ever recorded in the city. "The most unusual contributing factor was the record number of named storms in the east Pacific," state climatologist John Nielsen-Gammon said. "Texas tends to think of all our hurricane weather coming from the Atlantic Ocean, but a lot of the storms in the east Pacific make landfall in Texas and contribute to rainfall in our state." September and October were the fourth- and third-wettest months on record in the state, respectively. See WEATHER, A6

**Austin's remarkable year in weather**  
The torrential September and October rainfall that caused unprecedented flooding along the Colorado River will go down as the most notable weather event to occur last year. For at least two weeks in October, flooding caused Lake Travis to swell to historic levels, and the muddy floodwaters overwhelmed Austin's treatment plants.

Daily temperatures at Camp Mabey

Month	High	Low	Record High	Record Low	Daily Record Range (inches)
Jan	68	42	87	13	0.00
Feb	72	45	91	16	0.00
Mar	78	50	97	21	0.00
Apr	84	55	103	26	0.00
May	90	60	109	31	0.00
Jun	96	65	115	36	0.00
Jul	102	70	121	41	0.00
Aug	108	75	127	46	0.00
Sep	114	80	133	51	11.7
Oct	110	76	129	47	11.7
Nov	104	70	123	41	0.00
Dec	98	64	117	35	0.00

## Disaster Resiliency & Recovery in the Texas Capital Area

The Economic Impact and Local Response to the 2015 Memorial Day Disaster Event

*Thousands of miles of streams crisscross the CAPCOG region's watersheds creating the potential for flooding almost everywhere!*

*CAPCOG has some expertise in this area!*



# What is a Floodplain?

There is **NOT** just **ONE** Floodplain!

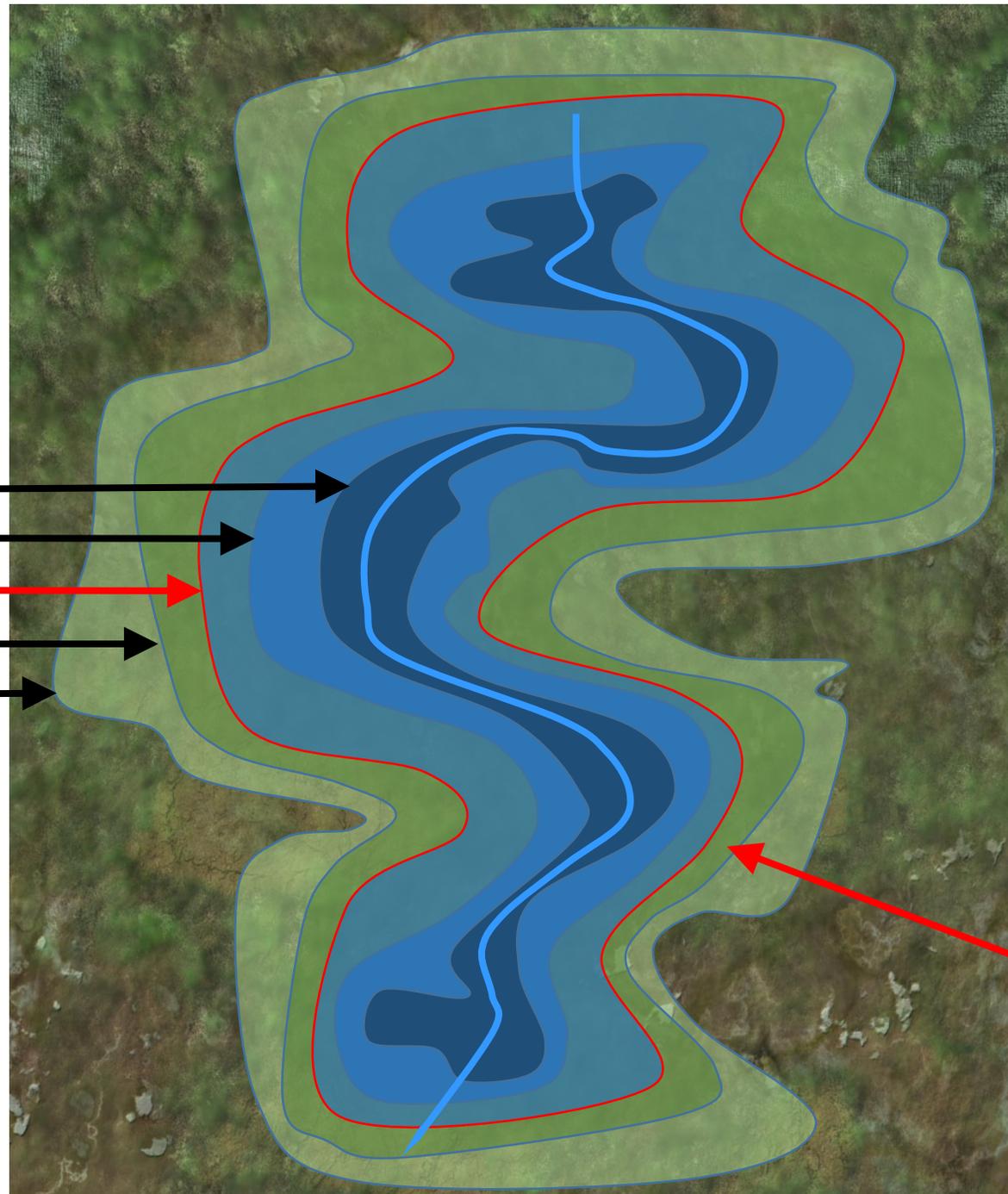
Floodplains are pervasive, widespread, often inescapable; **NOT** defined by one single discrete area

10-yr  
100-yr  
500-yr

These flood zones are referred to as Probabilistic Scenarios, Return Periods, Recurrence Intervals, or Frequencies

And the 100-yr Flood is often referred to as the:

- **1% Annual Chance Flood**
- **Base Flood**
- **Special Flood Hazard Area**
- **A, AE, etc. Zones**



These are various Flood Scenarios!

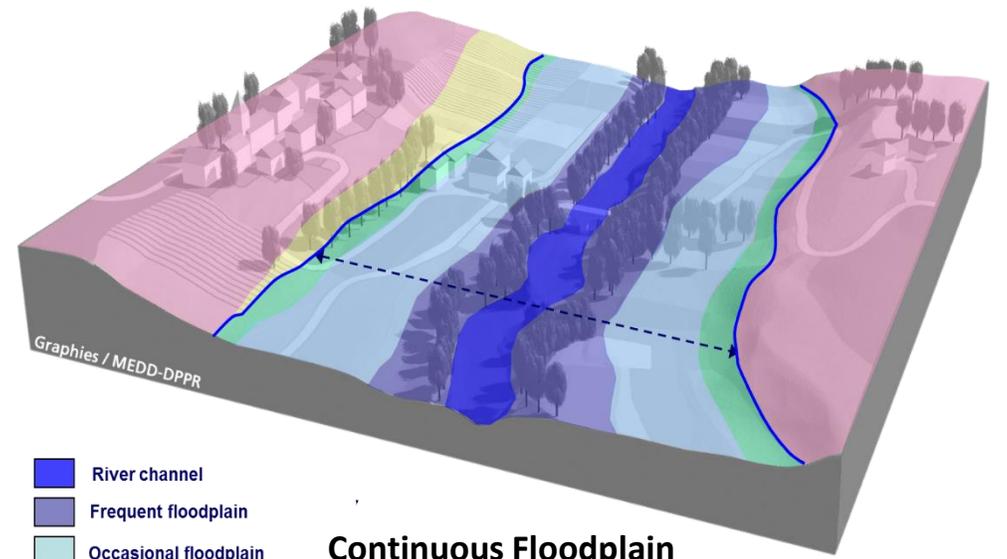
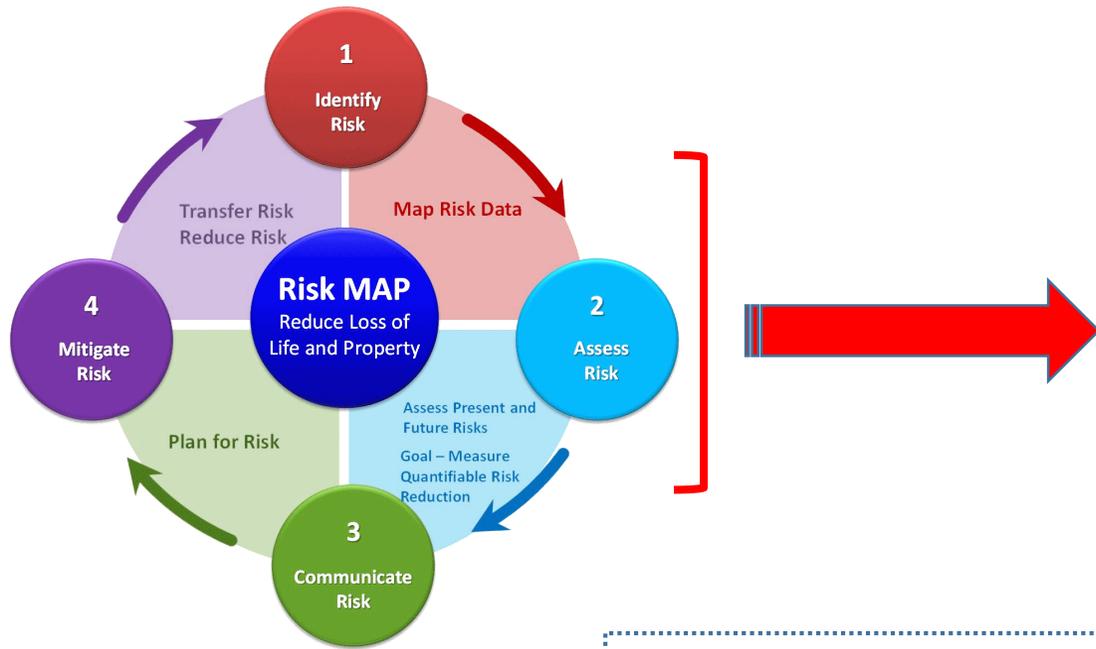
...based on various statistical analyses

...defined by Flood Zones on a map

...which change over time

Most hydrologists suggest we would need at least 400 years of data to even begin narrowing down the margin of error (uncertainty) of these flood scenarios

Note that these map examples only reveal flood scenario boundaries; yet other flood data may ALSO reveal **flood depths** w/in those boundaries

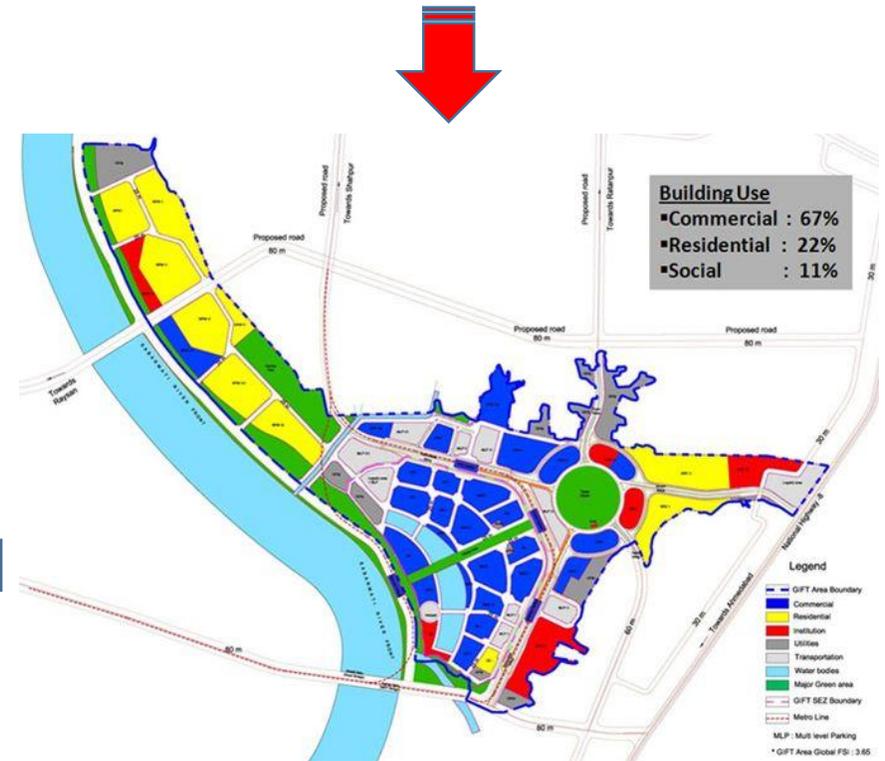


- River channel
- Frequent floodplain
- Occasional floodplain
- Exceptional floodplain

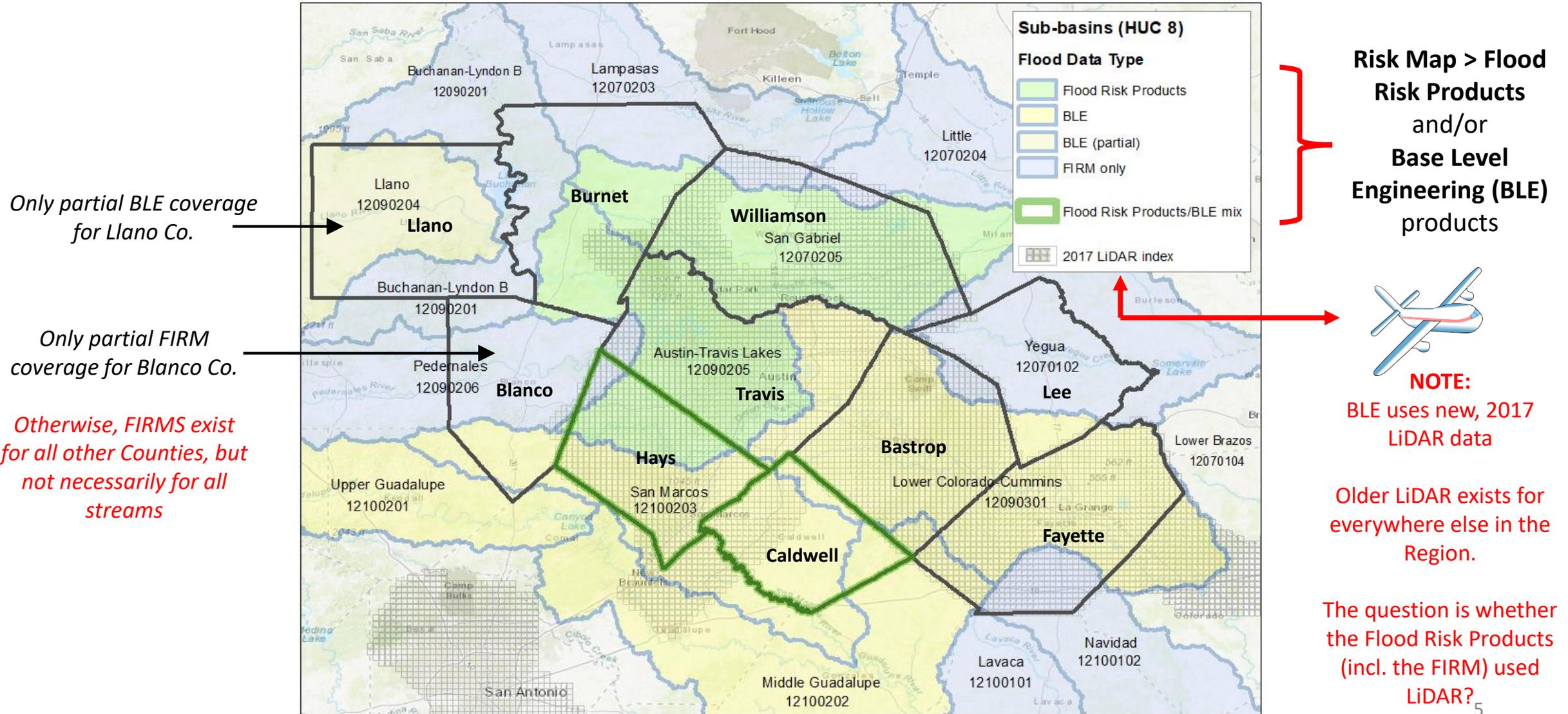
### Continuous Floodplain

Flood zones HGM

## Economic Resilience from Flooding CYCLE



# CAPCOG Regional Map of Watersheds (Sub-basins; HUC 8) and some Additional/Best Available Flood Data



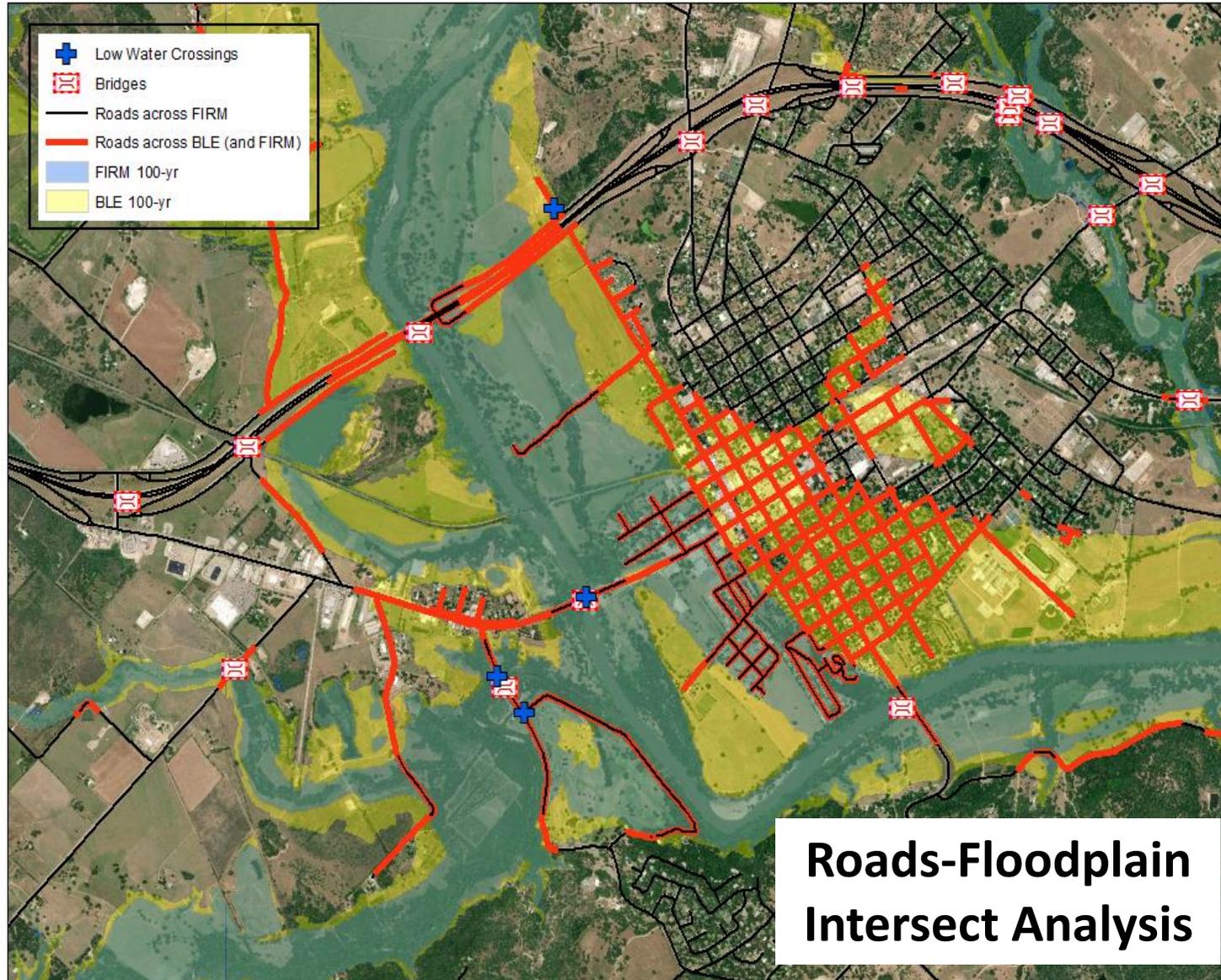
Only partial BLE coverage for Llano Co.

Only partial FIRM coverage for Blanco Co.

Otherwise, FIRMS exist for all other Counties, but not necessarily for all streams

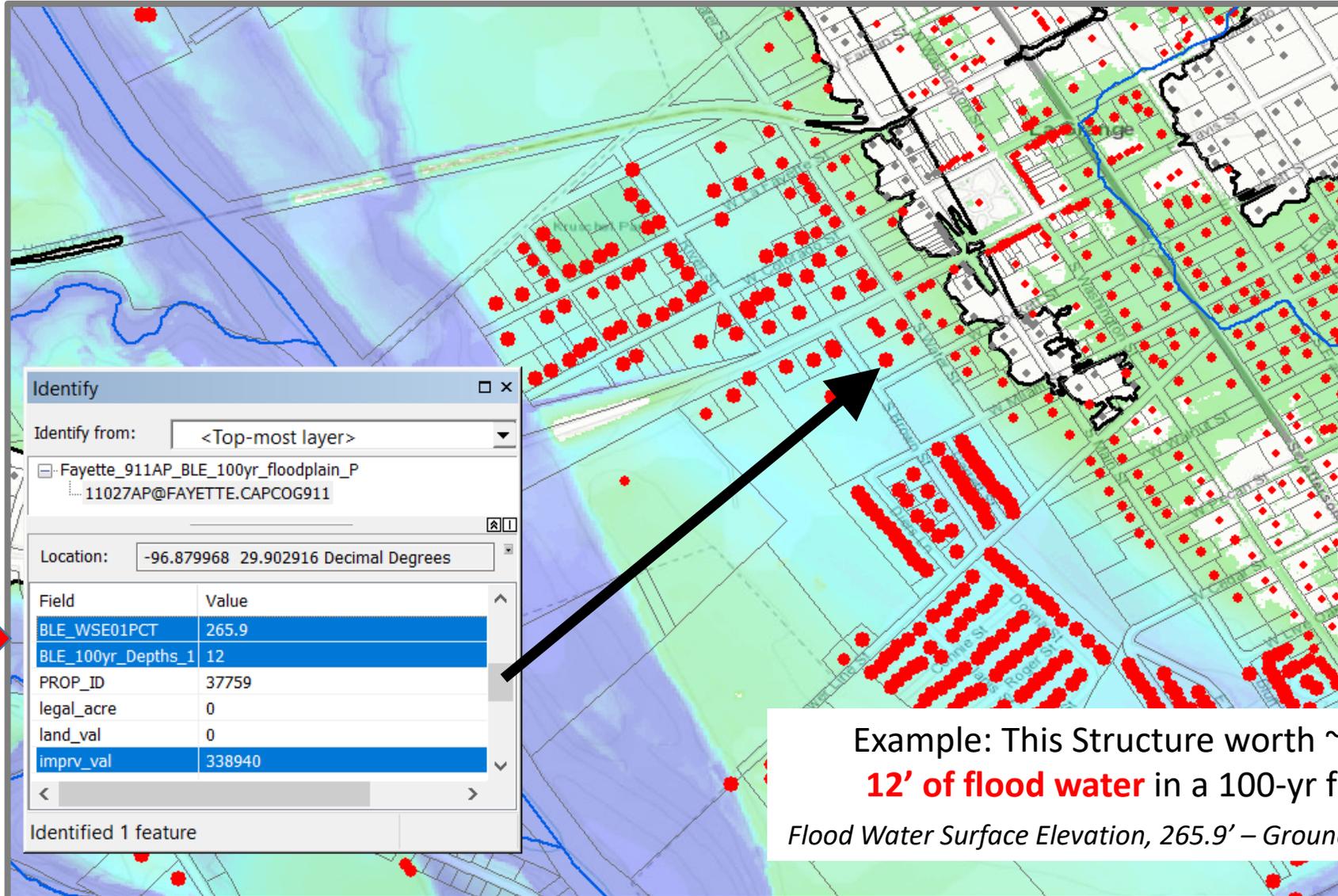
# Additional/Best available sources

Flood Data source = Base Level Engineering (BLE)



# Flood Depth data from Additional/Best available sources

Flood Data source = Base Level Engineering (BLE)



Example: This Structure worth ~\$338,000 is in **12' of flood water** in a 100-yr flood scenario  
*Flood Water Surface Elevation, 265.9' – Ground Elevation, 253.9' = 12'*

# Asset Exposure & Estimated Economic Loss Analysis

Parcel ID: 1234

Improvement (Structure) Value .....▶  
[\$338,000] *Technically, the 'Replacement' Value  
would be more meaningful*



Flood Depth  
[12 Ft.]

Asset  
Exposure



*Not Actual Data*  
 Economic Loss  
Estimation  
[\$220,000]

*Hazus is a nationally applicable standardized methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes. Hazus uses Geographic Information Systems (GIS) technology to estimate physical, economic, and social impacts of disasters.*

*Other information about this Parcel-Structure could be useful like previous Claims/Losses, etc.*

# Estimated Economic Losses (Flood Impact)

[Using HAZUS]

in various **business-economic** categories by various **building-occupancy** types

## Level 1 Results: Aggregated by **Census Blocks**

HAZUS comes packaged with aggregated inventory (buildings, and more) at the Census Block level...

	TotalLoss	BuildingLoss	ContentsLoss	InventoryLoss	RelocationC
3	0	0	0	0	0
4	32	21	11	0	0
5	18	12	6	0	0
6	323	207	116	0	0
7	0	0	0	0	0
8	0	0	0	0	0
9	268	172	96	0	0
10	0	0	0	0	0
11	8	5	3	0	0
12	0	0	0	0	0
13	0	0	0	0	0
14	1	1	0	0	0
15	0	0	0	0	0

Table 6: **Building-Related Economic Loss Estimates**  
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<b>Building Loss</b>						
	Building	8.04	1.30	0.19	0.44	9.97
	Content	5.23	4.15	0.46	1.82	11.66
	Inventory	0.00	0.08	0.10	0.01	0.19
	<b>Subtotal</b>	<b>13.27</b>	<b>5.53</b>	<b>0.75</b>	<b>2.27</b>	<b>21.82</b>
<b>Business Interruption</b>						
	Income	0.00	0.02	0.00	0.00	0.02
	Relocation	0.00	0.00	0.00	0.00	0.01
	Rental Income	0.00	0.00	0.00	0.00	0.00
	Wage	0.00	0.02	0.00	0.17	0.19
	<b>Subtotal</b>	<b>0.01</b>	<b>0.03</b>	<b>0.00</b>	<b>0.17</b>	<b>0.22</b>
<b>ALL</b>	<b>Total</b>	<b>13.28</b>	<b>5.56</b>	<b>0.75</b>	<b>2.45</b>	<b>22.04</b>

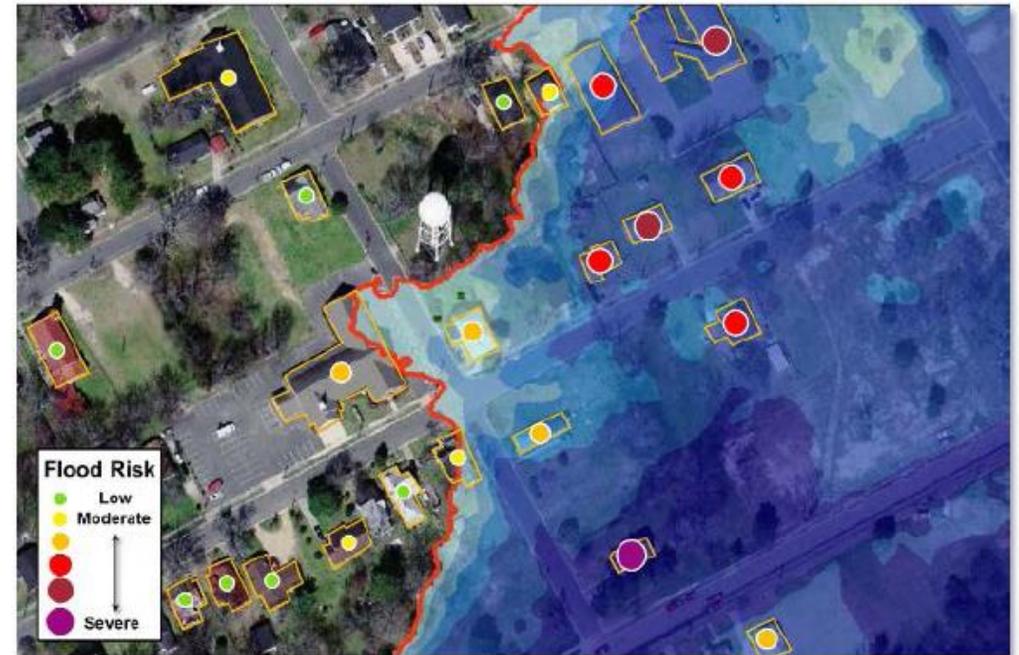
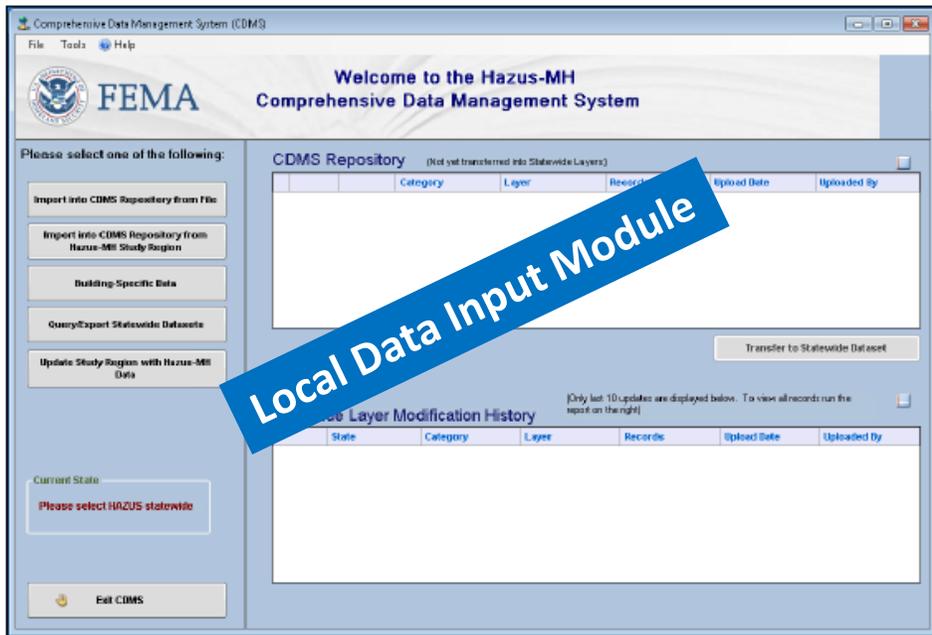
**NOTE:** And of course there are **map** results as well!  
(see next Slide for example)

...HAZUS comes packaged with aggregated inventory (buildings, and more) at the Census Block level. ...However, using better 'local inventory data' [AND/OR] better 'flood data', you may improve the results!

And you can do this by updating the aggregated data at the Census Block level [AND/OR] by adding Site-specific data directly for those locations (i.e. Address Points)

### Level 2 Results: by Site-specific location

Figure 10-1: Hazus Comprehensive Data Management System



**NOTE:** And of course there are **table** and **report** results as well!  
(see previous Slide for example)

Unfortunately, one in four flooded businesses stays this way.



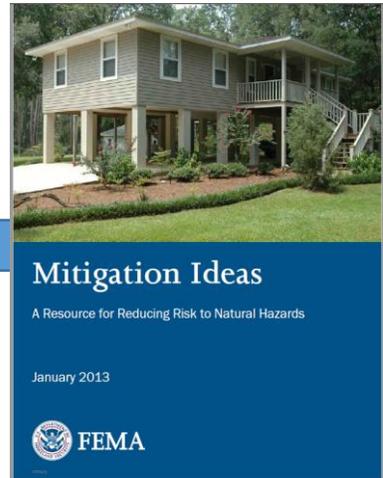
Protect your business with flood insurance. Did you know that just a couple inches of floodwater can cause tens of thousands of dollars in damages to your business? Are you prepared?



Only Flood Insurance Covers Floods

# The key to avoided losses and economic resiliency is **mitigation!**

Don't be this business



Mitigation Ideas  
A Resource for Reducing Risk to Natural Hazards  
January 2013  
FEMA



Be this instead!



## **Economic Resilience from Flooding**

Craig Eissler, GIS Program Manager

Flood Risk Management: Initiative

512-916-6184  
ceissler@capcog.org