

NOTE: We would like to record this meeting and make it available to others that were not able to attend or if you would like to review its content later. Please raise concerns or objections.

Southeast Texas Hurricane Evacuation Study

Evacuation Zone Workshop for Jefferson, Hardin, Orange, Newton, and Jasper

April 1, 2024



Welcome and Introductions:

- US Army Corps of Engineers: Galveston District
 - Kyle Donlevy
- FEMA, Region 6
 - Arianne Thomas
- Texas Department of Emergency Management
 - Blake White & Carman Apple
- Texas A&M Hazard Reduction and Recovery Center & Texas A&M Transportation Institute
 - Walt Peacock, David Bierling, Doug Wunneburger, Darrell Borchardt, & Alexander Abuabara
- Local government and stakeholder
 - **Please make sure to put your name, organization, county, and contact information on the attendance sheet.**

AGENDA: Southeast Texas HES Evacuation Zone Workshop for Jefferson, Hardin, Orange, Newton, and Jasper Counties

1. Introductions

- USACE, FEMA, TDEM, TAMU
- Participants

2. Overview of the Hurricane Evacuation Study (HES) Process

3. Goals for the Day

- General agreement on guidelines and naming conventions
- Getting as close as can to a set of evacuation/risk zones
- Some degree of consistency among county zones.

4. Review workshop Materials

- HES planning Atlas
- Maps and County Packets

5. Lunch (~11:30am-1:00pm)

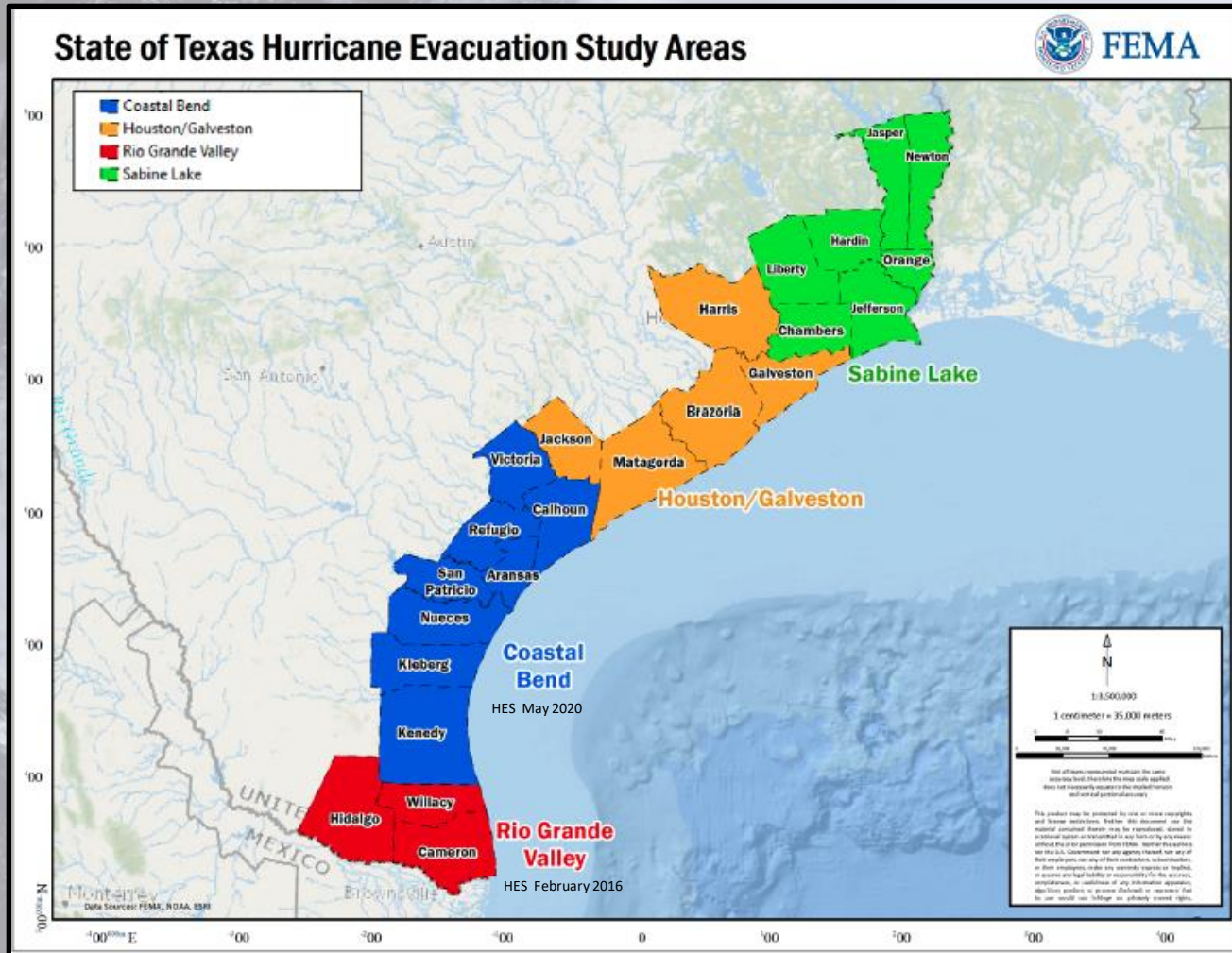
6. Working group or groups

- Decide if one or more working Groups
 - If more than one: Elect spokesperson/scribe
 - Review data, maps, make recommendations
- Seek consistency with adjacent counties

7. working group reports

- Summary of findings and zone changes/modifications or development
- Issues yet to be resolved
- Plans for moving forward

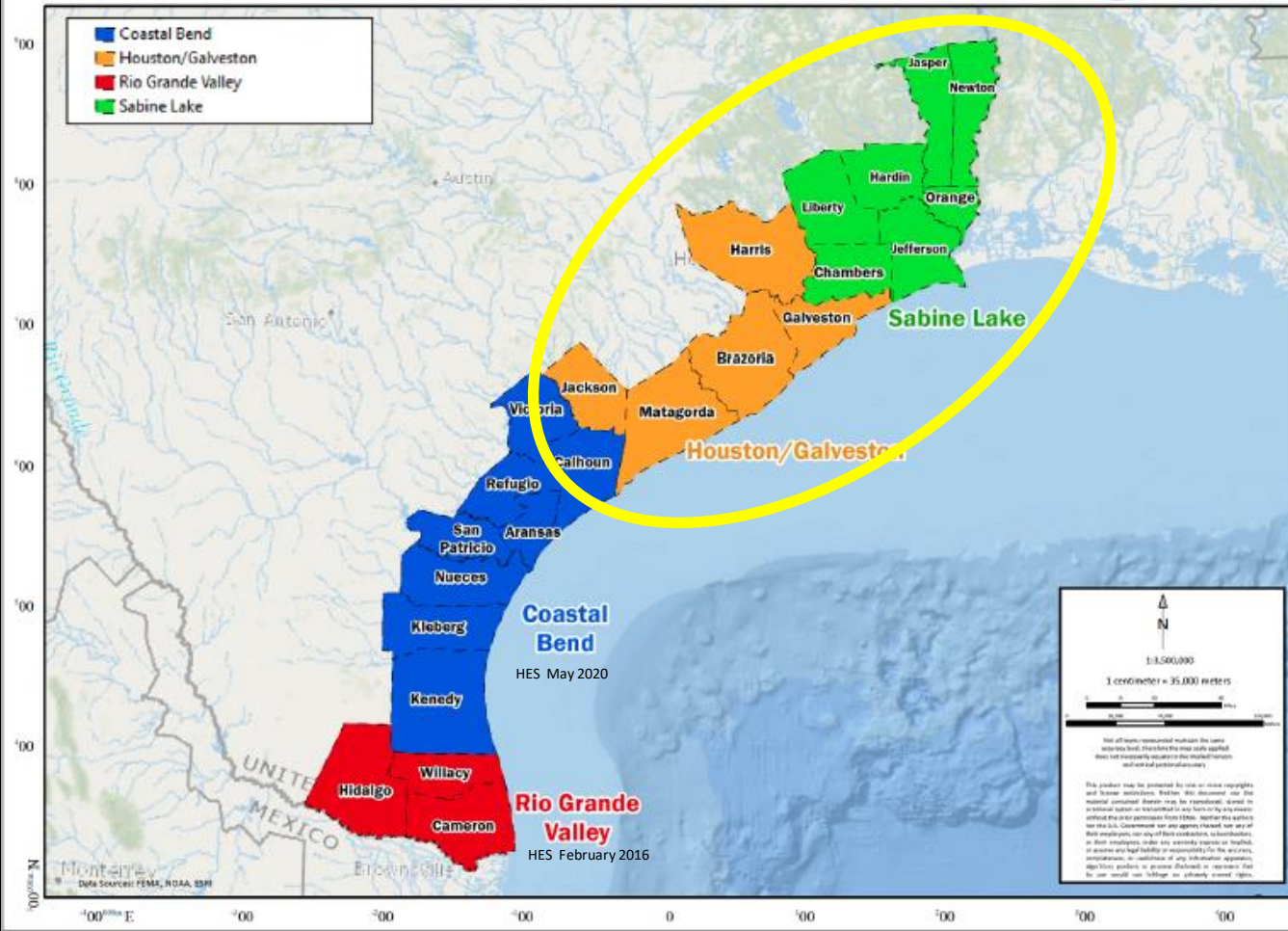
Overview of HES Re-Study for Southeast Texas



- Texas traditionally had 4 HES areas
 - Sabine Lake, Houston/Galveston, Coastal Bend, and Rio Grande Valley
- Coastal Bend HES 2020
- Rio Grande Valley HES 2016
- Lake Sabine: HES 2011
- Houston/Galveston HES 2004
 - HGAC 2011 Zip-Code based evac zones and transportation analysis

Overview of HES Re-Study for Southeast Texas

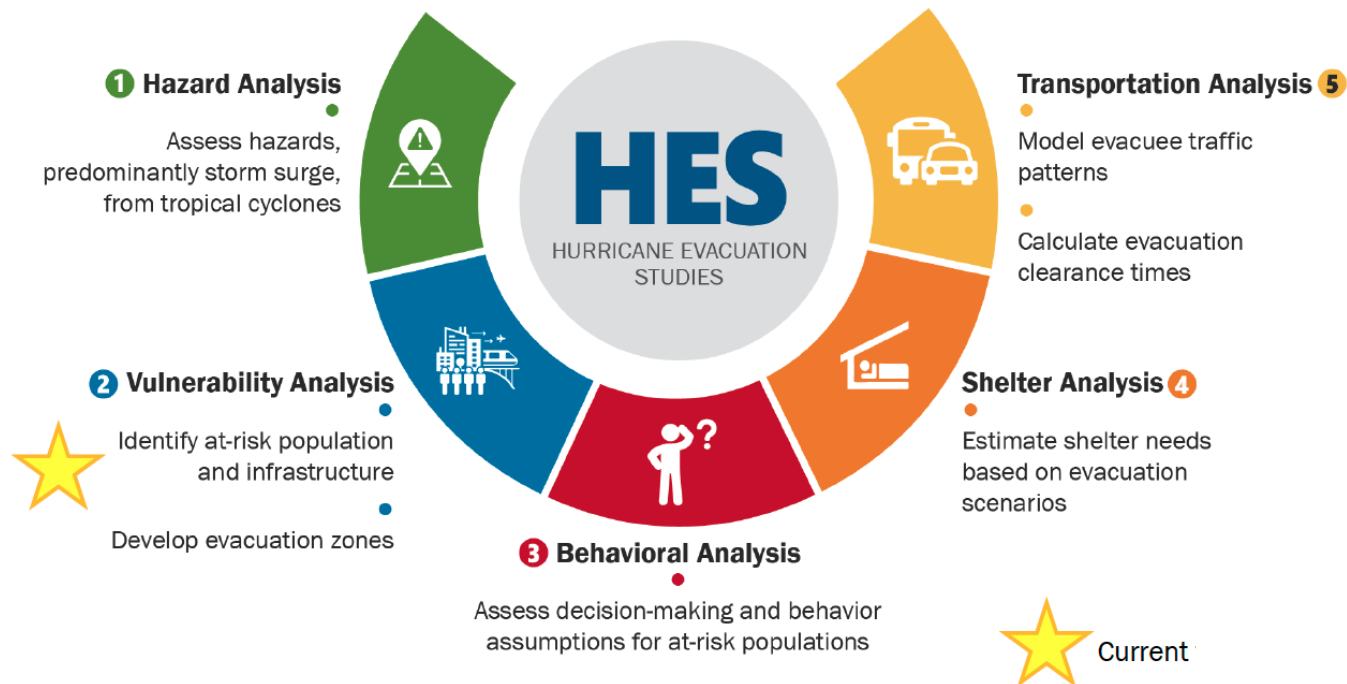
State of Texas Hurricane Evacuation Study Areas



- The NHP has combine the Houston/Galveston and Sabine Lake study areas into the **Southeast Texas HES – Re-study area.**
 - 12 highly diverse counties:
 - Population Size: 4.8 million to 12,052
 - Sq. Miles: 1,707 to 334
 - Density: 2,772 to 18.1 per mile
 - Socio-economic, demographic, economic characteristic
 - Extent and nature of hurricane hazard exposure
 - Established Hurricane risk/evacuation zones

Overview of HES Re-Study for Southeast Texas

HURRICANE EVACUATION STUDIES



- Steps in HES process:

1. Hazard Analysis: Hazard data for surge and wind has been generated, report forthcoming
2. Vulnerability Analysis: The focus of this phase
3. Behavioral Analysis
4. Shelter Analysis
5. Transportation Analysis

TBA:
Awaiting final funding.
Hopefully will begin in late summer early fall.

Overview of Vulnerability Analysis Phase



Project QR code

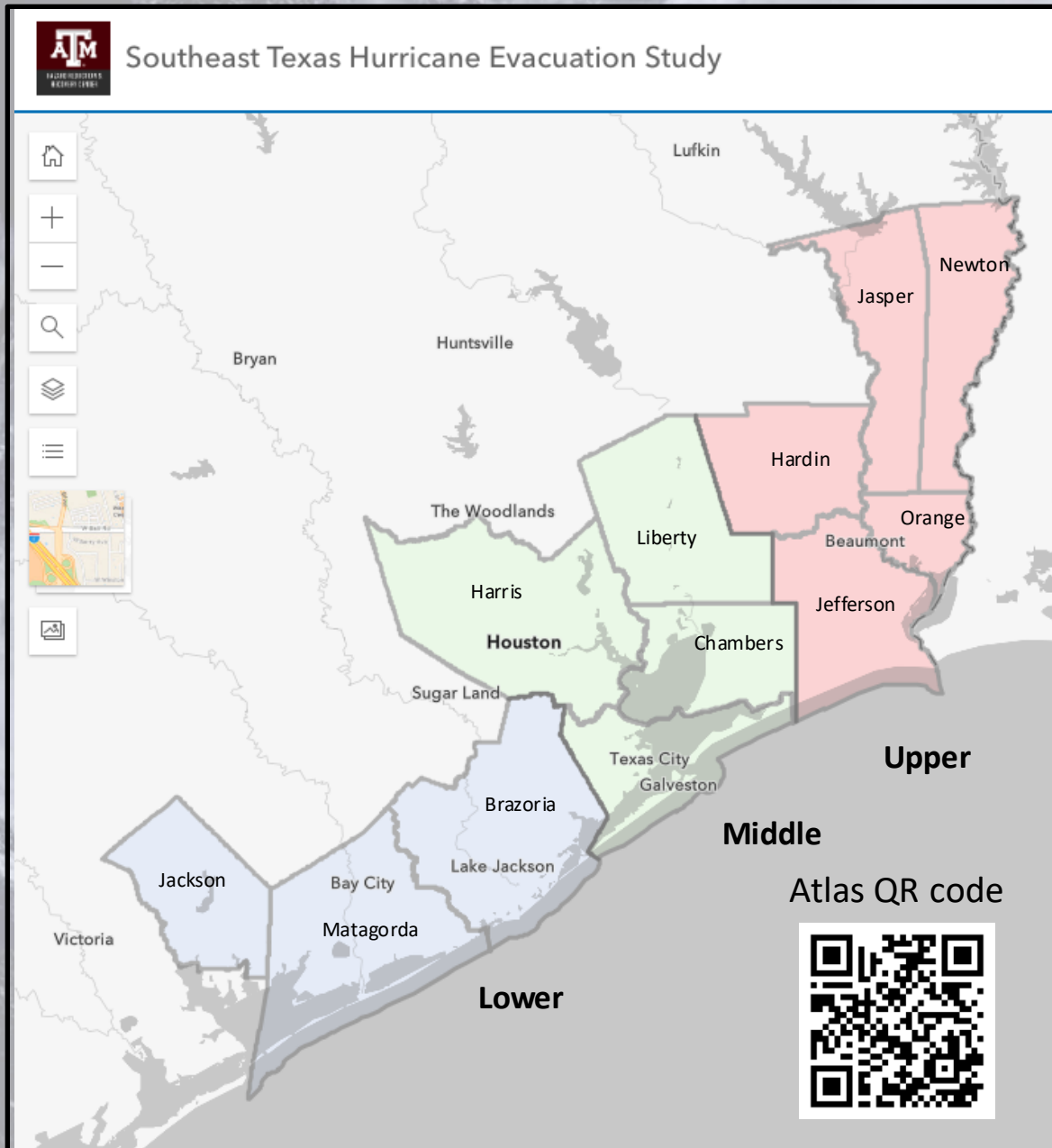
Two key components:

1. Evacuation zone assessment, modification, and development

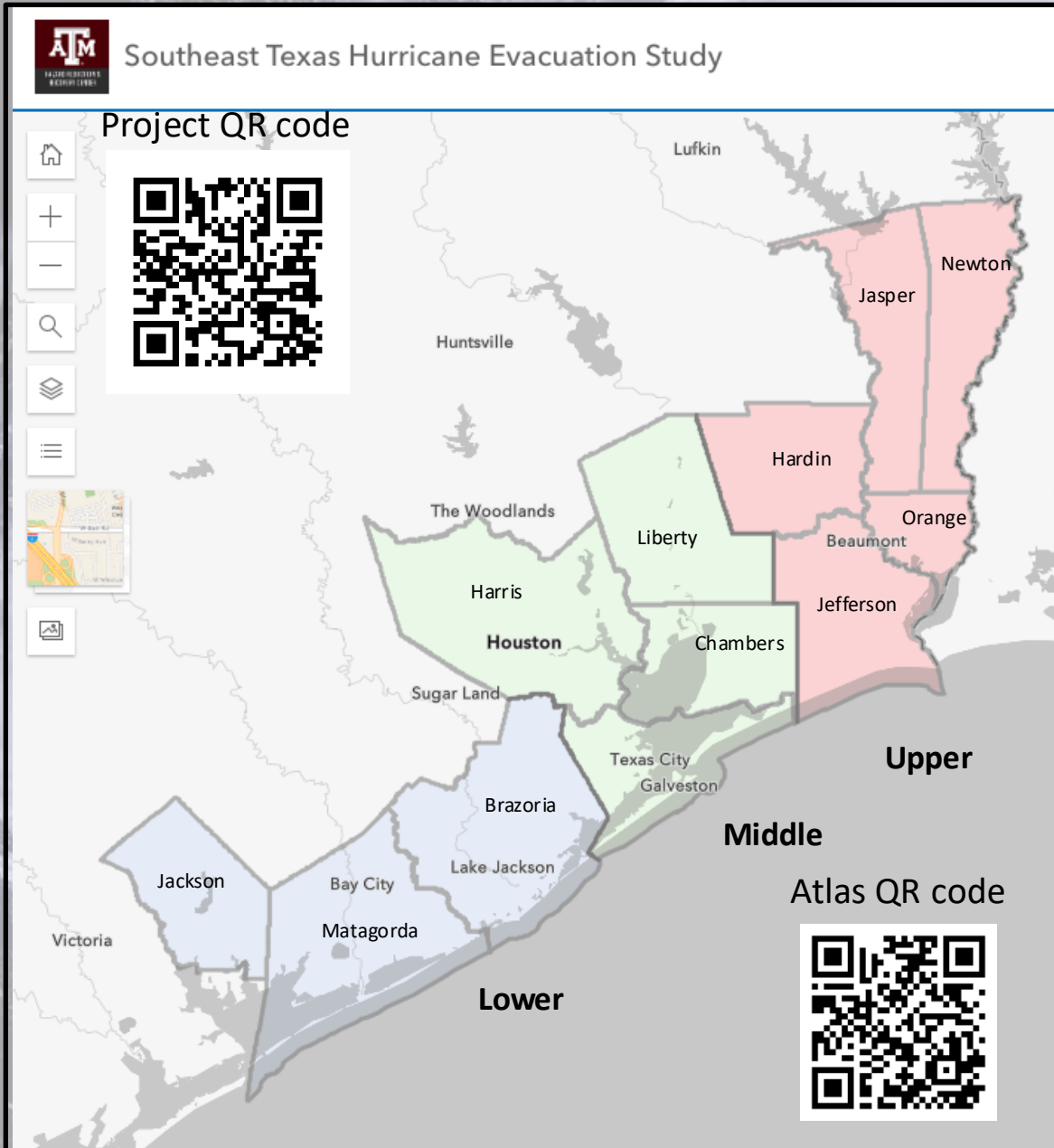
- Driven by new hazard analysis, updated population and other data, and existing evacuation zones.
- To facilitate this process and enhance meeting participation we will identify three planning zones
 - Project front Page:
 - <https://texasatlas.arch.tamu.edu>
 - “Working” GIS Website:
 - <https://texasatlas.arch.tamu.edu/hes>

2. Vulnerability Analysis

- Predicated on modified evacuation zones and hazard data.



The Purpose of this workshop...



... is to potentially develop hurricane evacuation/risk zones for **2025**

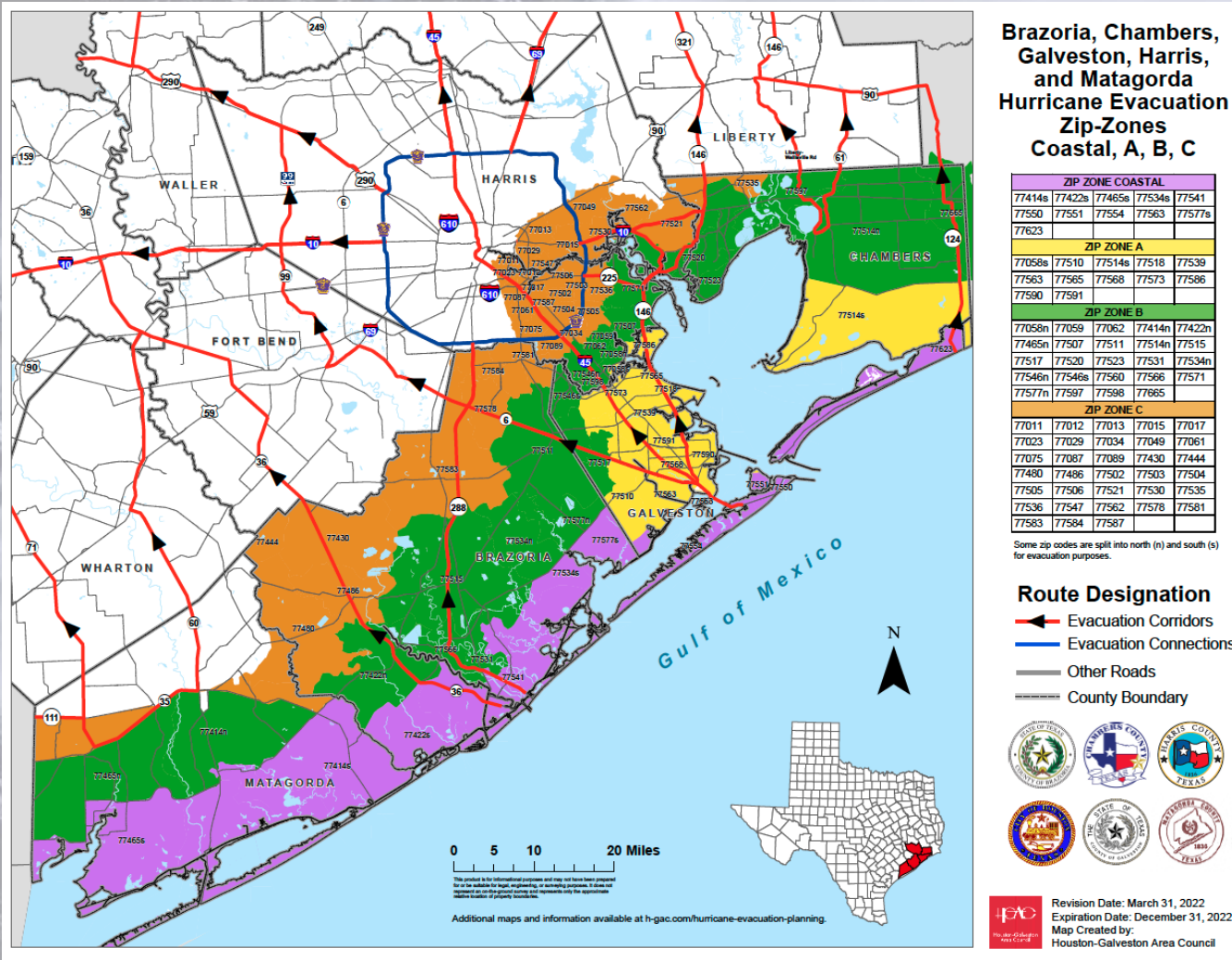
1. Our focus is on the five counties in the upper planning area:

- 5 highly diverse counties:
 - Population Size (est. July 1, 2022)
 - Jefferson: 250.8K, Orange: 84.9K, Hardin: 57.8K, Jasper: 32.4K, and Newton: 12.1K
 - Density (per sq. mile)
 - Jefferson: 287.9, Orange: 245.3, Hardin: 61.3, Jasper: 38, and Newton: 15.5
- Variations in the extent and nature of hurricane hazard exposure
- Some variations in evacuation routes and susceptibility to surge
- All similar in no "official" zones, but have been risk areas in the past under some HES and some traffic studies

Updated Situation

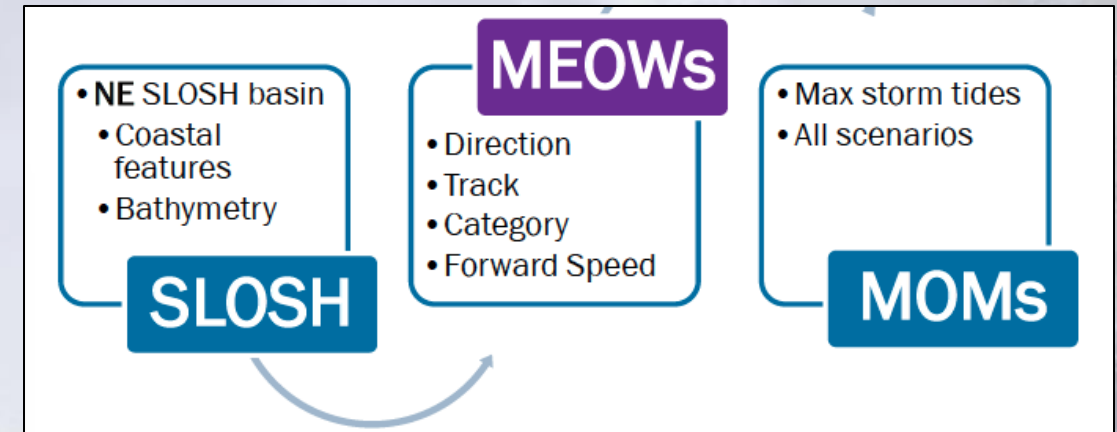
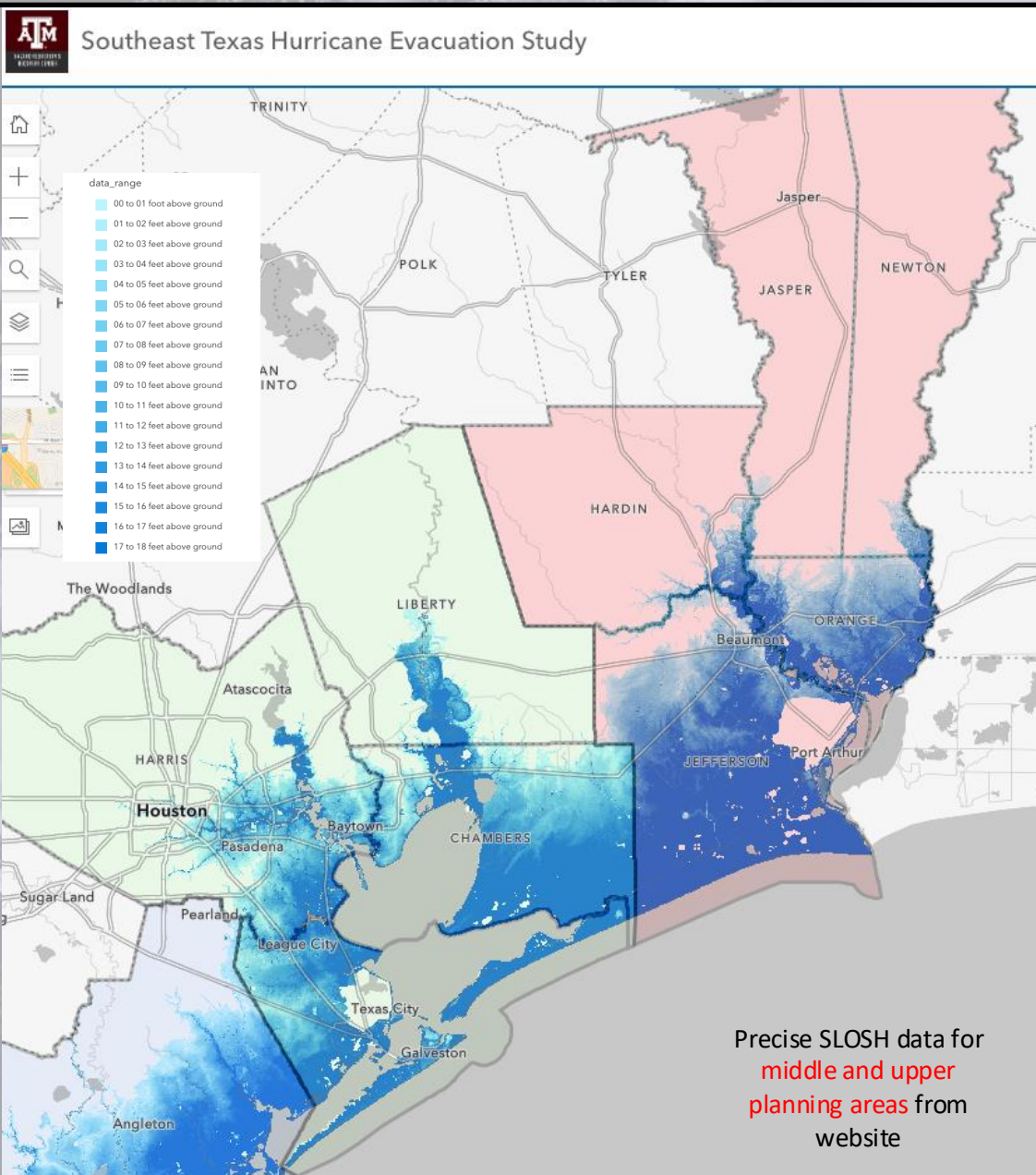
Central planning areas Counties have played off existing Hurricane Evacuation Zones, while **Liberty** developed new ones:

- Based on 2011 HGAC Study
 - Employs zip-code zones but weren't always updated and many had to be modified employing roads.
 - **Chambers and Liberty** employed roadways and other landmarks, NOT zips
- Evacuation zone naming convention: Coastal, Zone A, Zone B, and Zone C
 - In general, each successive zone from Coastal to C has declining risk
 - But this pattern does not hold in some areas where phased evacuation is an important issue.
 - Also, some places only had lettered zones, no coastal.
 - For the upper coast, phased evacuation is not a critical issue, but loss of evacuation routes is an issue...



Hazard Data: Storm Surge Modeling

Produced by NOAA
and USACE



SLOSH = Sea, Lake, and Overland Surges from Hurricanes

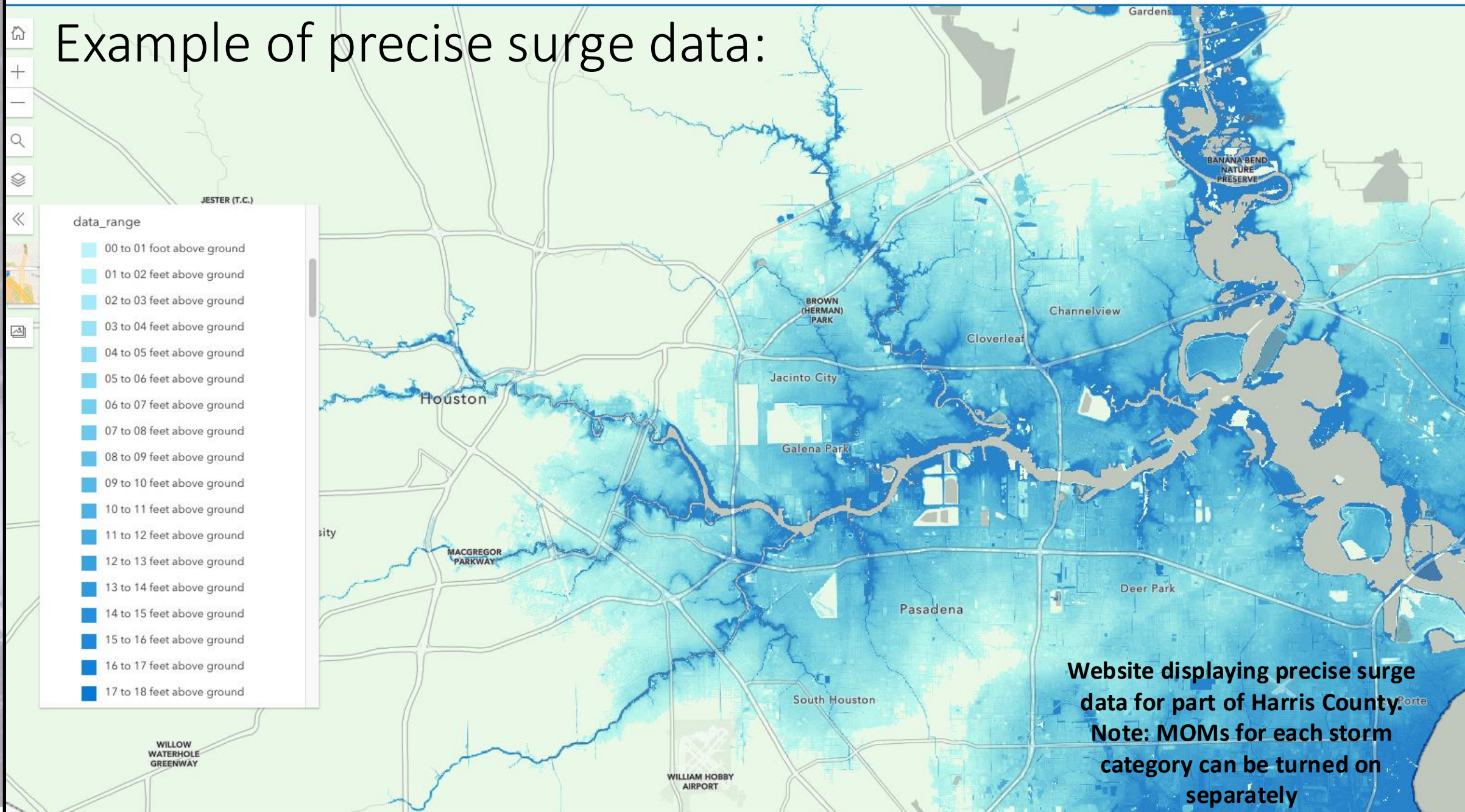
MEOW = Maximum Envelope of Water

MOM = Maximum of Maximums

Data are generated from multiple SLOSH model runs

- Total of 216 MEOWs
 - 9 directions WNW, 6 intensities & 4 forward speeds
 - Assuming High-tide
- Total of 6 MOMs generated
 - Category 1 – Category 5 storms on website
 - **Note** MEOWs are classified according to predominant storm categories generating similar surge levels, not necessarily specific wind speeds.


Example of precise surge data:




Additional MOM layers: smoothed

We also process the MOM layers seeking to even out ragged edges or boundaries between MOMs and addresses orphaned areas. In general, these data represent a conservative risk adverse, assessment and make zone development or modification less problematic.

Middle Zone








Lower Zone



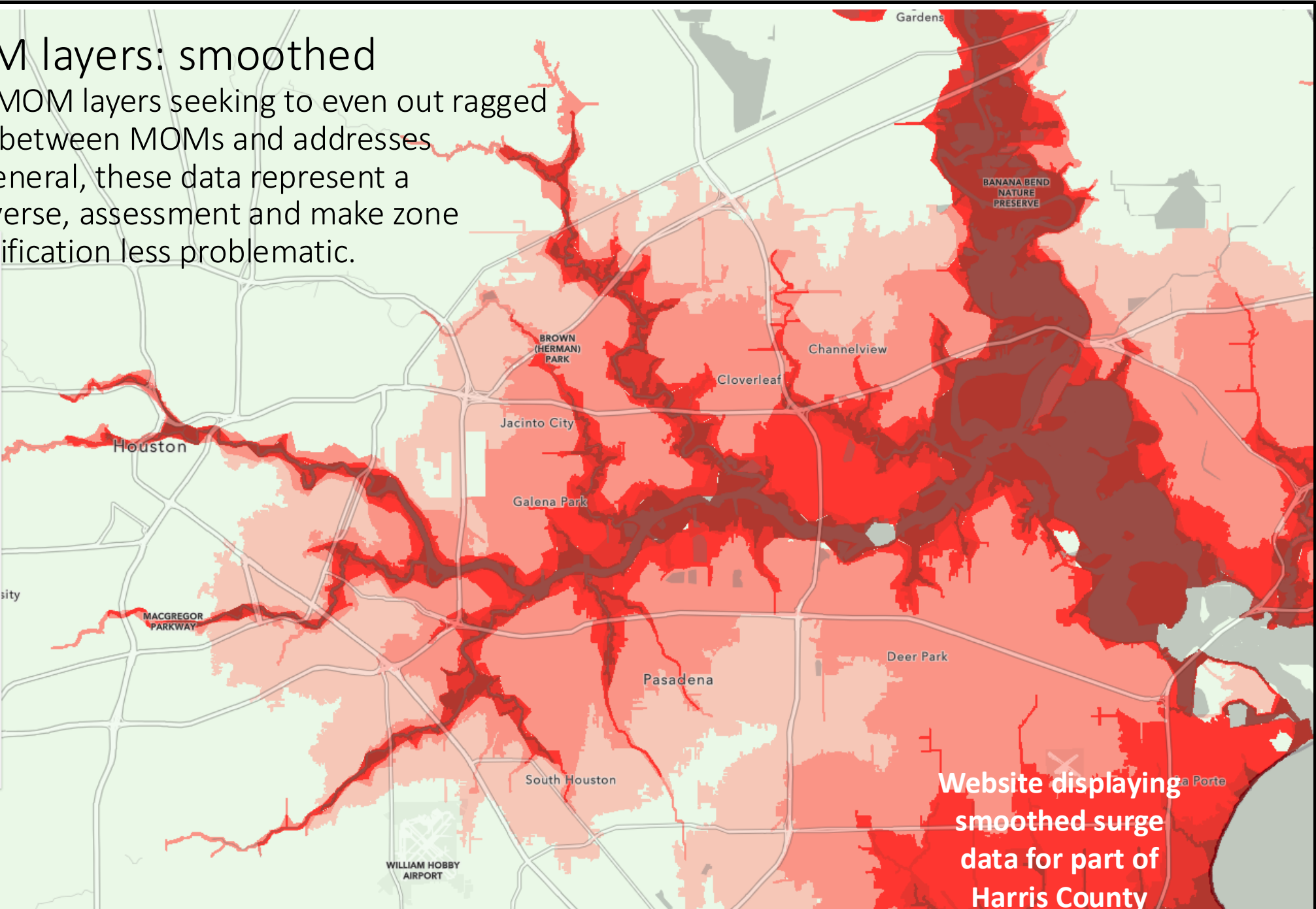
Surge Zones (Smoothed)

All Categories (1-5)

CAT

	5
	4
	3
	2
	1

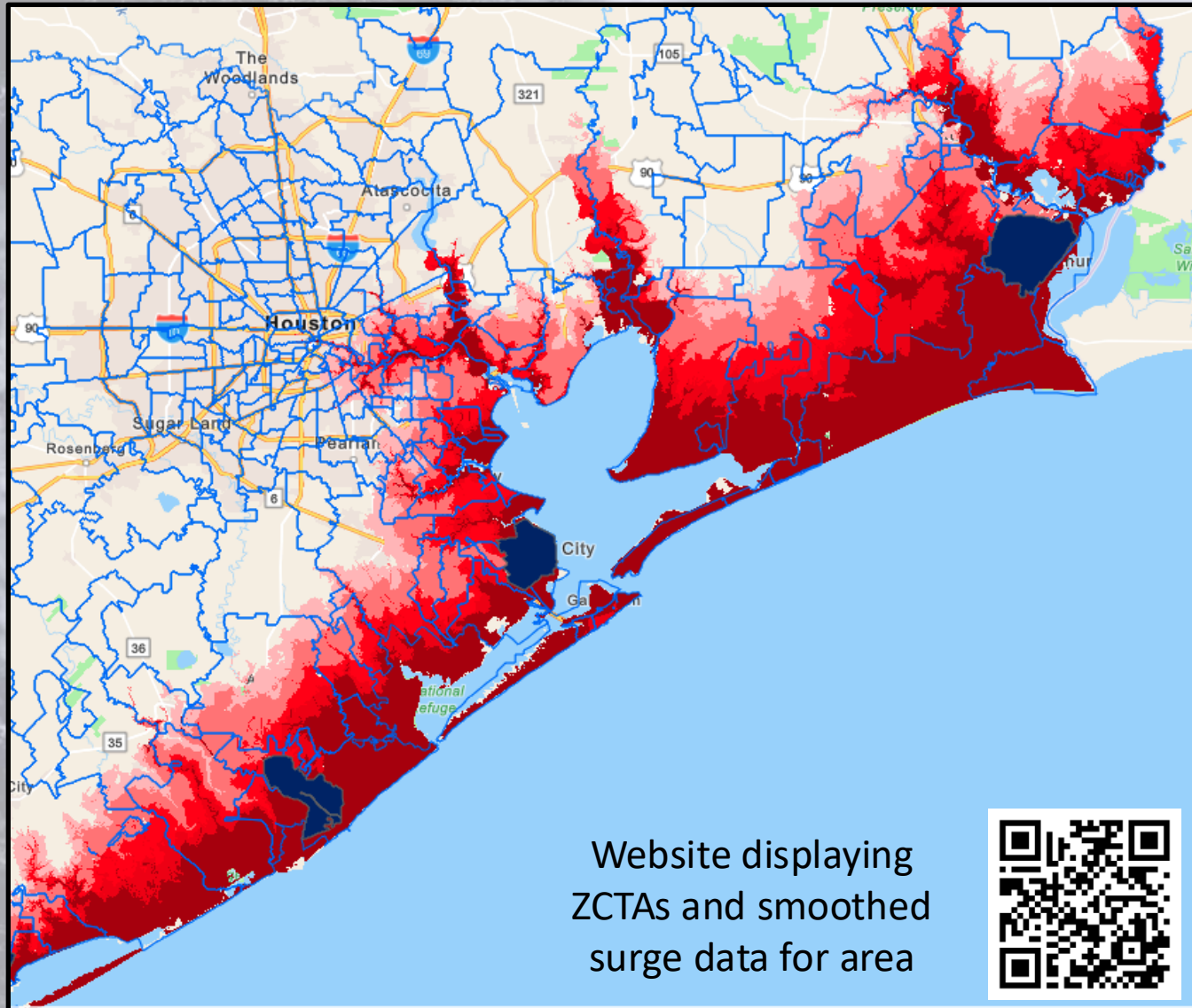
Note these can be turned on individually



Website displaying smoothed surge data for part of Harris County

Additional data:

Project QR code

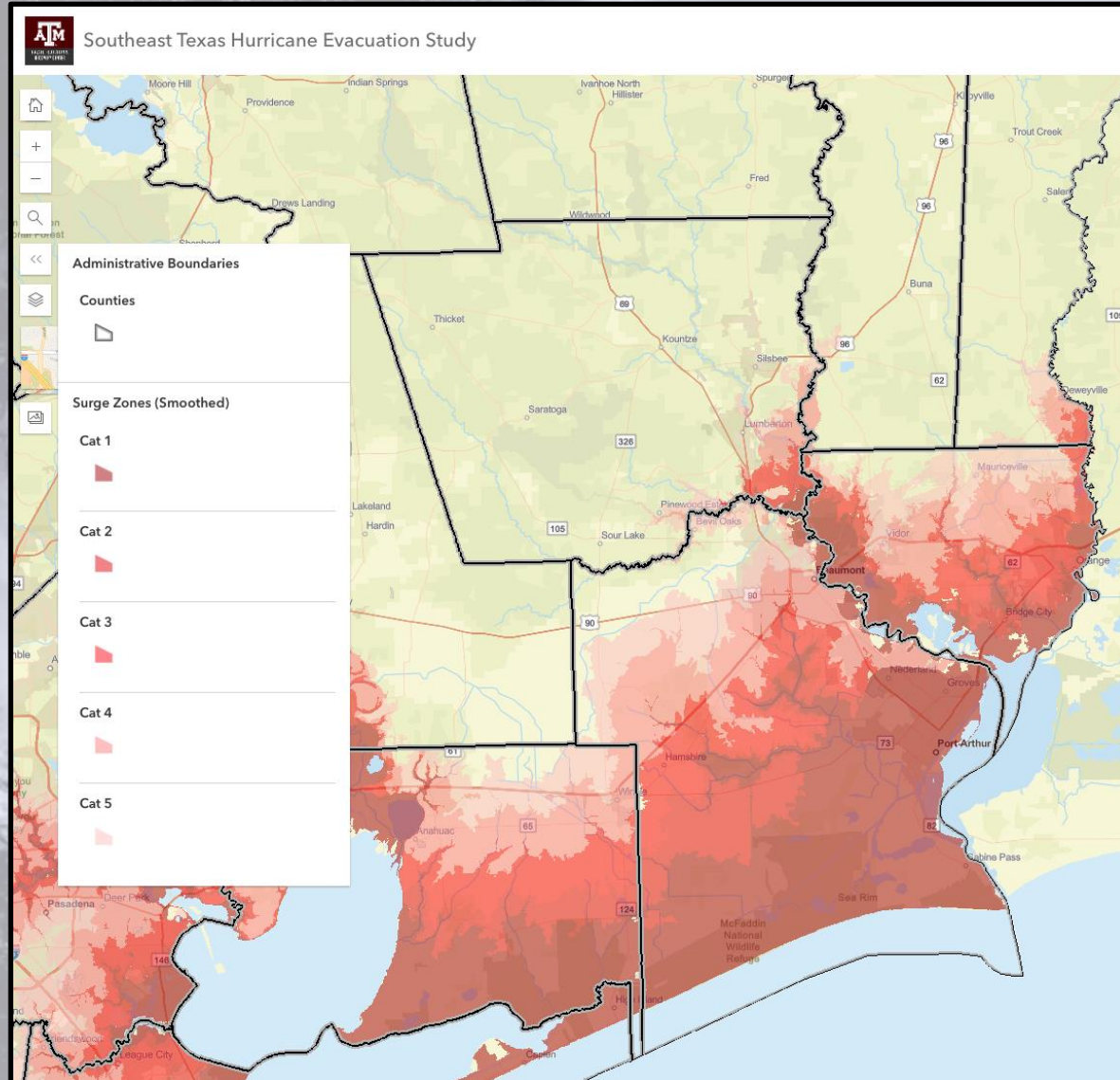


Website displaying
ZCTAs and smoothed
surge data for area



- Population and infrastructure data
 - Population:
 - Landscan 90-meter (2021)
 - Census's LEHD Origin-Destination Employment Statistical (LODES) data on job and residential locations by Census Blocks (2022)
 - Building foot-print data
 - Transportation road network data
 - Zip code tabulation areas (ZCTAs)
 - Other data:
 - Critical facilities
 - Mass shelters and/or evacuation centers
 - vulnerable populations
 - We will review these and other data shortly.

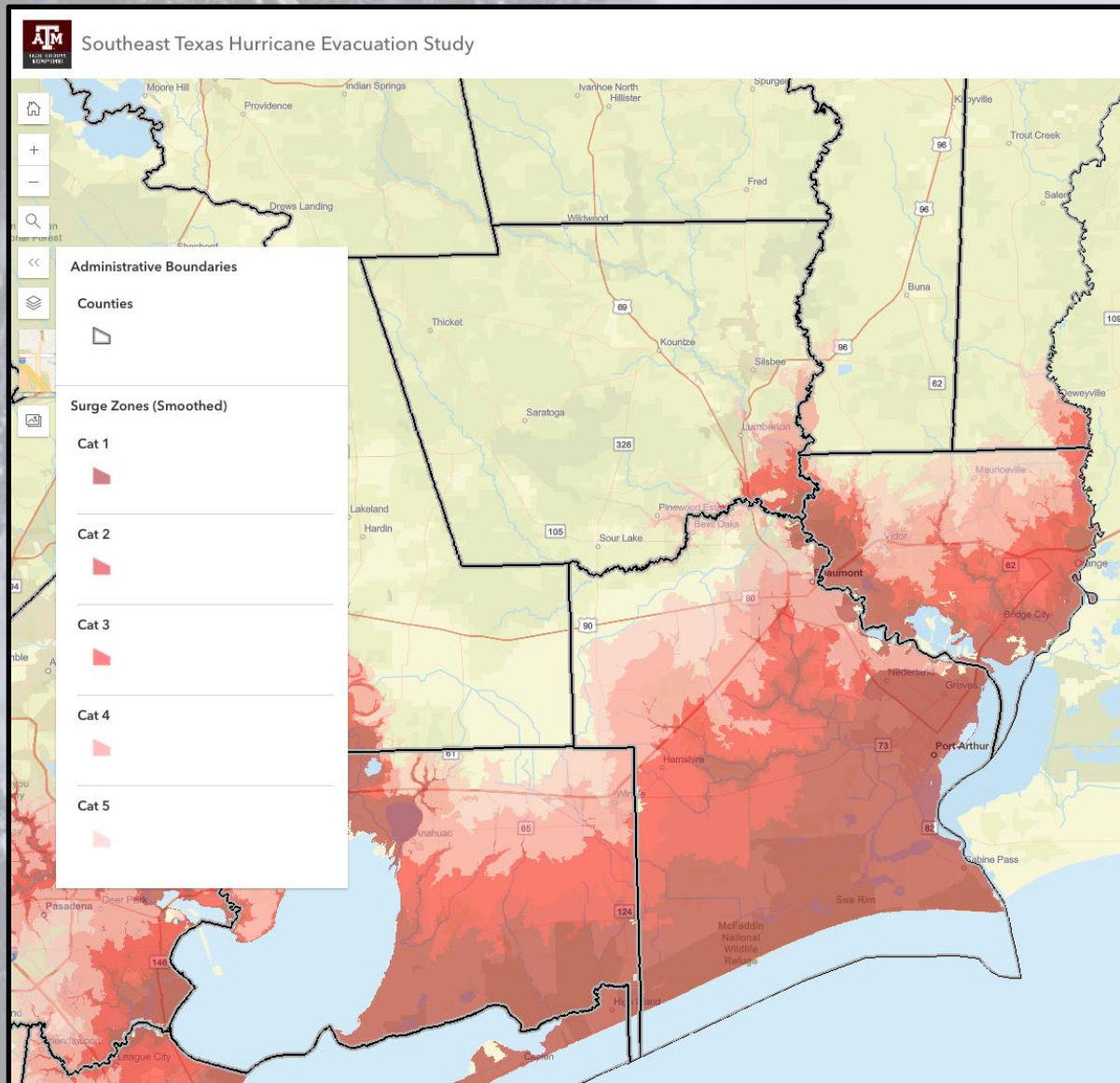
Evacuation Zone assessment and modification



Guiding principles in zone development and/or modification:

1. **Life safety** – getting the public out of potential harms way
2. **Storm Surge hazard** is the key hazard driving evacuation/risk zone development & modifications
3. **Facilitating risk/warning communication** – zones should be easily identifiable, communicable, and interpretable by public
4. **Facilitating emergency management decision making** – getting people out of harms way but in manner facilitating transportation flow
5. **Avoiding zone identification based on storm categories** – variations in storms and conditions can demand modifications in evacuation calls
6. **Regional Consistency**: naming and, where possible, adjacency in zones.

Evacuation Zone assessment and modification

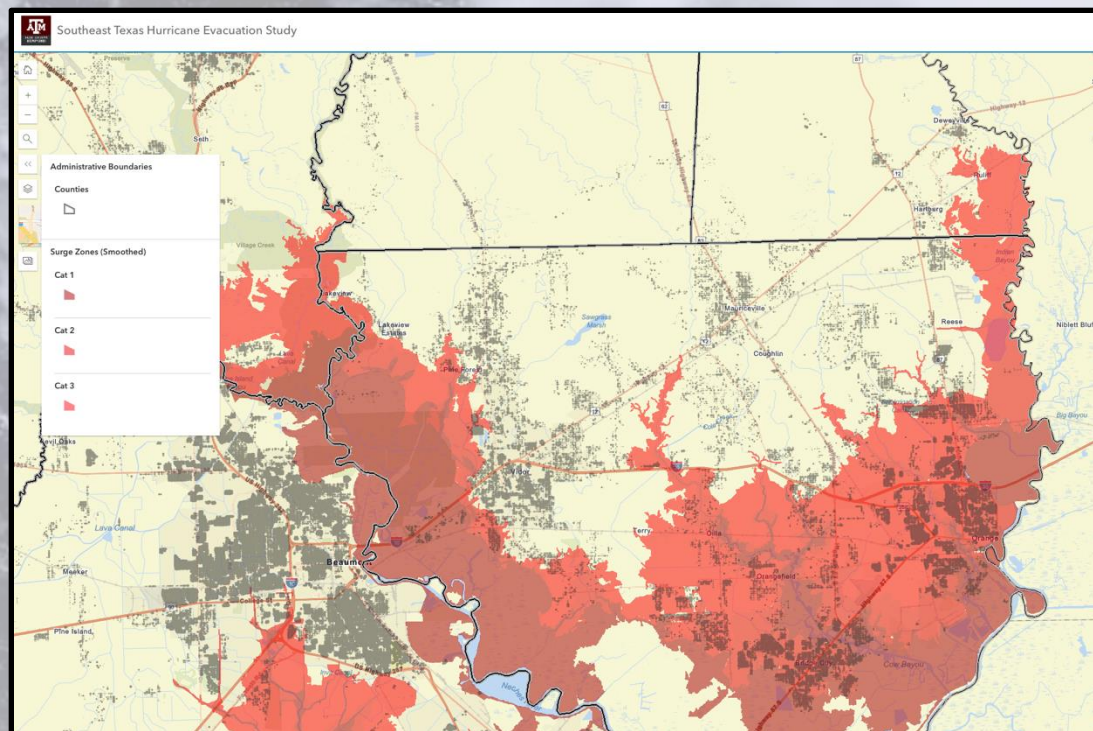
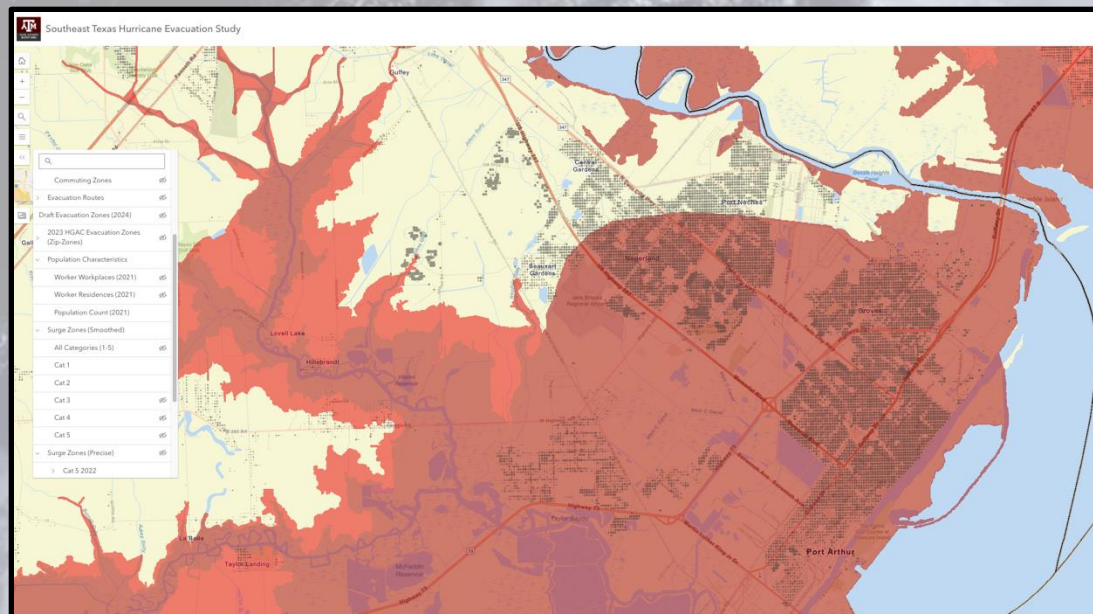


Evacuation Zone Naming Convention: Current:

- Coastal and Zones A-C
- Generally, successive zones reflect declining surge risk probability
- But evacuation timing/phasing may be important to consider
- Not all counties must have each zone

An aerial photograph of a tropical cyclone, showing a well-defined eye and spiral cloud bands over a dark ocean. The image is slightly faded, serving as a background for the text.

Review of Workshop Materials



Example of Working Group Activities:

1. Elect spokesperson/reporter
2. Review map packets, problems/issues highlighted, and proposed changes
3. Work with maps and Atlas data to develop a better understanding of the issues
4. Propose, consider, and reconsider problem areas, other issues, and produce solutions.
5. Develop consensus where possible
 - Strive for consensus within work groups
 - Write up/record changes, modifications, solutions
 - Identify problems and issues that will need additional data or unique solutions
 - Meet with adjacent county groups to assess consistency problems or issues – seek solutions.
6. Develop a county report to entire group
 - make sure that HES team member has clear understanding (preferably written and recorded on printed maps) of changes, modifications, problems to be addressed, and steps forward.

Contacts



- USACE Galveston District

- **Kyle Donlevy:** kyle.a.donlevy@usace.army.mil
 - Overall, HES Re-Study Manager and coordination



- FEMA Region 6

- **Arianne Thomas:** arianne.deruisse@fema.dhs.gov
 - HES input and technical support

- Texas Department of Emergency Management



- **Blake White:** blake.white@tdem.texas.gov
- **Carman Apple:** carman.apple@tdem.texas.gov
 - HES oversight, input and technical support, coordination with county, local, & regional government, agencies, and stakeholders.

- Texas A&M HRRC and TTI



- Conducting vulnerability, behavioral, shelter, and transportation analysis and providing technical assistance.
 - **Walt Peacock:** peacock@tamu.edu
 - Overall team management, coordination, and data analysis
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