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

Vulnerability Analysis Kick-Off Meeting

February 15, 2024

NATIONAL HURRICANE PROGRAM

Texas A&M Transportation Institute

HAZARD REDUCTION & RECOVERY CENTER

TEXAS DIVISION OF EMERGENCY MANAGEMENT

TDEM

THE TEXAS A&M UNIVERSITY SYSTEM

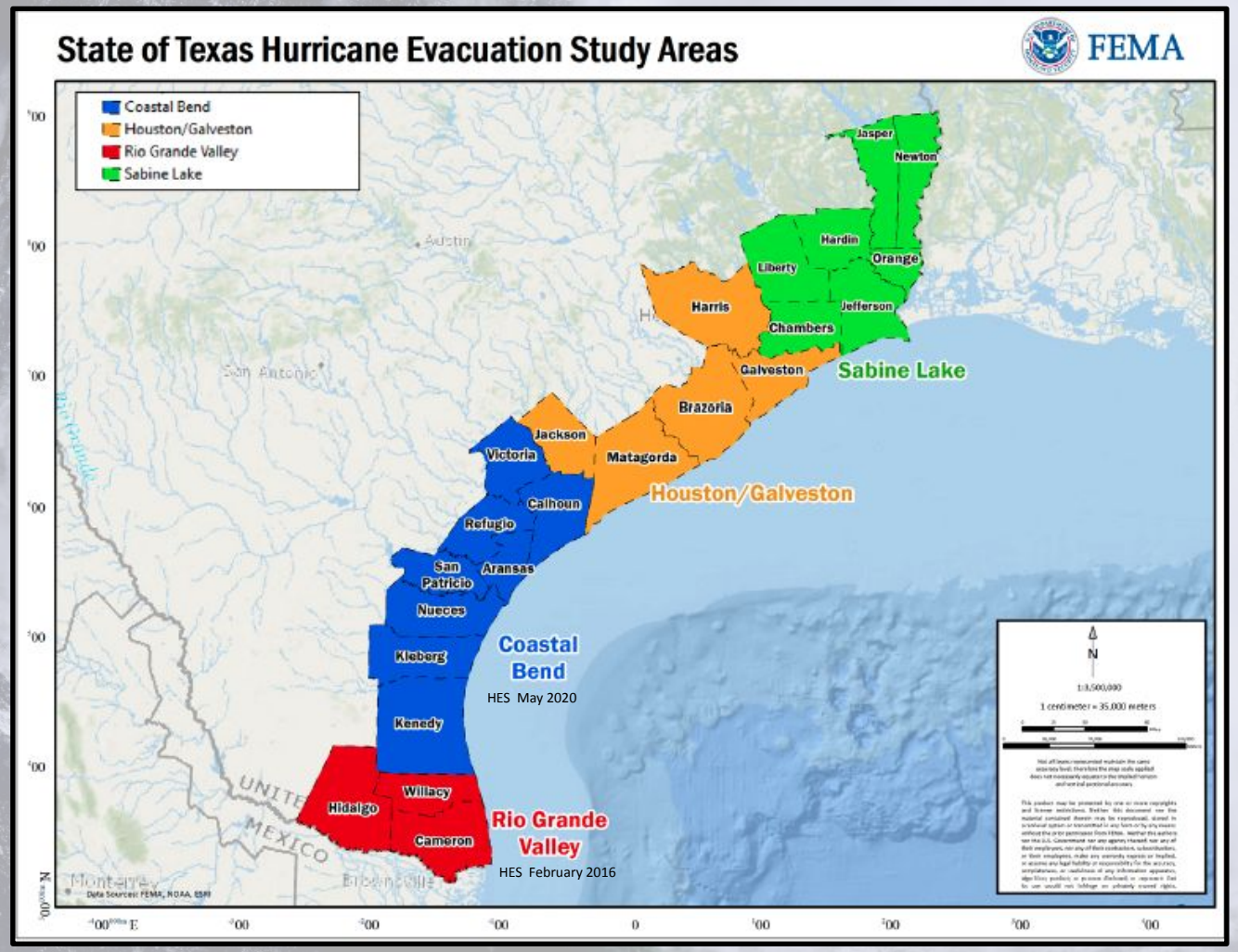
Agenda:

- Introductions
- Overview of HES restudy for Southeast Texas
- Vulnerability Analysis Phases
  - Evacuation Zone Re-Assessment and Modification
  - Vulnerability Analysis
- Next Steps
  - Regional meetings
  - Data requests and needs
- Questions and Discussion
- Contacts

Team Members:

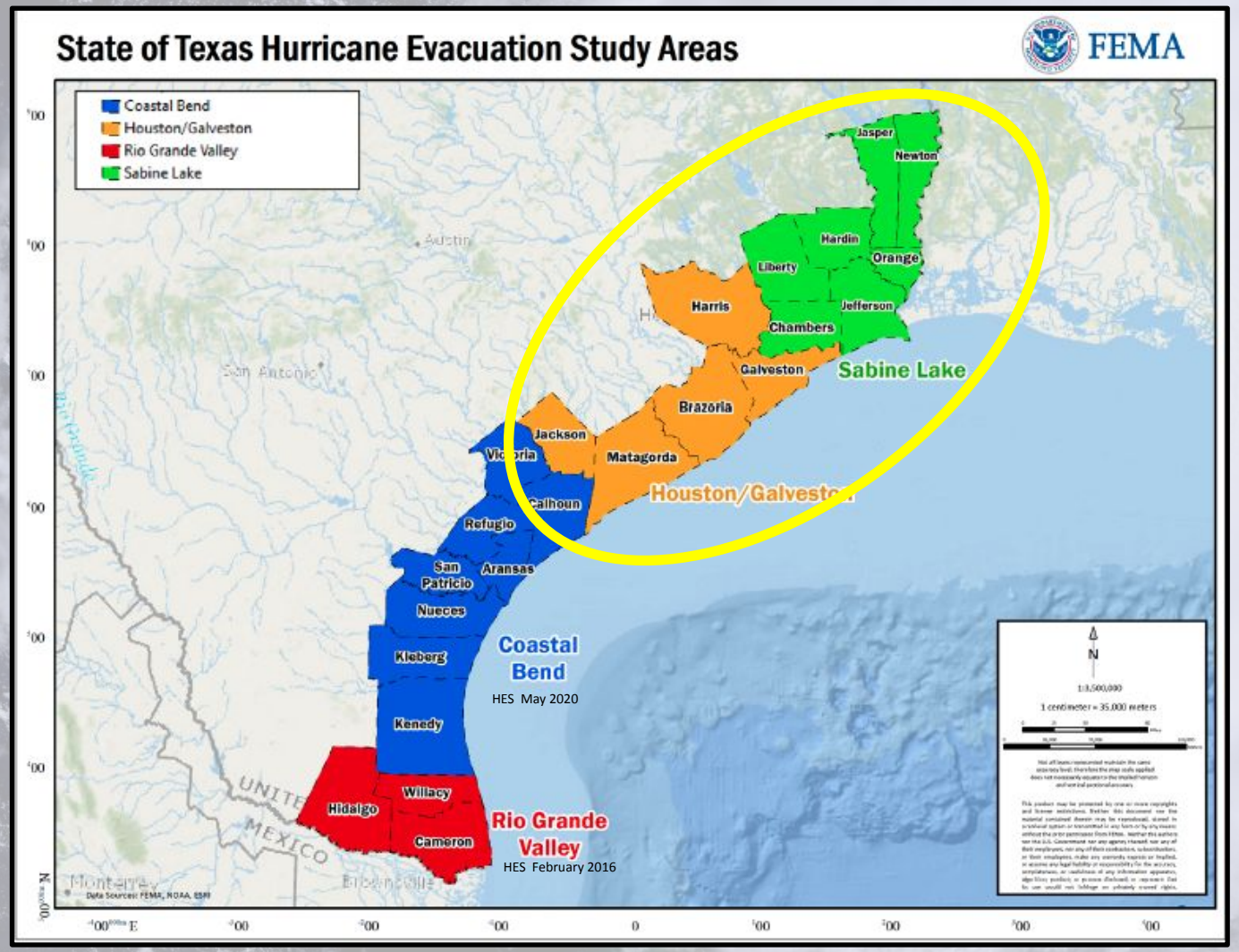
- US Army Corps of Engineers: Galveston District
  - Kyle Donlevy
- FEMA, Region 6
  - Arianne Thomas
- Texas Department of Emergency Management
  - Blake White & Carman Apple
- Texas A&M Hazard Reduction and Recovery Center & Texas A&M Transportation Institute
  - Walt Peacock, David Bierling, Doug Wunneburger, Darrell Borchardt, & Alexander Abuabara
- Local government and stakeholder
  - County Judges, Local Emergency management organizations, and other stakeholders
  - **Please put your name, organization, county, and contact information in the chat**

Overview of HES Re-Study for Southeast Texas



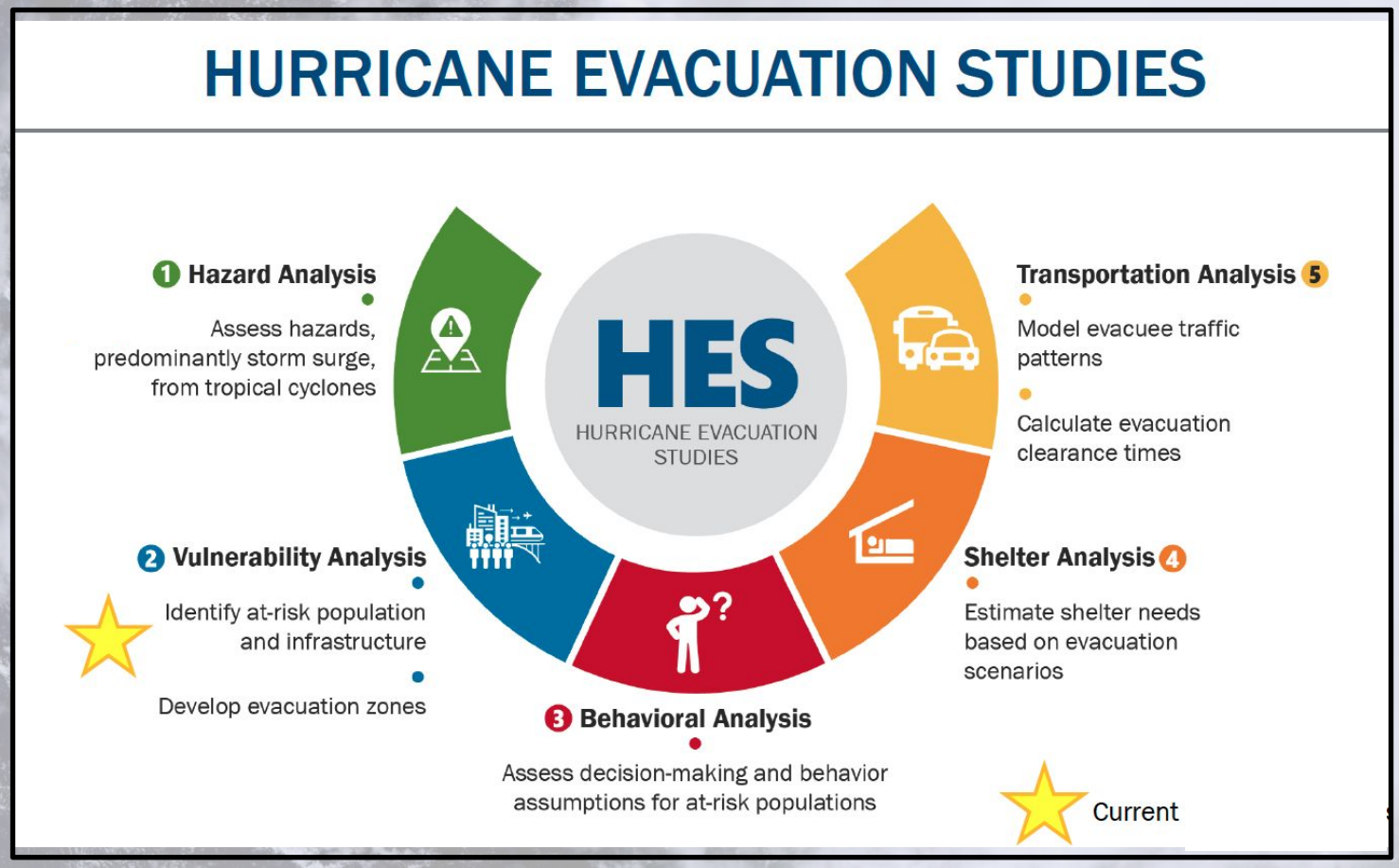
- Texas traditionally had 4 HES areas
  - Sabine Lake, Houston/Galveston, Coastal Bend, and Rio Grande Valley
- Coastal Bend HES 2020
- Rio Grande Valley HES 2016
- Lake Sabine: HES 2011
- Houston/Galveston HES 2004
  - HGAC 2011 Zip-Code based evac zones and transportation analysis

Overview of HES Re-Study for Southeast Texas



- 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

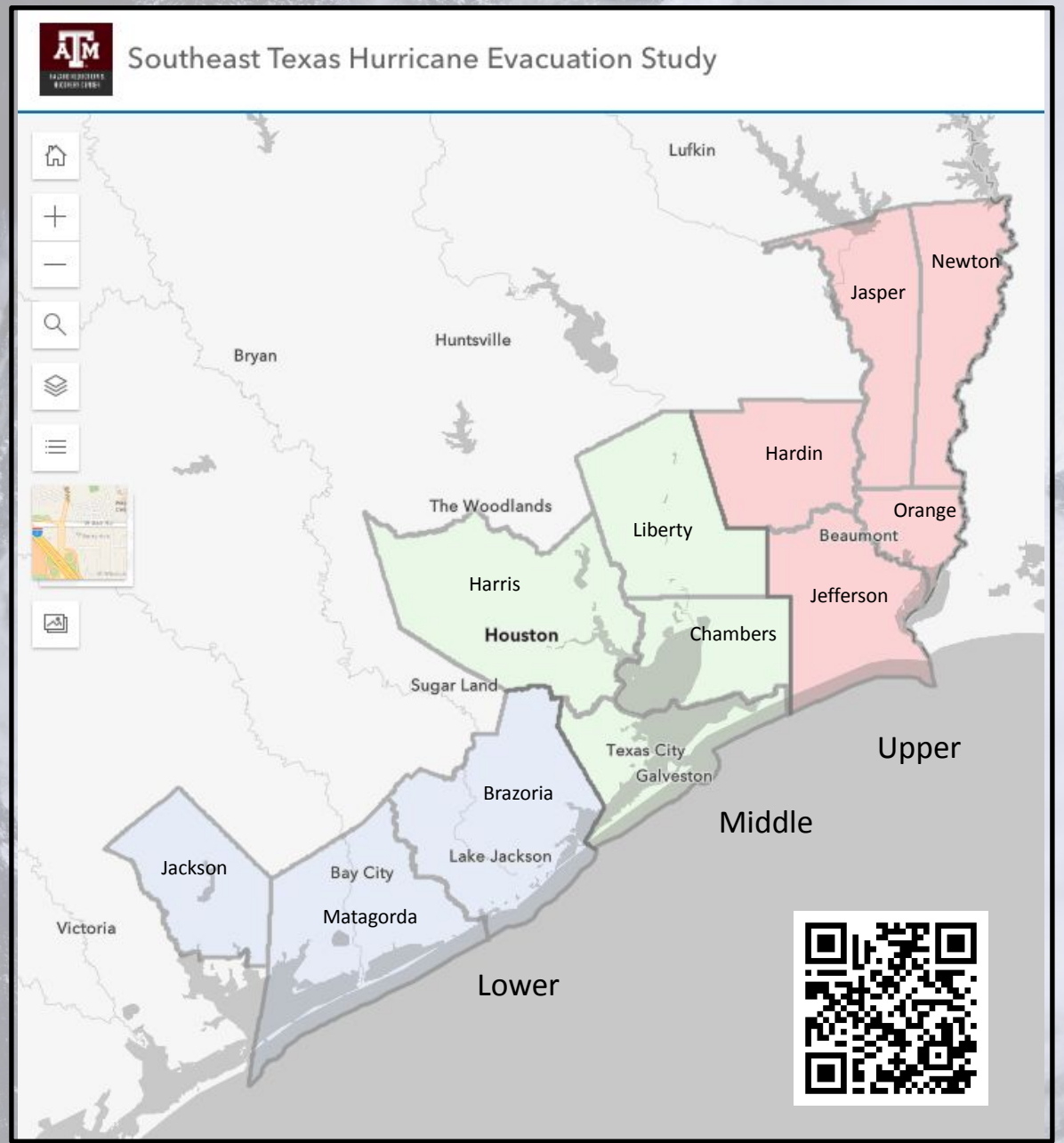
Overview of HES Re-Study for Southeast Texas



- 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

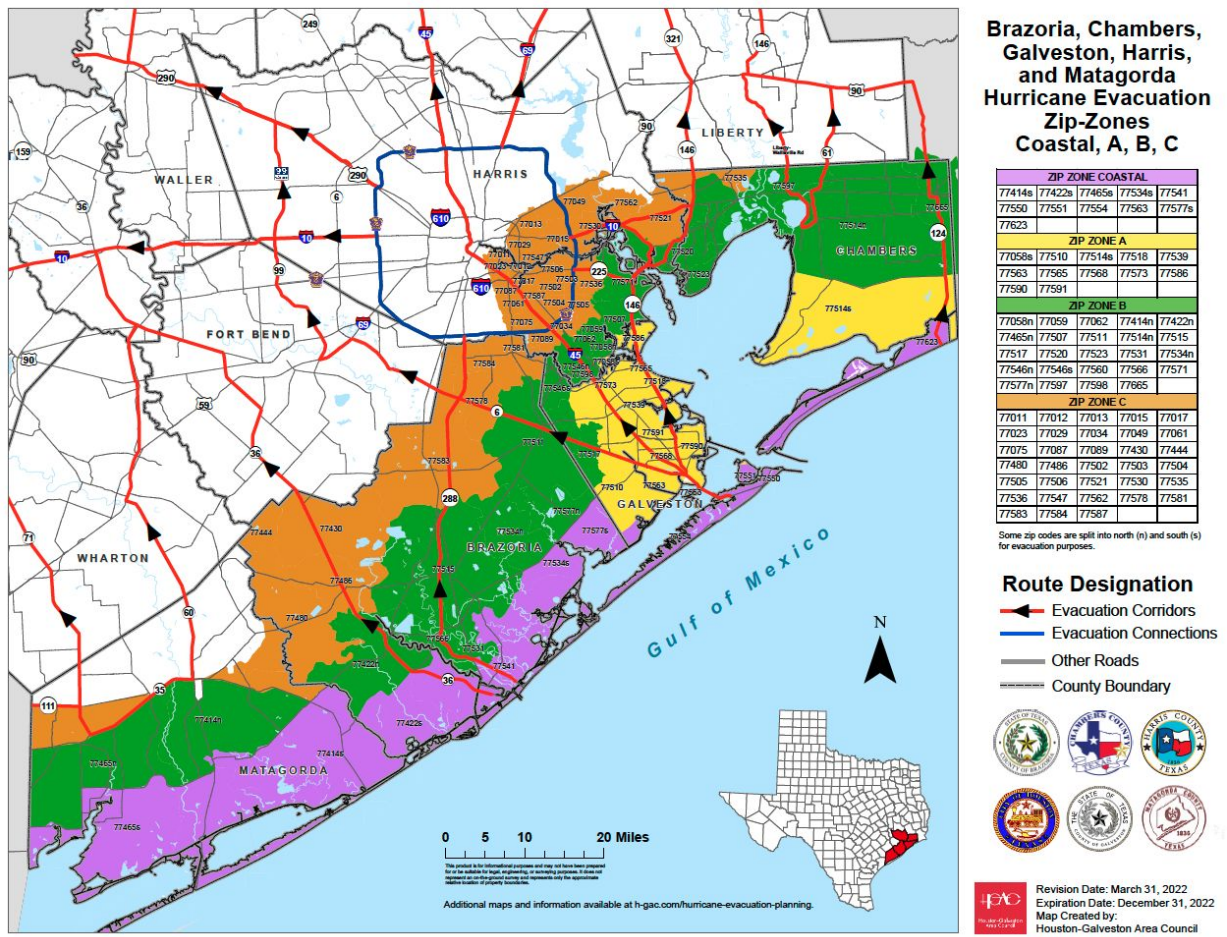


Two key phases:

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
   - "Working" Website: https://texasatlas.arch.tamu.edu/hes
2. Vulnerability Analysis
   - Predicated on modified evacuation zones and hazard data.

Overview of Evacuation Zone assessment and modification phase

Goal is to assess, modify, or develop hurricane evacuation/risk zones for 2025



Brazoria, Chambers, Galveston, Harris, and Matagorda Hurricane Evacuation Zip-Zones Coastal, A, B, C

ZIP ZONE COASTAL				
77414s	77422s	77465s	77534s	77541
77550	77551	77554	77563	77577s
77623				
ZIP ZONE A				
77058s	77510	77514s	77518	77539
77563	77565	77568	77573	77586
77590	77591			
ZIP ZONE B				
77058n	77059	77062	77414n	77422n
77465n	77507	77511	77514n	77515
77517	77520	77523	77531	77534n
77546n	77546s	77560	77566	77571
77577n	77597	77598	77665	
ZIP ZONE C				
77011	77012	77013	77015	77017
77023	77029	77034	77049	77061
77075	77087	77089	77430	77444
77480	77486	77502	77503	77504
77505	77506	77521	77530	77535
77536	77547	77562	77578	77581
77583	77584	77587		

Some zip codes are split into north (n) and south (s) for evacuation purposes.

Route Designation

- Evacuation Corridors
- Evacuation Connections
- Other Roads
- County Boundary

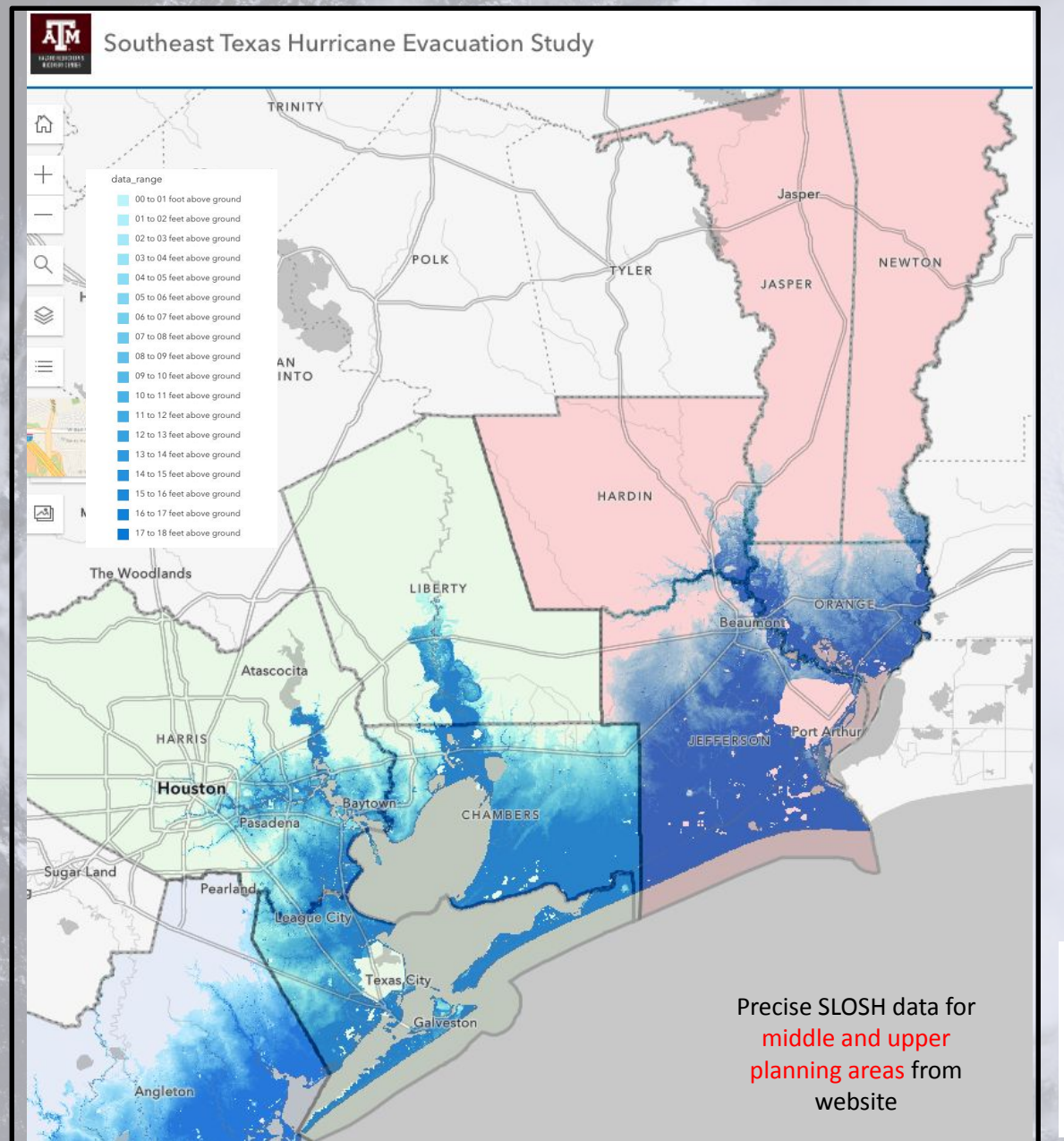
Revision Date: March 31, 2022
Expiration Date: December 31, 2022
Map Created by:
Houston-Galveston Area Council

Potential Guiding principles:

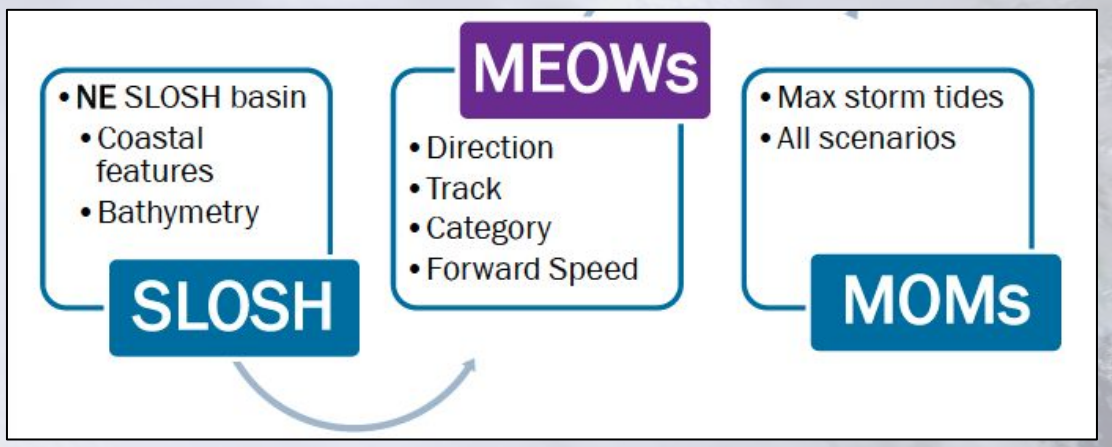
1. **Life safety –** getting the public out of potential harms way
2. **Storm Surge hazard** is the key hazard driving evacuation/risk zone development/modifications
3. **Facilitating risk/warning communication** – zones should be easily identifiable, communicable, and interpretable by public
4. **Facilitating 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**

Hazard Data: Storm Surge Modeling

Produced by NOAA and USACE



Precise SLOSH data for middle and upper planning areas from website



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

Hazard Data: Storm Surge Modeling

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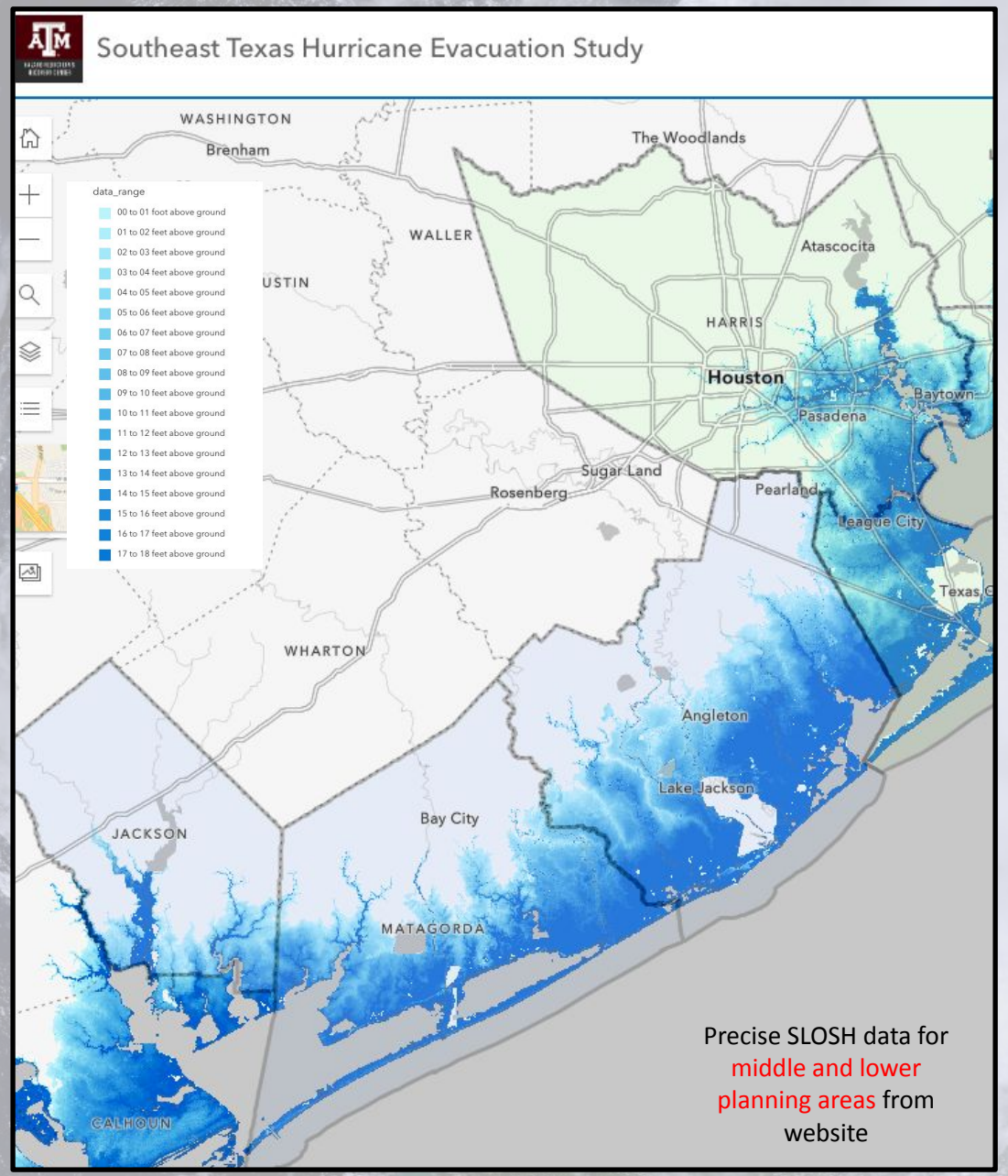
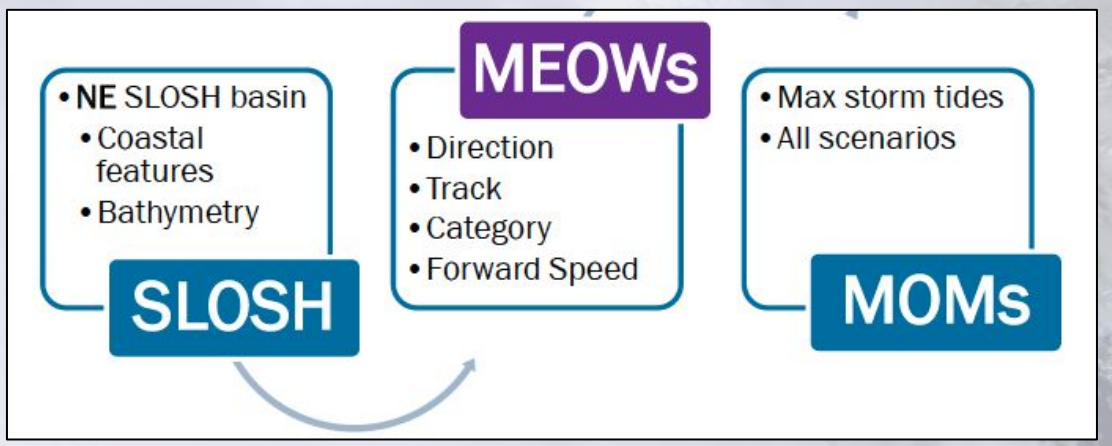


Precise SLOSH data for middle and lower planning areas from website



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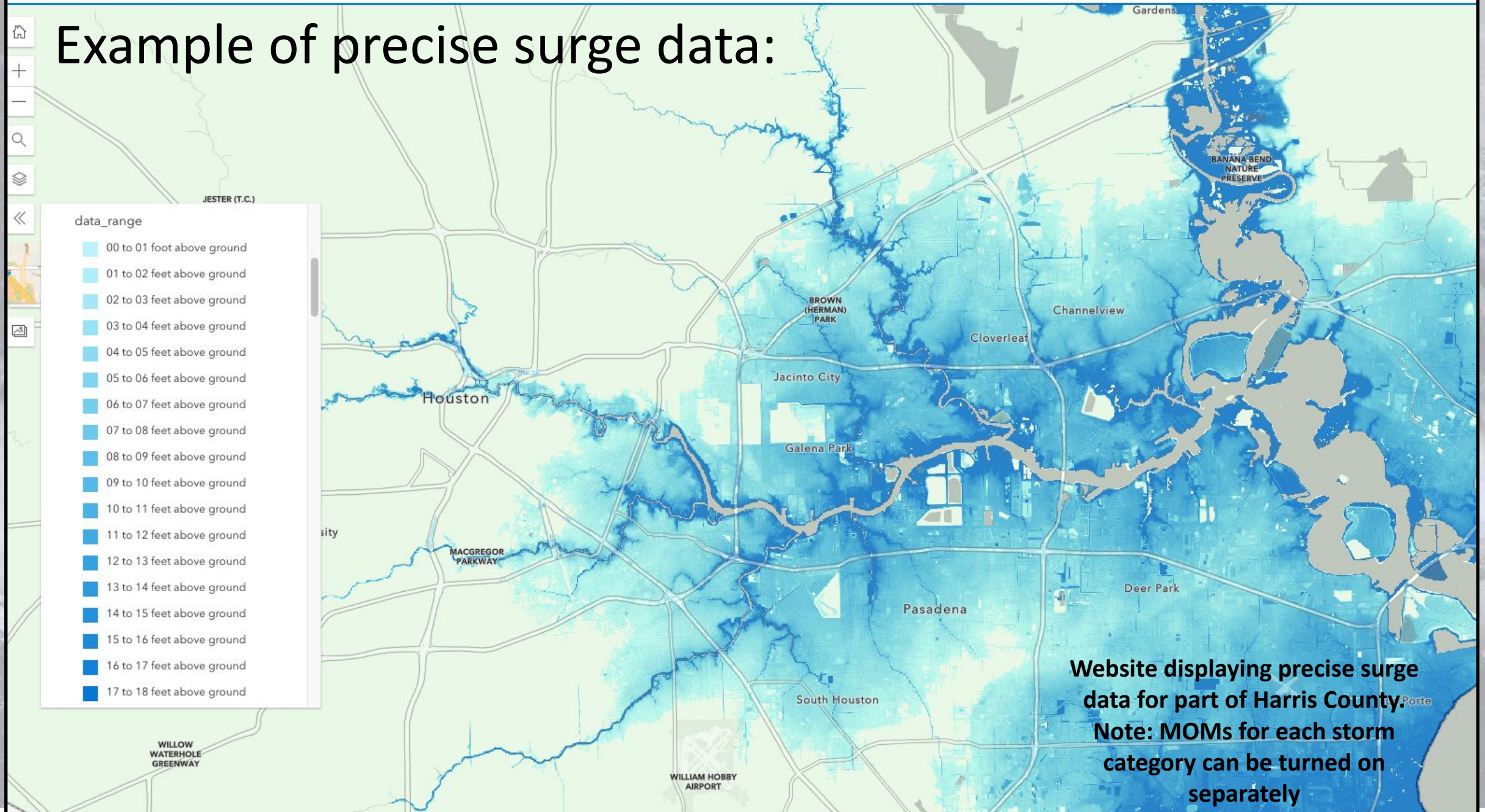
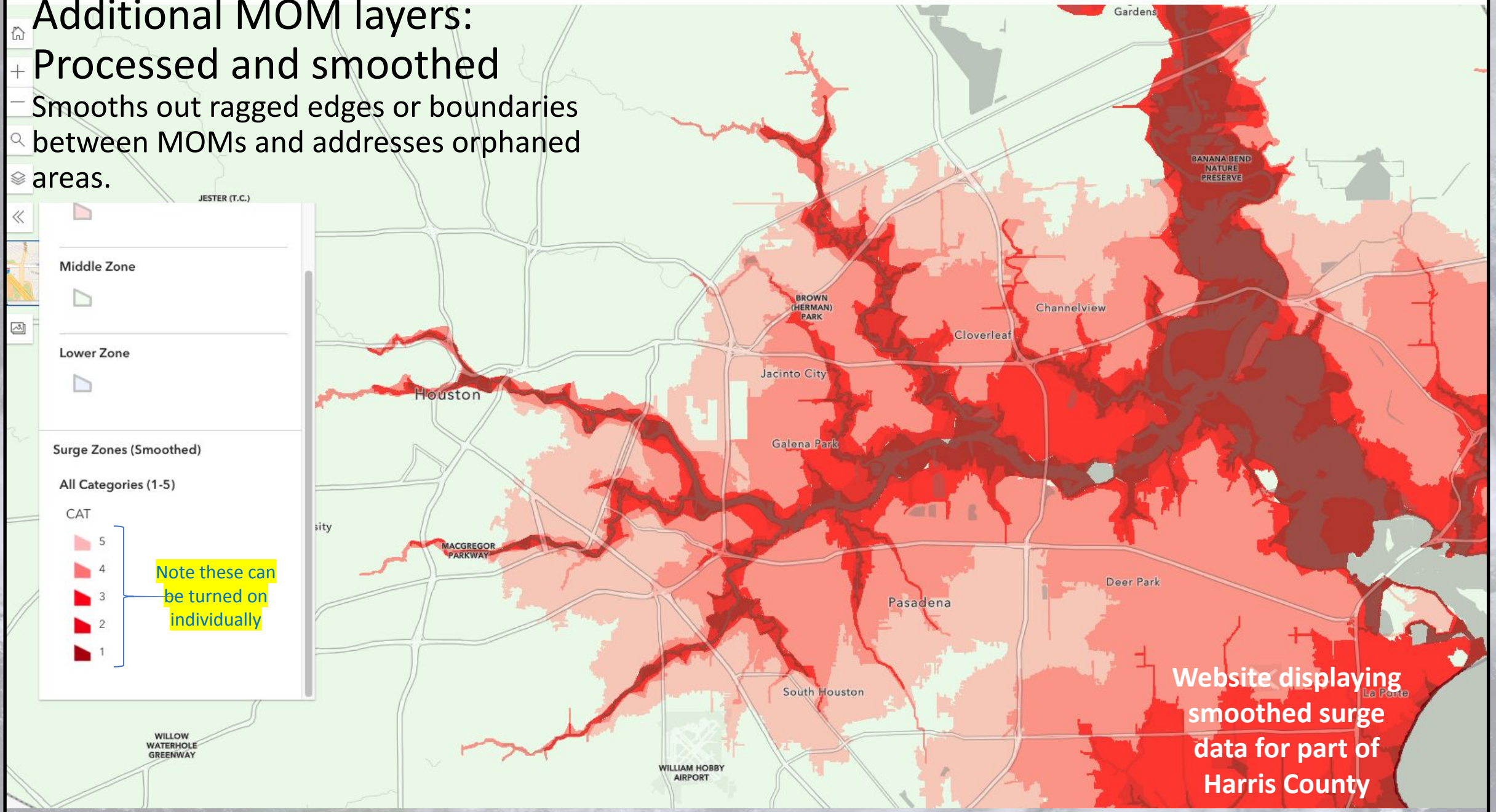
Example of precise surge data:



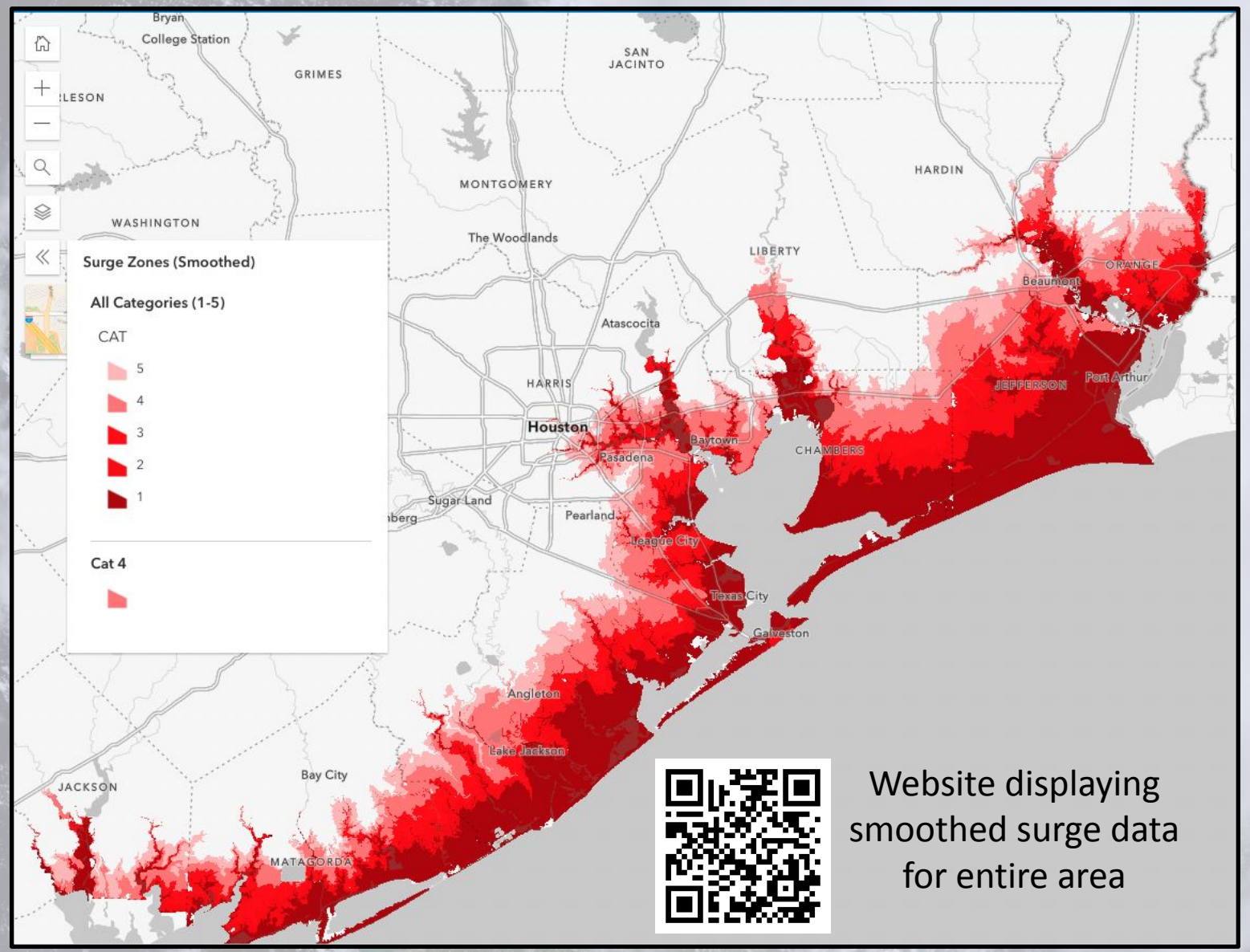
Website displaying precise surge data for part of Harris County. Note: MOMs for each storm category can be turned on separately

Additional MOM layers: Processed and smoothed

Smooths out ragged edges or boundaries between MOMs and addresses orphaned areas.

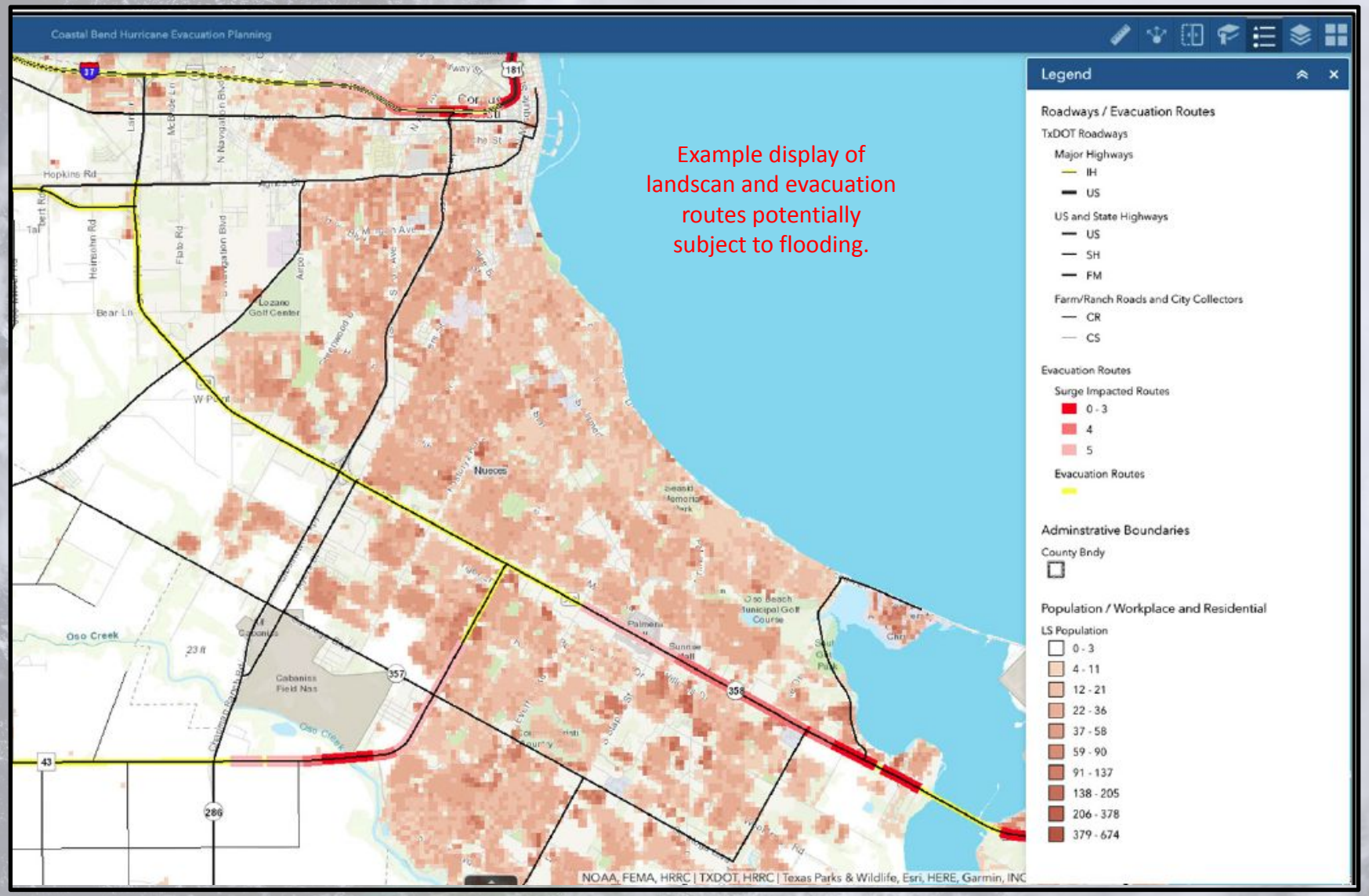


Additional hazard data for Evacuation Zone assessment and modifications



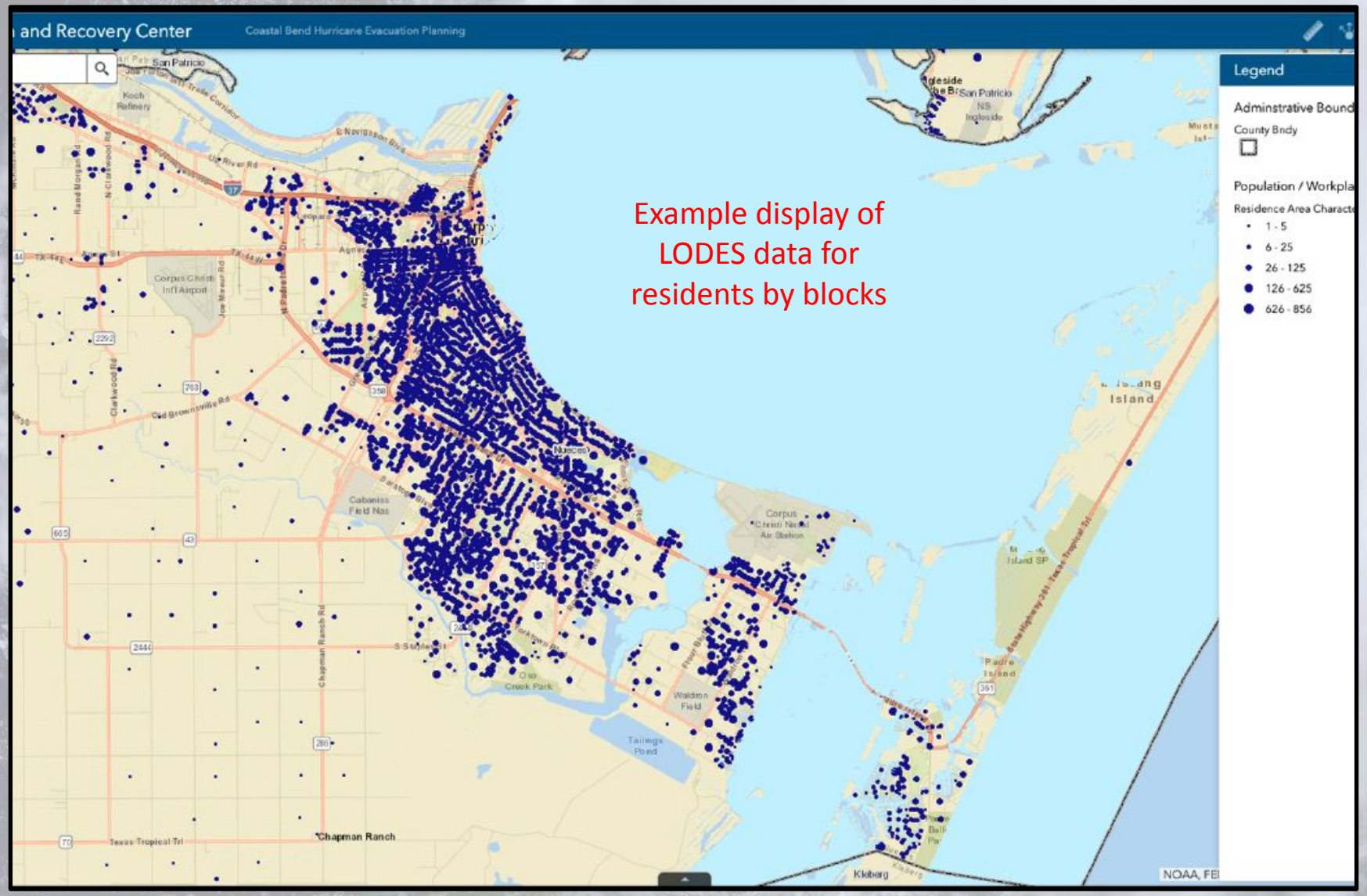
- Processed and smoothed MOM Layers are also available
  - Smooths out ragged edges or boundaries between moms and addresses orphaned areas.
- Additional Hazard Data can be utilized, including:
  - FEMA Flood Zones
  - MEOWs for wind
  - Sea Level Rise
  - If there are additional data you would like to include, please contact the team.

Additional data for Evacuation Zone assessment and modifications



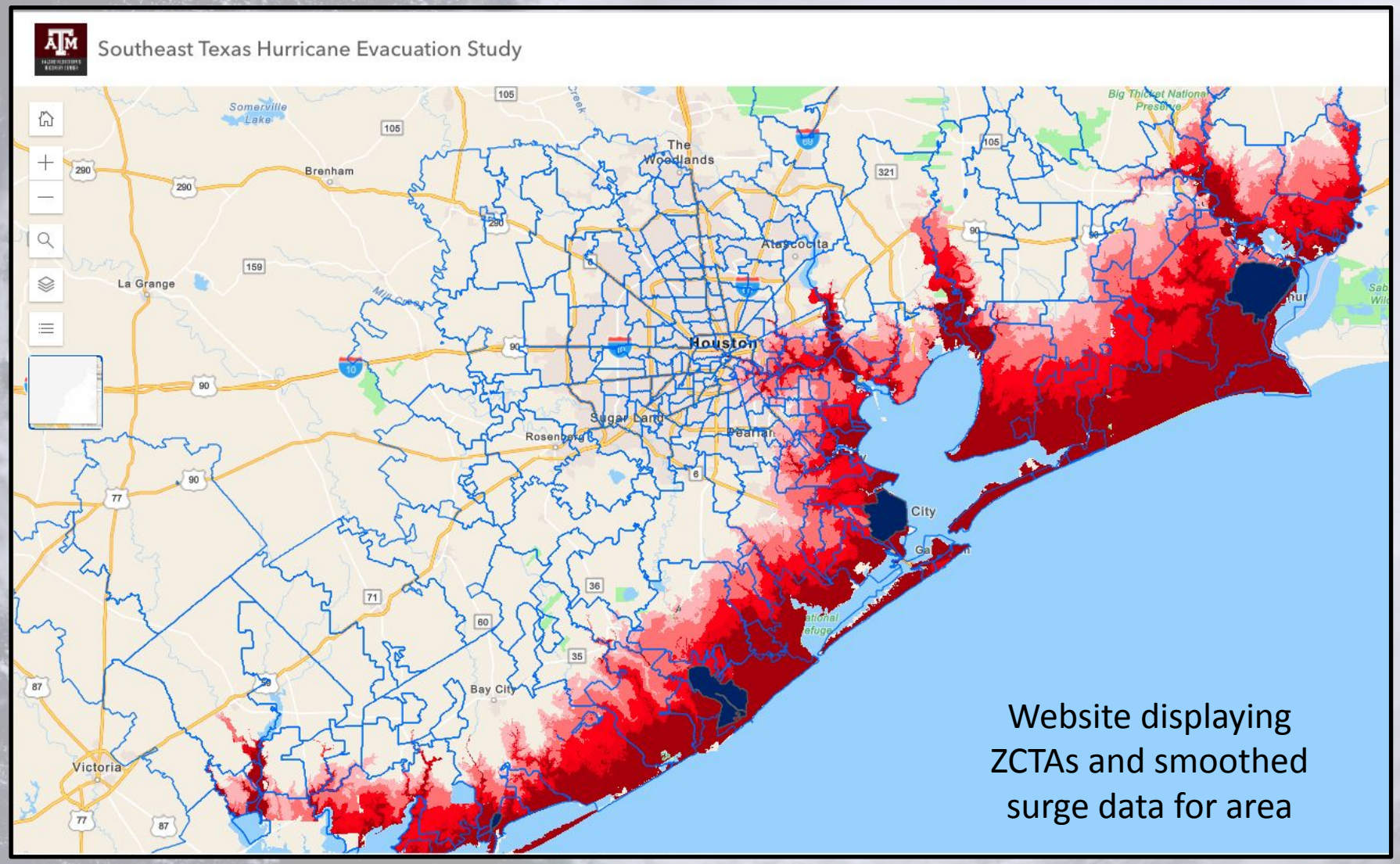
- Population and infrastructure data
  - 2022 LANDSCAN – population estimates at 90-meter resolution
  - Estimated evacuation route flooding based on surge data
    - These estimates should be supplemented by local data and knowledge

Additional data for Evacuation Zone assessment and modifications

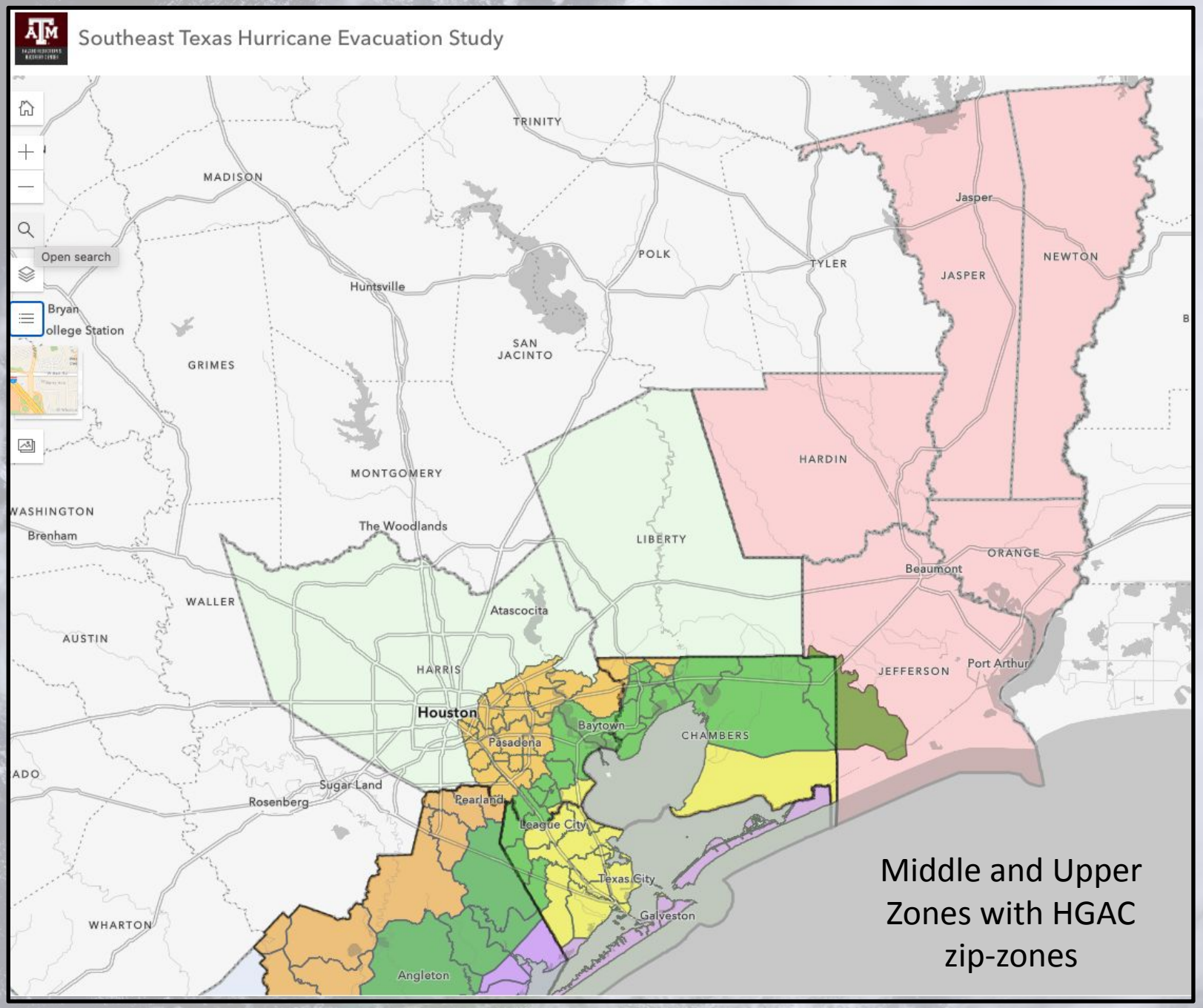


- Population and infrastructure data
  - Census's LEHD Origin-Destination Employment Statistical (LODES) data on job and residential locations by Census Blocks.

Additional data for Evacuation Zone assessment and modifications

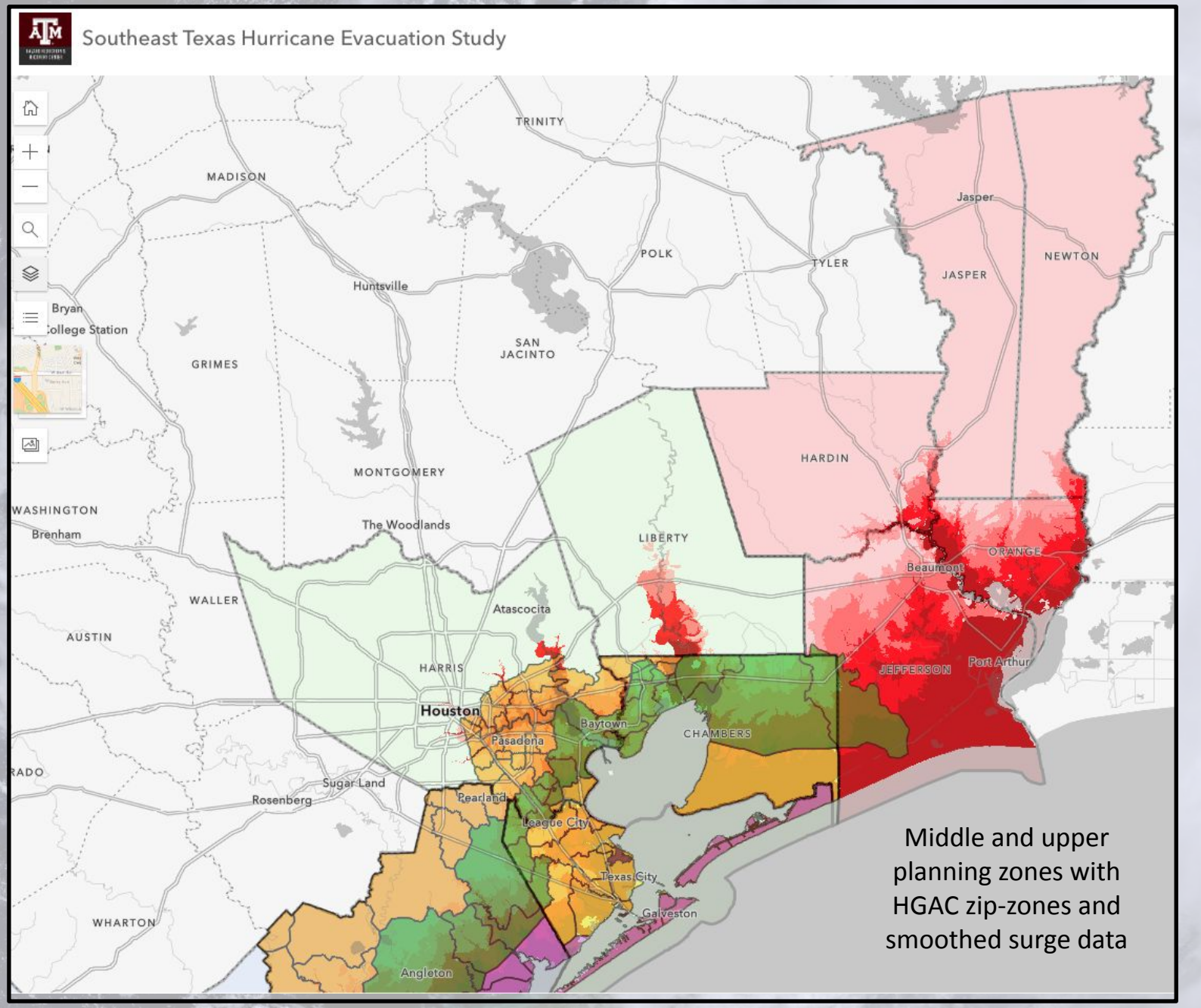


- Population and infrastructure data
  - Transportation road network data
  - Zip code tabulation areas (ZCTAs)
  - Other data possibilities:
    - Critical facilities
      - Mass shelters and/or evacuation centers
      - vulnerable populations
    - If you have additional data, particularly local data, that should be included, please let us know.



Final element: Current Evacuation Zones

Please note: if there are **evacuation zones or similarly designated areas** such as those identified in the Sabine Lake *2011 Transportation Analysis Report's* evacuation scenarios that are being employed for decision making, please let team members know so they can be incorporated into the website and planning process.



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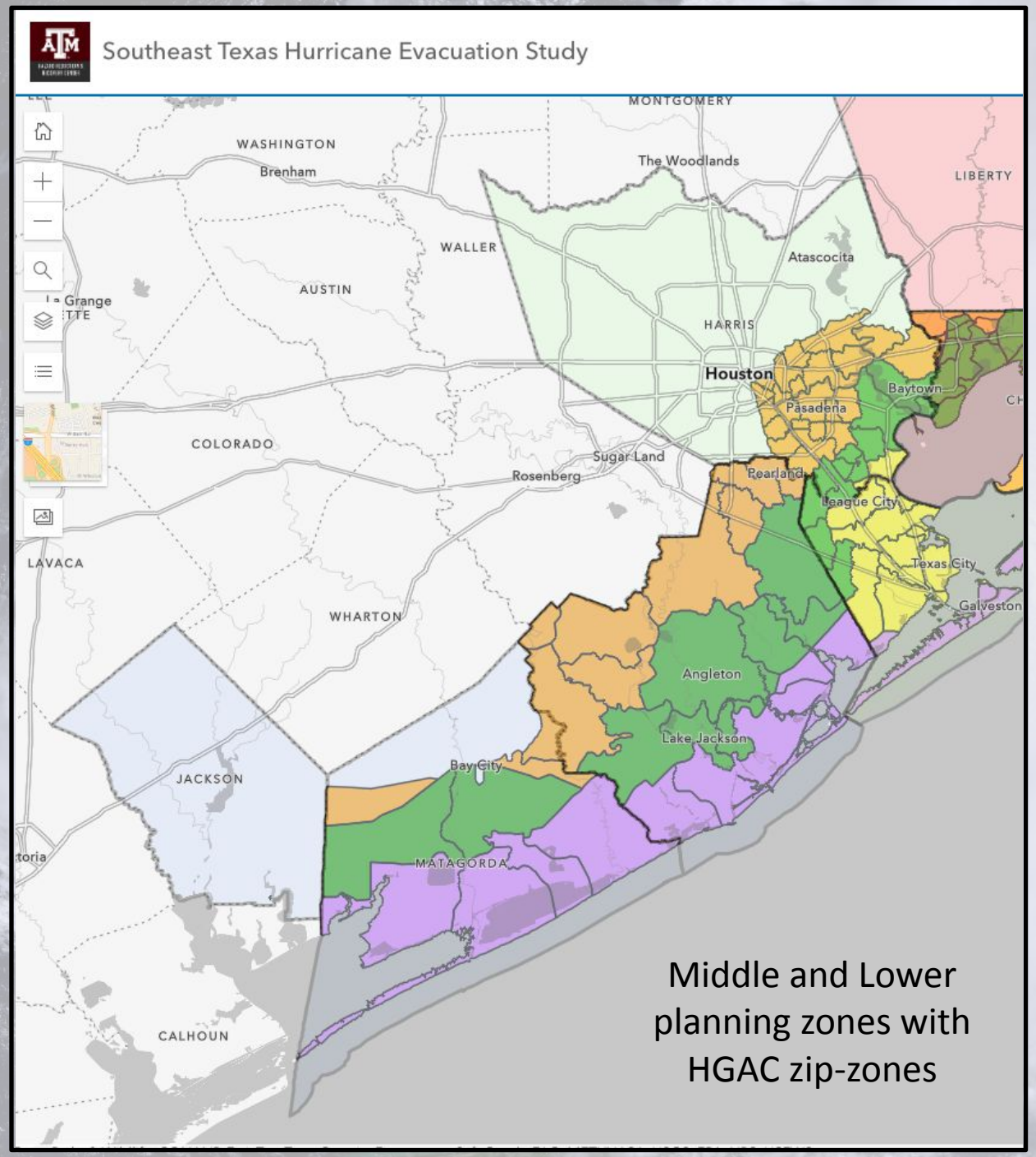
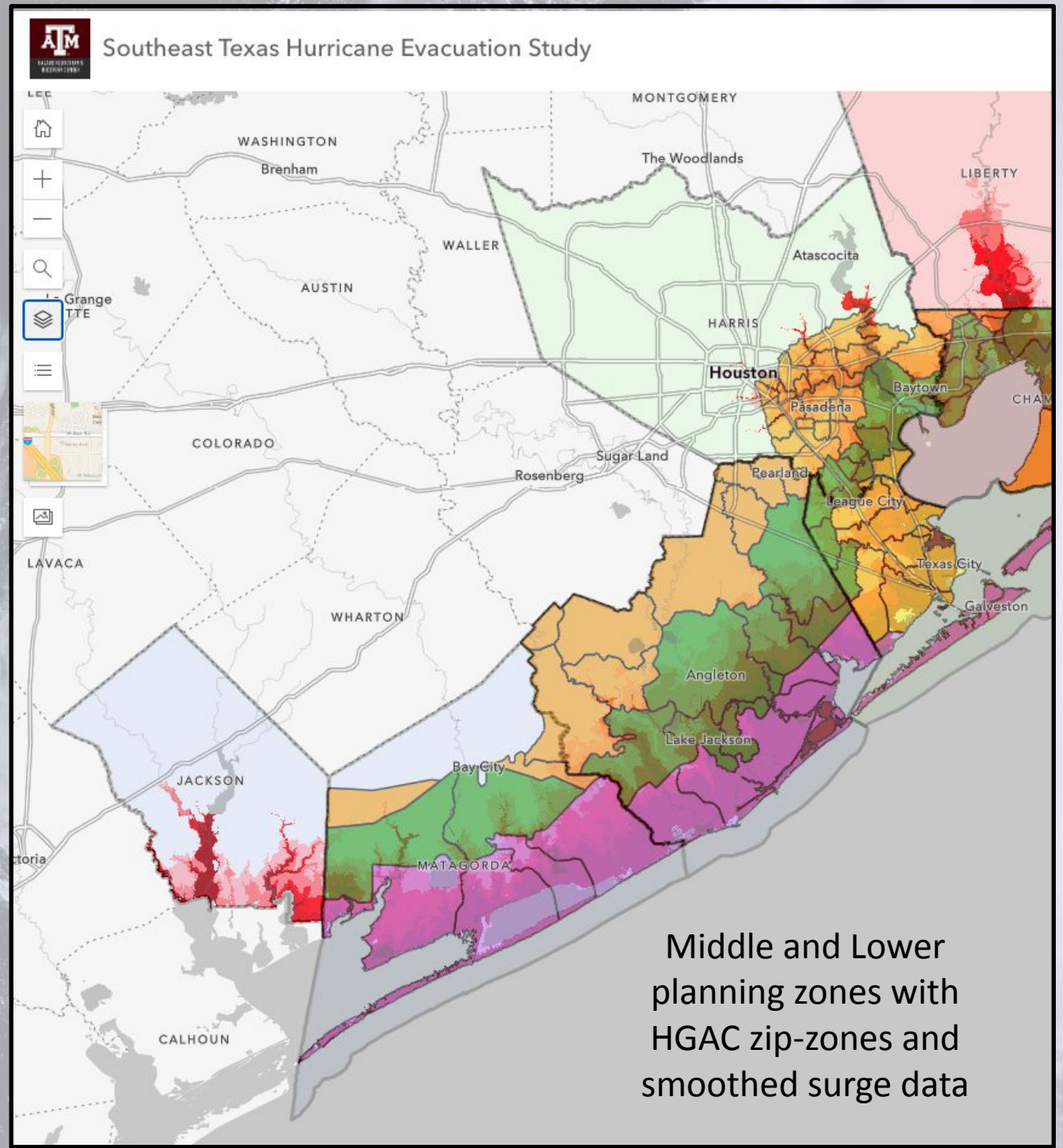


Final element: Current Evacuation Zones

Again, please note: if there are **evacuation zones or similarly designated areas for Jackson County,** please let team members know so these data and information can be incorporated into the website and planning processes.



Final element: Current Evacuation Zones

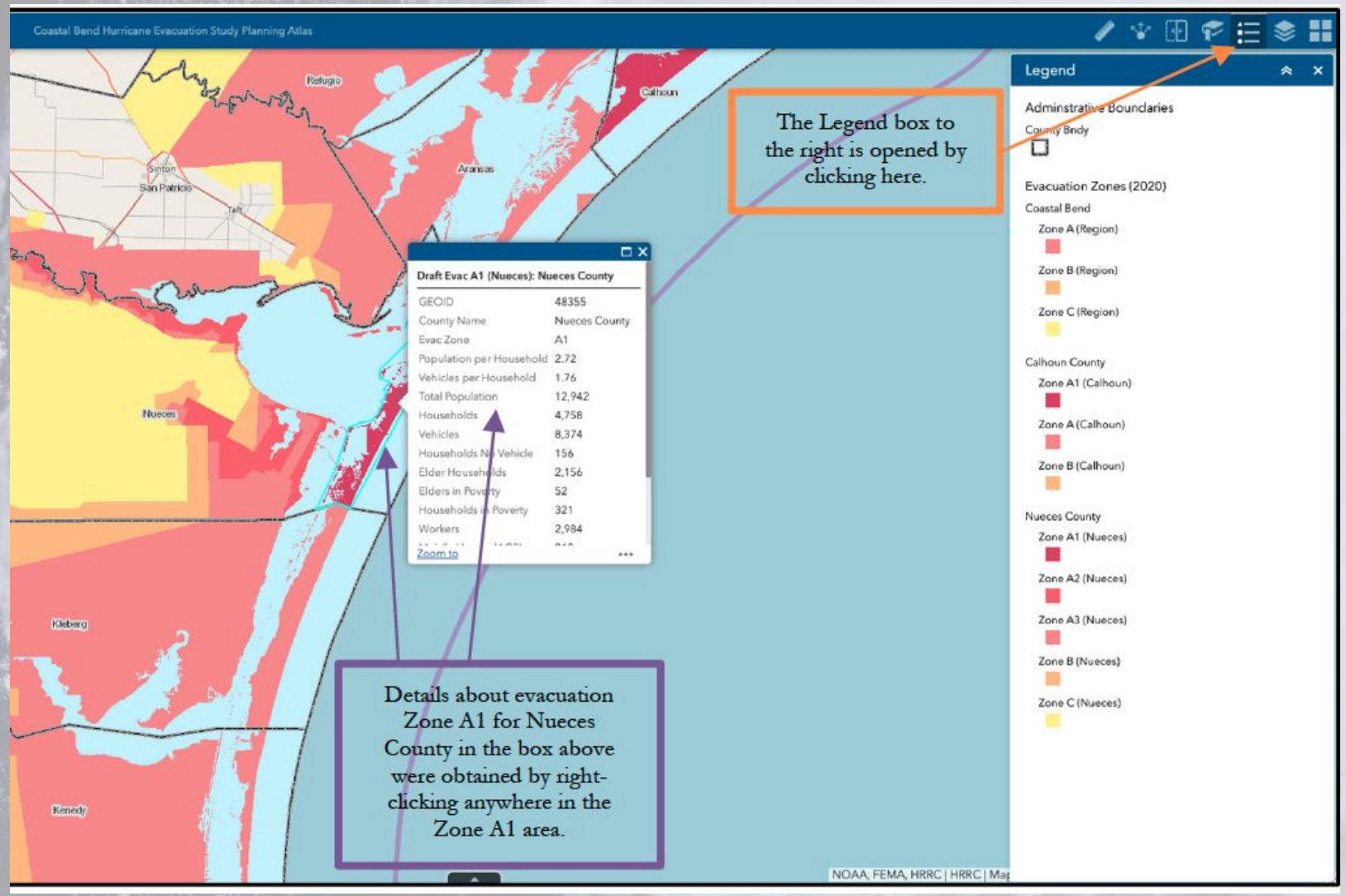
Again, please note: if there are **evacuation zones or similarly designated areas for Jackson County,** please let team members know so these data and information can be incorporated into the website and planning processes.

Phase 2: Vulnerability Analysis

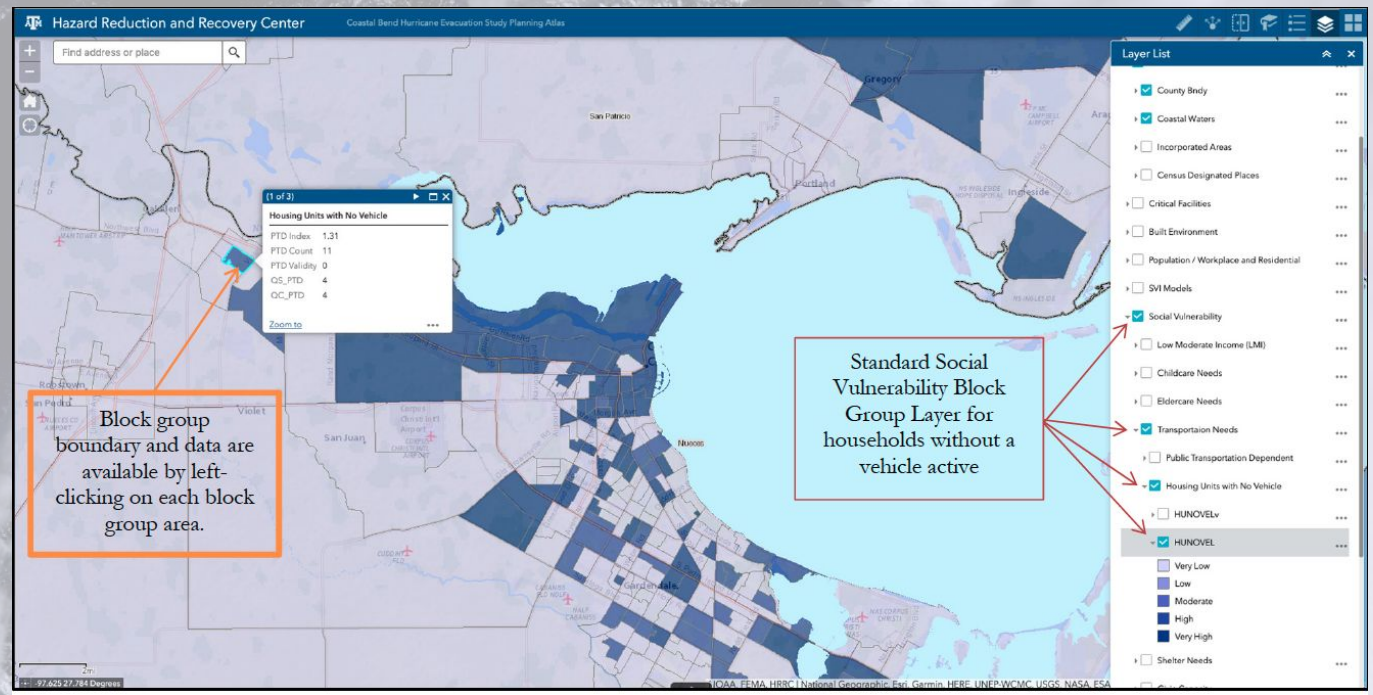
- The Vulnerability Analysis
  - Will provide detailed data and analysis on populations and infrastructure located in each hurricane risk/evacuation zones as well as other data to facilitate
  - Transportation analysis
  - Comprehensive Evacuation Planning
  - Broad based Disaster resilience planning
    - Hazard mitigation planning
    - Recovery planning

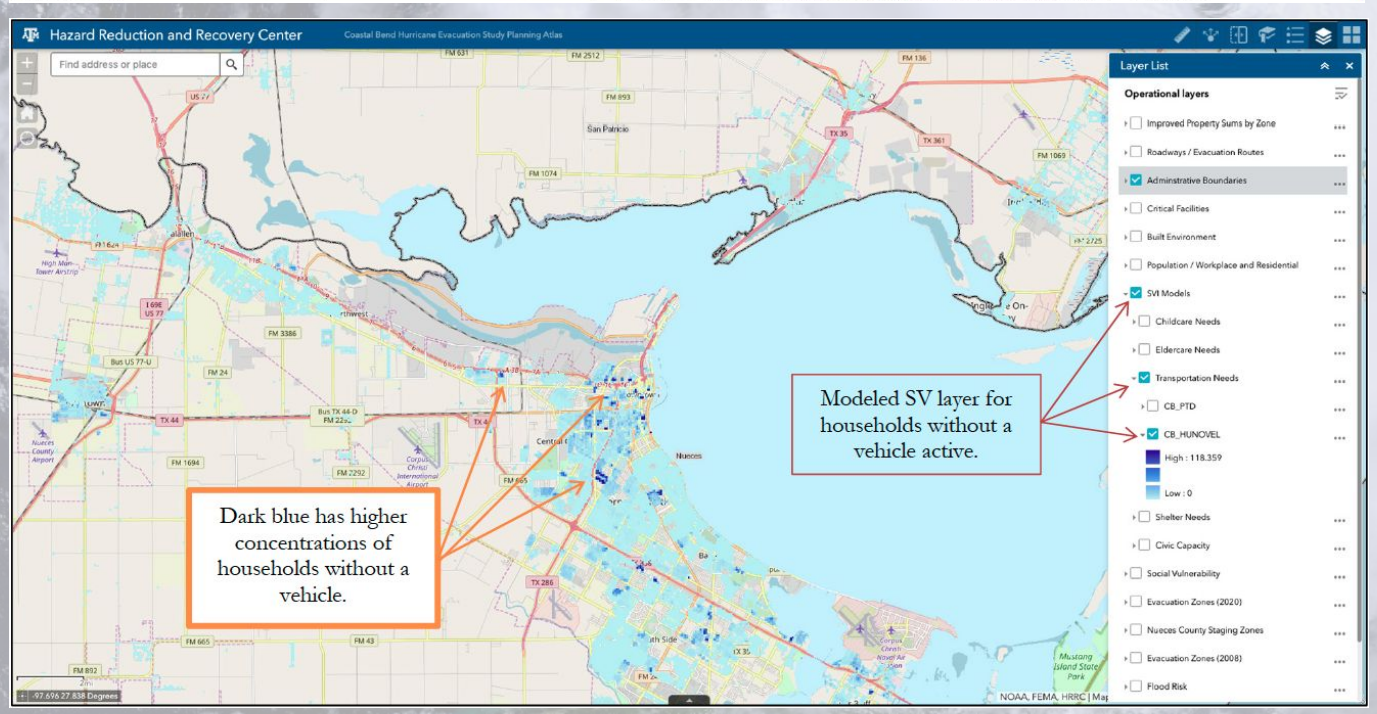
- Analyses will be conducted at the county level
  - Providing counts, proportions, percentages relative to each county
  - Primarily focusing on risk zones with counts and percentages in each area
    - Also, utilizing data for various census geographies (blocks, block-groups, and census tracts) and were possible point, parcel, and modeled data
    - Results will be produced in the form of:
      - Reports and tables
      - GIS/Mapping data, products, and layers including heat, modeled, and point data as well as pop-outs.

Phase 2: Vulnerability Analysis



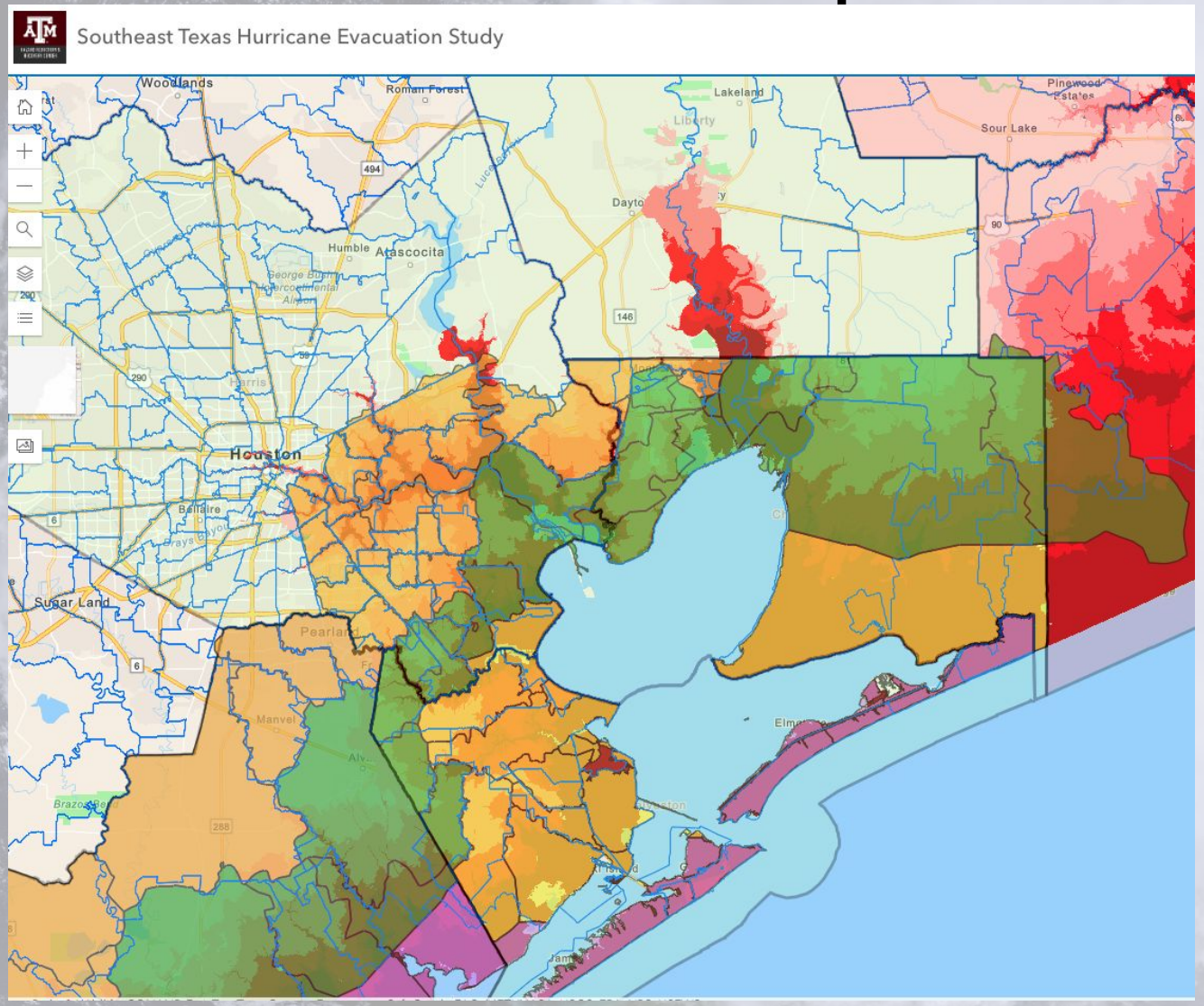
- Examples:
  - Population/household (counts and percentages)
  - Vehicles (total, per-household)
  - Tourist and seasonal populations
    - Hotels, motels, vacation housing
    - Estimated occupants, rooms, & vehicles.
  - Individuals and households needing transportation assistance.
  - Populations in mobile homes.
  - Critical facilities
  - Schools (public, charter, private)





- Additional Examples:
  - Employee job and residential locations
  - Estimate assessed values of vulnerable residential property
    - Subject to data availability
  - Socio-economic vulnerable
    - Elderly, children, single parent households
    - Transportation dependent households & households without a vehicle
    - Rental households
    - Households in poverty and HUD poverty classifications
    - Households without broadband
    - Unemployed
    - Language, education,
    - Census Community resilience estimates

Back to Phase 1: Evacuation Zone assessment and modification phase

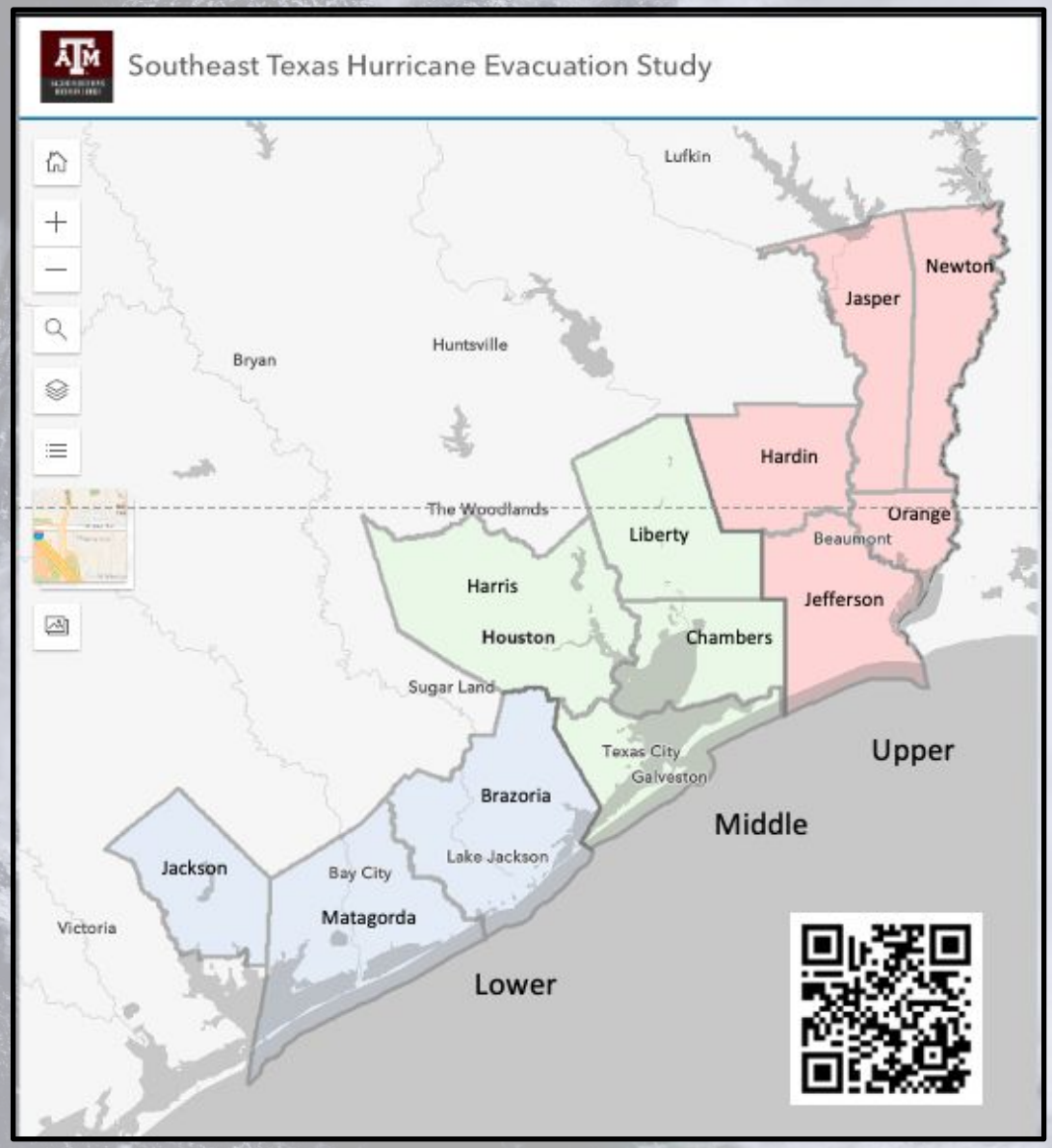


Next steps:

1. Meetings – in person and virtual – with stakeholders from each planning area
2. Agreement in guidelines (see slide 8)
3. Reviewing and working with the data
   - Both in and outside of meetings
4. Proposing, considering, and reconsidering options
5. Developing consensus
   - both within and among counties

- This will be an iterative process.
- Goal will be to have agreement and consensus by the end of May early June. Remember these zones will be for 2025.

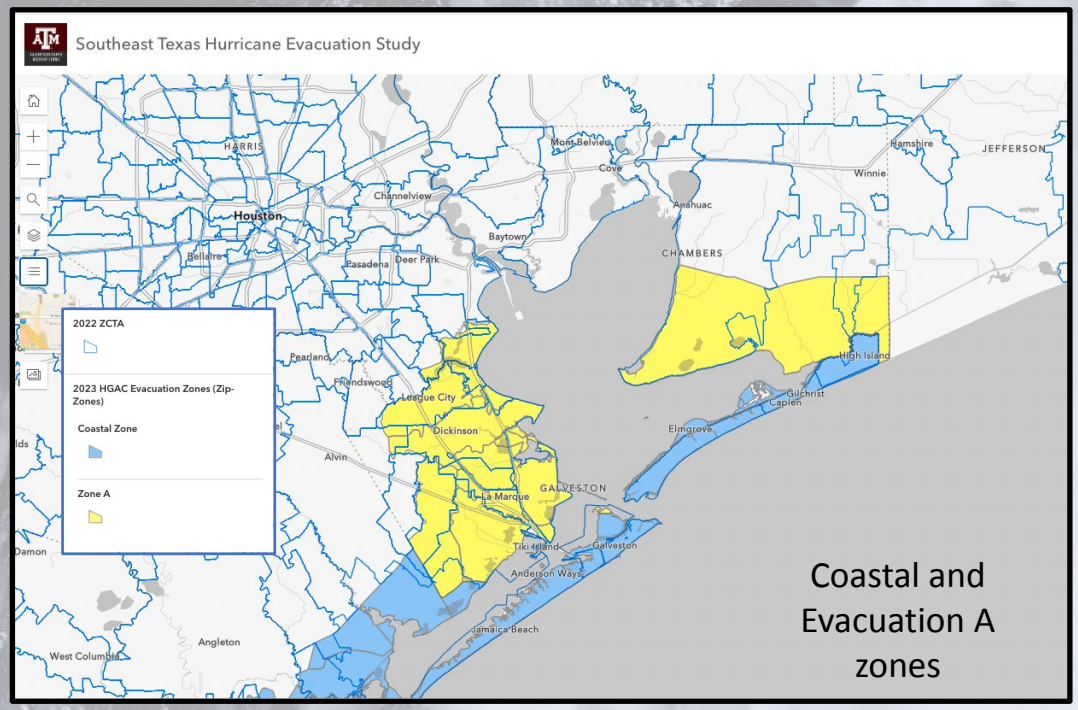
Phase 1: First Regional Meetings

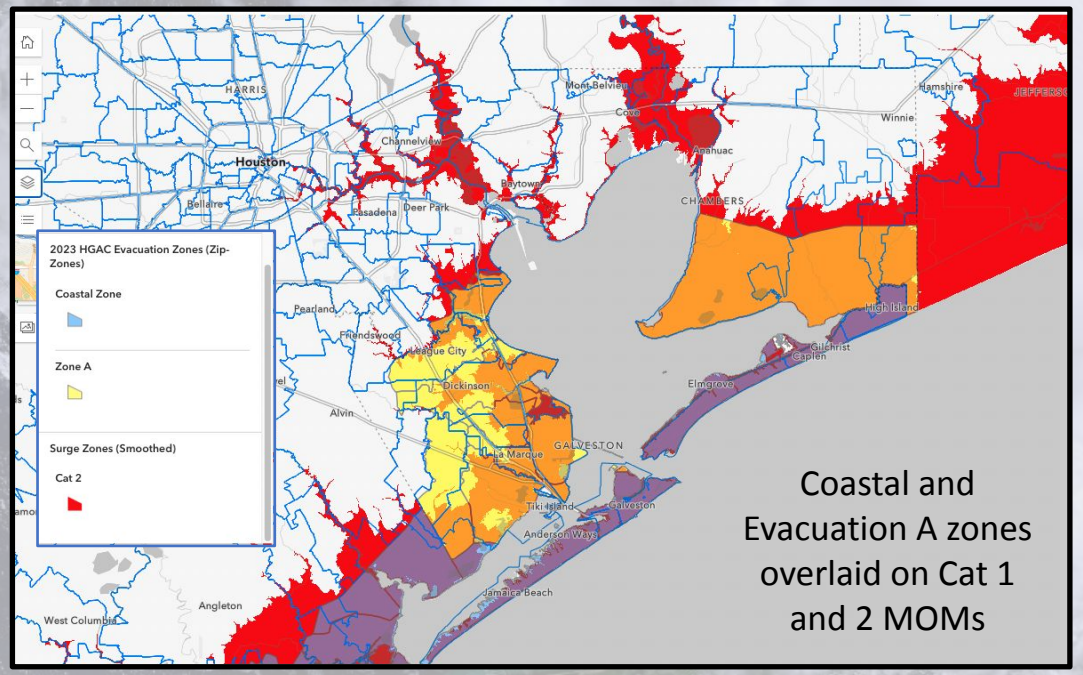


- **Meeting #1 Middle Planning Zone**
  - Dates: 3/18/24 (half-day on 3/19 if needed)
  - Chambers, Galveston, Harris, and Liberty Counties
  - Walter Hall Park
  - 807 State Hwy 3 N.
  - League City TX 77573
  - Set-up for 150 attendees (can hold 300)
- **Meeting #2 Upper Planning Zone**
  - Date: 4/1/24
  - Hardin, Jasper, Jefferson, Newton, and Orange Counties
  - Orange County Convention and Expo Center
  - 11475 FM 1442
  - Orange, TX 77630
  - Set-up for 50 attendees (can hold 200+)
- **Meeting #3 Lower Planning Zone**
  - Date: 4/15/24
  - Brazoria, Jackson, and Matagorda Counties
  - Lake Jackson Civic Center
  - 333 TX-332
  - Lake Jackson TX 77566
  - Set-up for 100 attendees

Agendas distributed prior to meetings and potentially a virtual pre-meeting to distribute information and discuss goals.

Again, please put your name, organization, county, and contact information in the chat so we can contact you.





Example content and activities for initial meetings:

1. Review and agree on general guidelines (see slide 8)
   - Please, share problems and issues prior to meetings if possible
2. Review and work with data layers
   - Suggest/provide for additional layers
   - A virtual pre-meeting is possible, if necessary
   - Remember the website will evolve and change
     - Likely to have a landing page, with a new website link and links to maps, documents, and layers.
   - Work with site and layer prior to meetings
3. Propose, consider, and reconsider problem areas and produce solutions
   - Some problems may arise due to different contingencies across counties; others may be similar
   - Solutions may well vary as well
   - Some meetings will have subgroups focusing on specific counties/areas.
4. Develop consensus where possible
   - Strive for consensus within and among counties in the Southeast Texas region
     - evacuation/risk naming conventions, coloring, etc.
5. These meeting are only part of the process. additional vetting and meetings will be necessary.

Again, please put your name, organization, county, and contact information in the chat so we can contact you.

Data and input needs

- Please inform and provide:
  - Additional evacuation zones or similar areas employed for evacuation decisions or call.
  - Additional flooding data, particularly related to
    - Roadways
    - Areas outside FEMA flooding zones
  - Input regarding additional community based or other data you would like to include to facilitate evacuation zone development/modifications.
- Vulnerability analysis and data
  - If there are additional data or analyses, you would like to see in the vulnerability assessment please communicate with the team.
  - Parcel and land use data will be particularly useful
  - Special needs listings and registries, etc. can be helpful
    - We can protect PII
  - MOUs related to evacuation and sheltering locally and host counties/communities
  - mitigation and recovery related data and information

Questions & Discussion

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.deruise@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
    - **David Bierling:** d-bierling@tti.tamu.edu
      - Overall team management, coordination, and data analysis
    - **Doug Wunneberger:** dwunneburger@arch.tamu.edu
      - GIS and data development and analysis, website development
    - **Darrell Borchardt:** d-borchardt@tti.tamu.edu
      - Transportation scenario development and analysis
    - **Alexander Abuabara:** aabuabara@arch.tamu.edu
      - GIS & data development and analysis and website development and maintenance