

CRS Users Group/Elected Officials Floodplain Seminar & CHARM Policy Workshop



July 18, 2019

Earl Anthony Room, International Bowling Museum & Hall of Fame
621 Six Flags Drive, Arlington, TX 76011

AGENDA

<u>Time</u>	<u>Topic</u>	<u>Speaker</u>
9:00a-9:10a	Welcome and Introductions	<i>Mia Brown, CFM NCTCOG</i>
9:10a-9:40a	The Future of Flood Planning in Texas Updates from the 86 th Legislature	<i>Wes Birdwell, P.E. Halff Associates</i>
9:40a-10:10a	Base Level Engineering (BLE) Benefits and Uses of Community Driven Data	<i>Jarred Overbey, PE, CFM Halff Associates</i>
10:10a-10:40a	Floodplain Benchmarking	<i>Ben Pylant, PE, CFM Halff Associates</i>
10:40a-10:50a	Break	
10:50a-11:10a	Community Health and Resource Management (CHARM) Tool	<i>Steven Mikulencak, AICP Texas A&M AgriLife Extension Service</i>
11:10a-12:20p	CHARM Demonstration	<i>Steven Mikulencak, AICP Timothy Little Md Yousuf Reja Texas A&M AgriLife Extension Service</i>
12:20p-1:30p	Meeting Wrap-Up and Networking Lunch	

If you have any questions regarding the meeting or agenda items, please contact
Mia Brown: (817) 695-9227; MBBrown@nctcog.org

If you plan to attend this public meeting and you have a disability that requires special arrangements at the meeting, please contact Barbara Bradford by phone at (817) 695-9231 or by email at BBradford@nctcog.org 72 hours in advance of the meeting. Reasonable accommodations will be made to assist your needs.

NCTCOG CRS USERS GROUP/ELECTED OFFICIALS

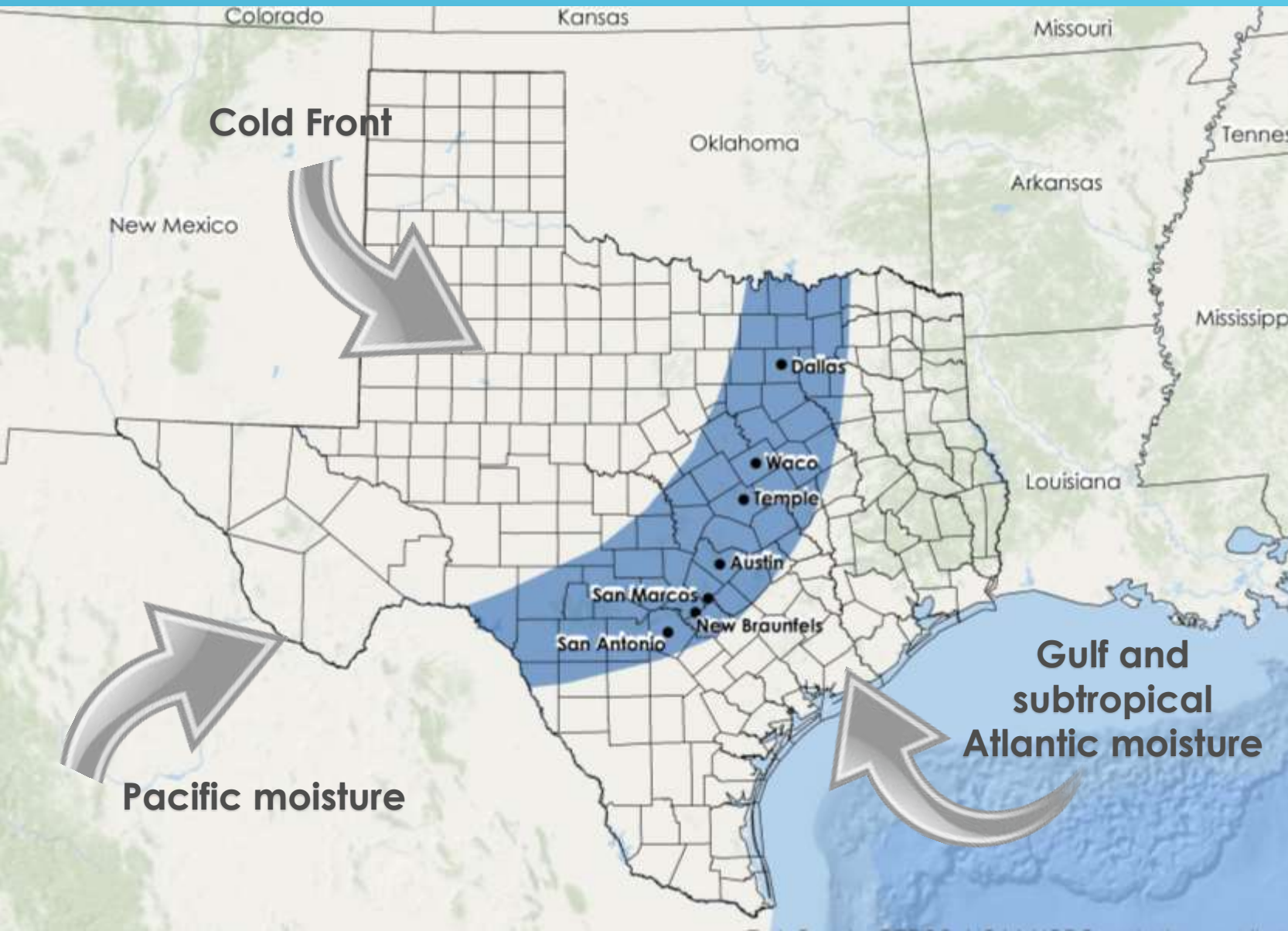
LEGISLATIVE UPDATE

ARLINGTON TX

July 18, 2019

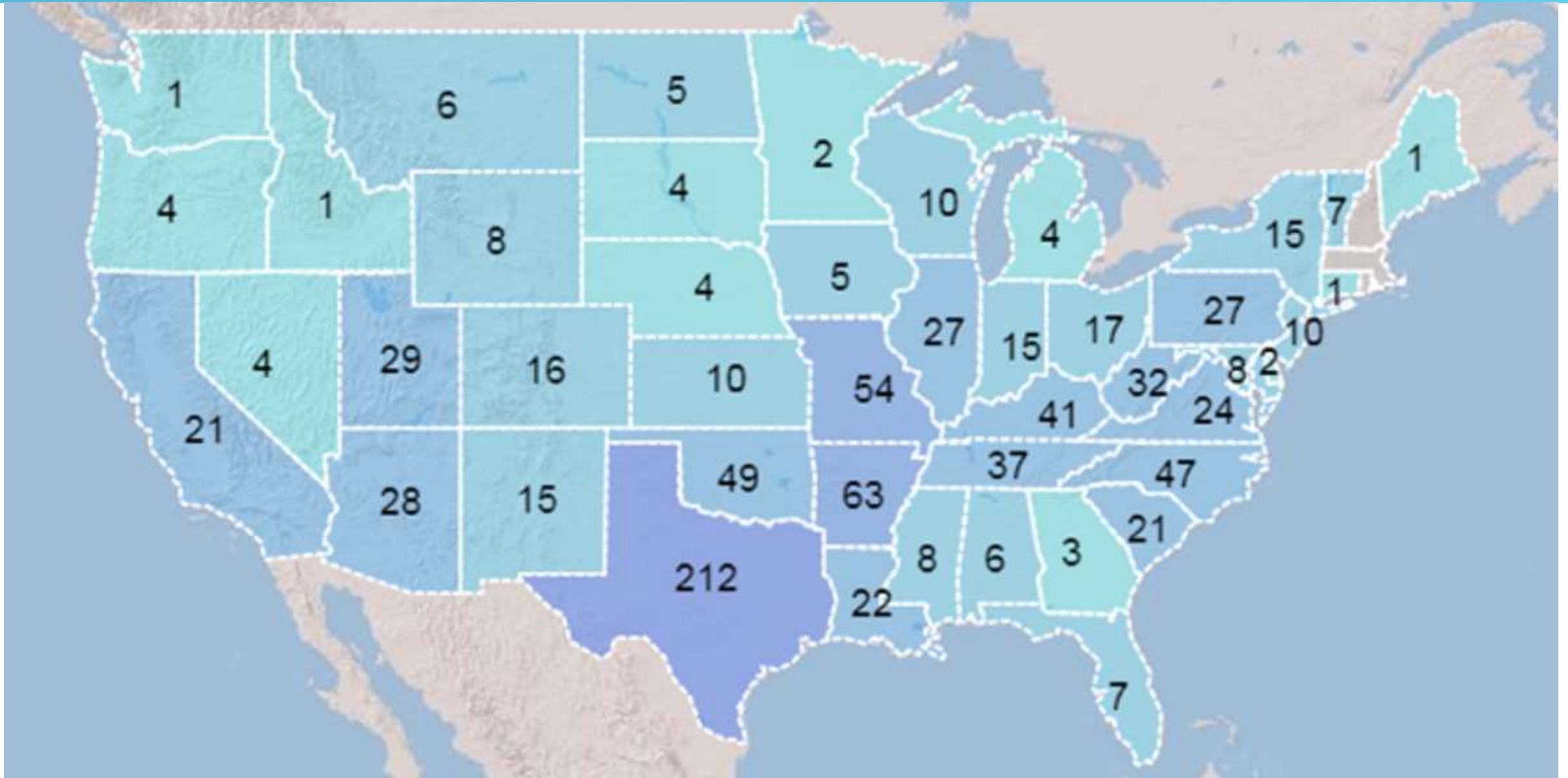
Wes Birdwell PE, Halff Associates Inc

TEXAS IS PRONE TO FLOOD

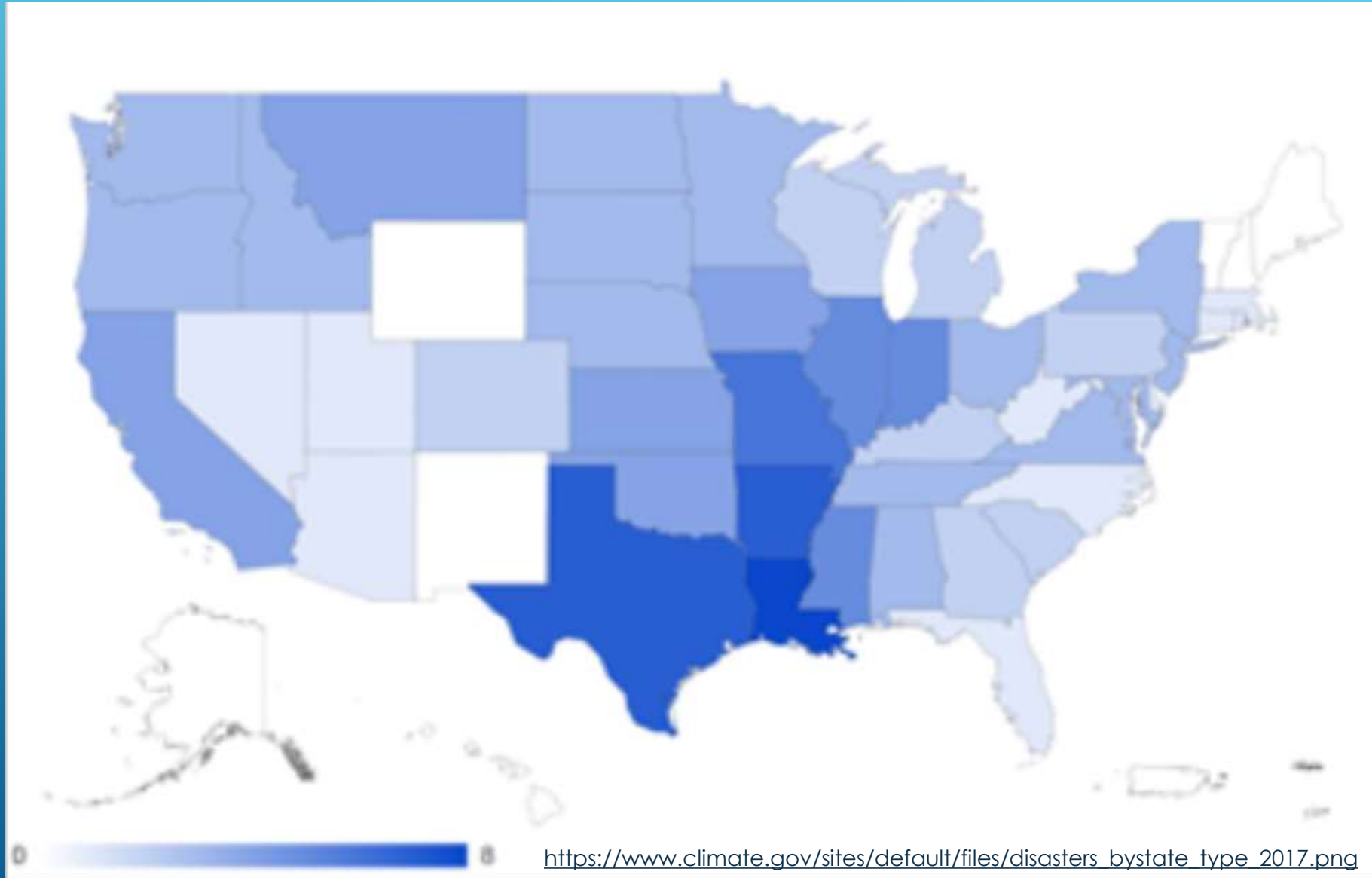


- ▶ Texas is geographically located to be subject to big floods
 - Anywhere
 - Anytime

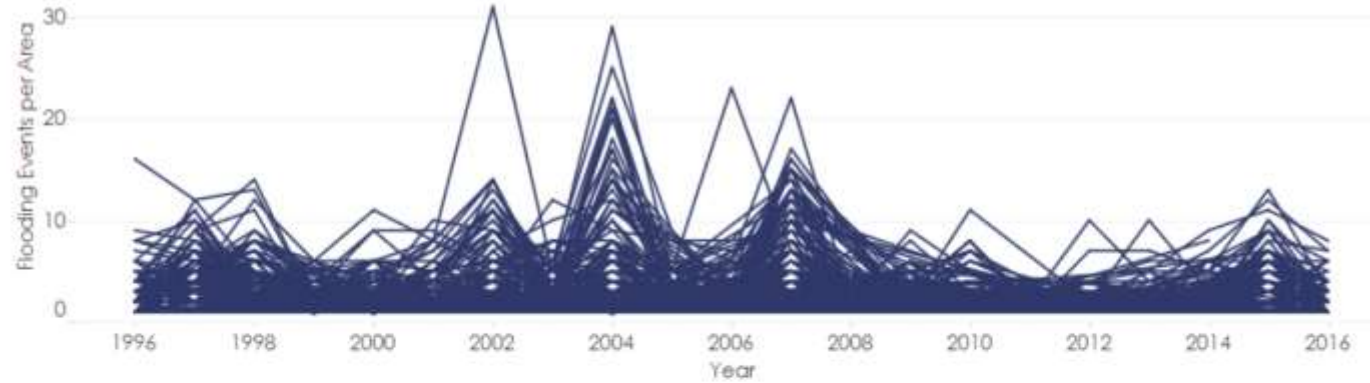
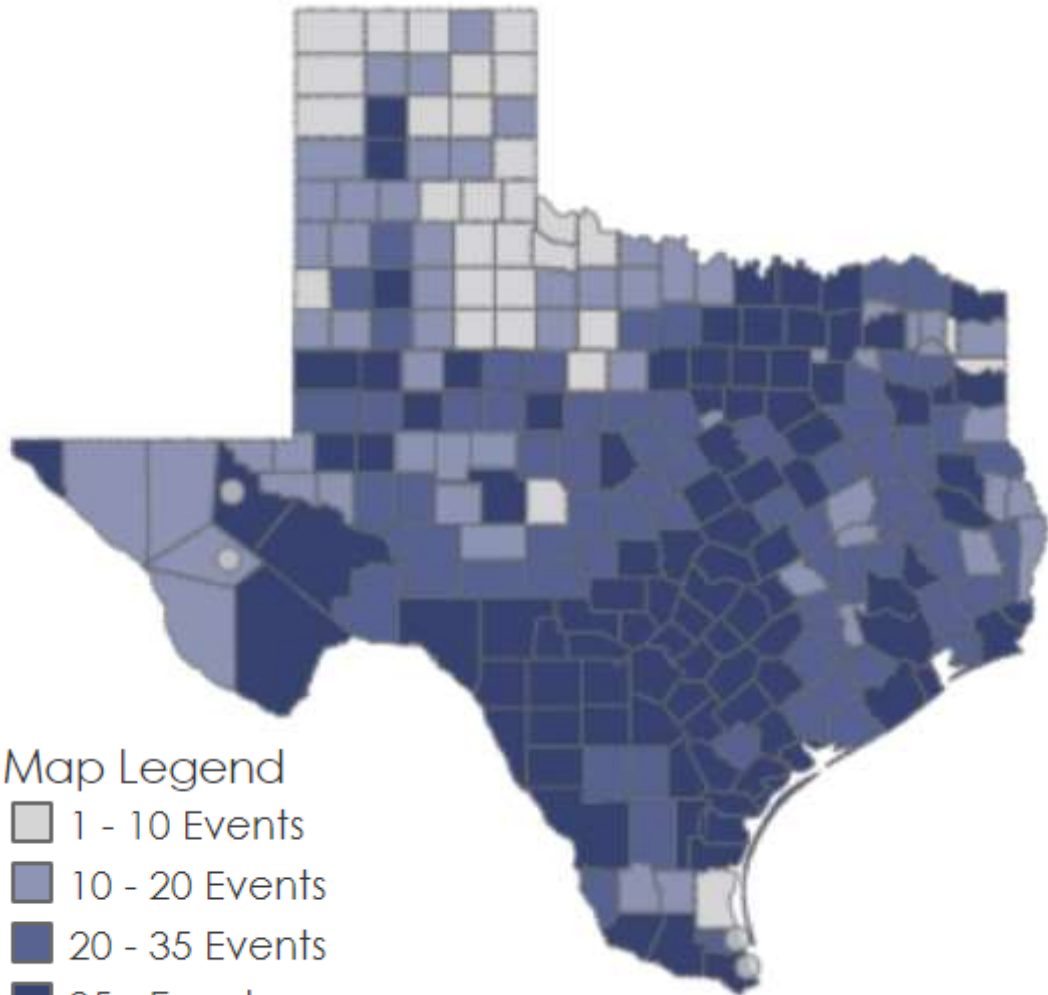
2010 – 2018 U.S. FLOOD FATALITIES



1980 – 2017 BILLION DOLLAR FLOODING DISASTERS BY STATE (CPI ADJUSTED)

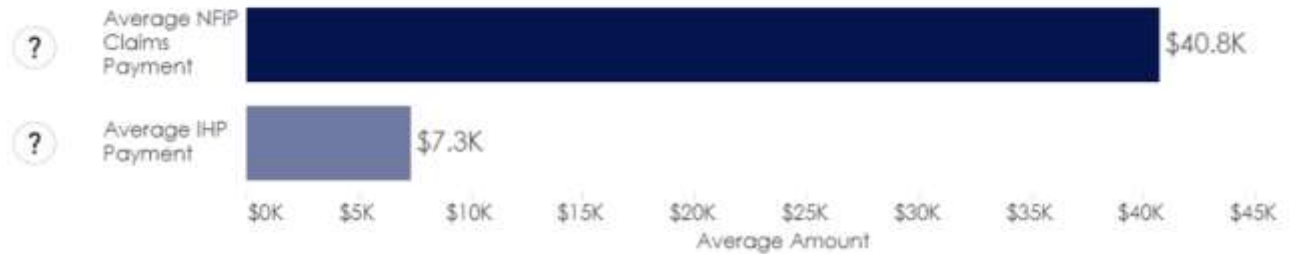


1996 -2016 FLOODING IN TEXAS



Costs of Flooding

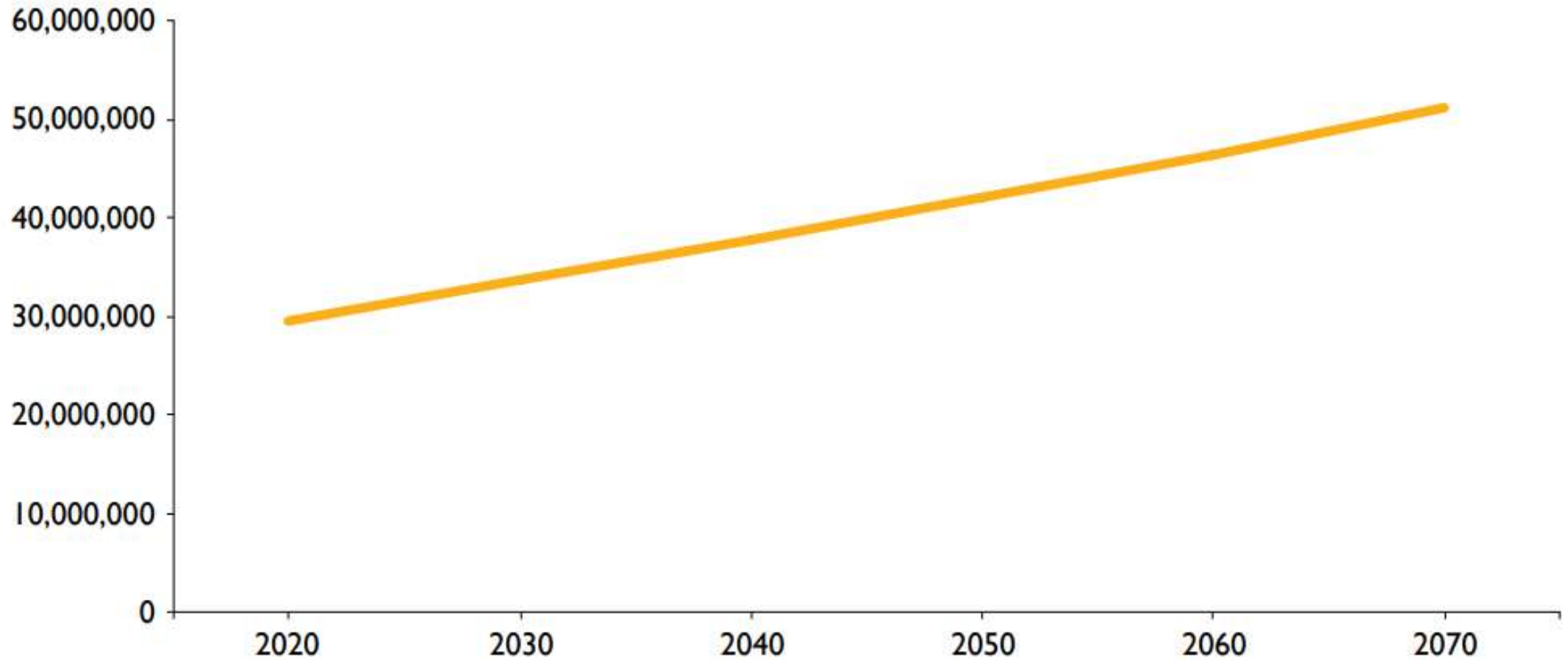
The National Flood Insurance Program (NFIP) provides flood insurance to homeowners, renters, and business owners. FEMA's Individuals and Households Program (IHP) provides financial assistance and direct services to eligible individuals and households who have uninsured or underinsured necessary expenses and serious needs. See differences in NFIP claims paid to individuals from 1996-2016 and funding from IHP for flood-related damages from 2006-2016 for your state.



TEXAS PROJECTED POPULATION



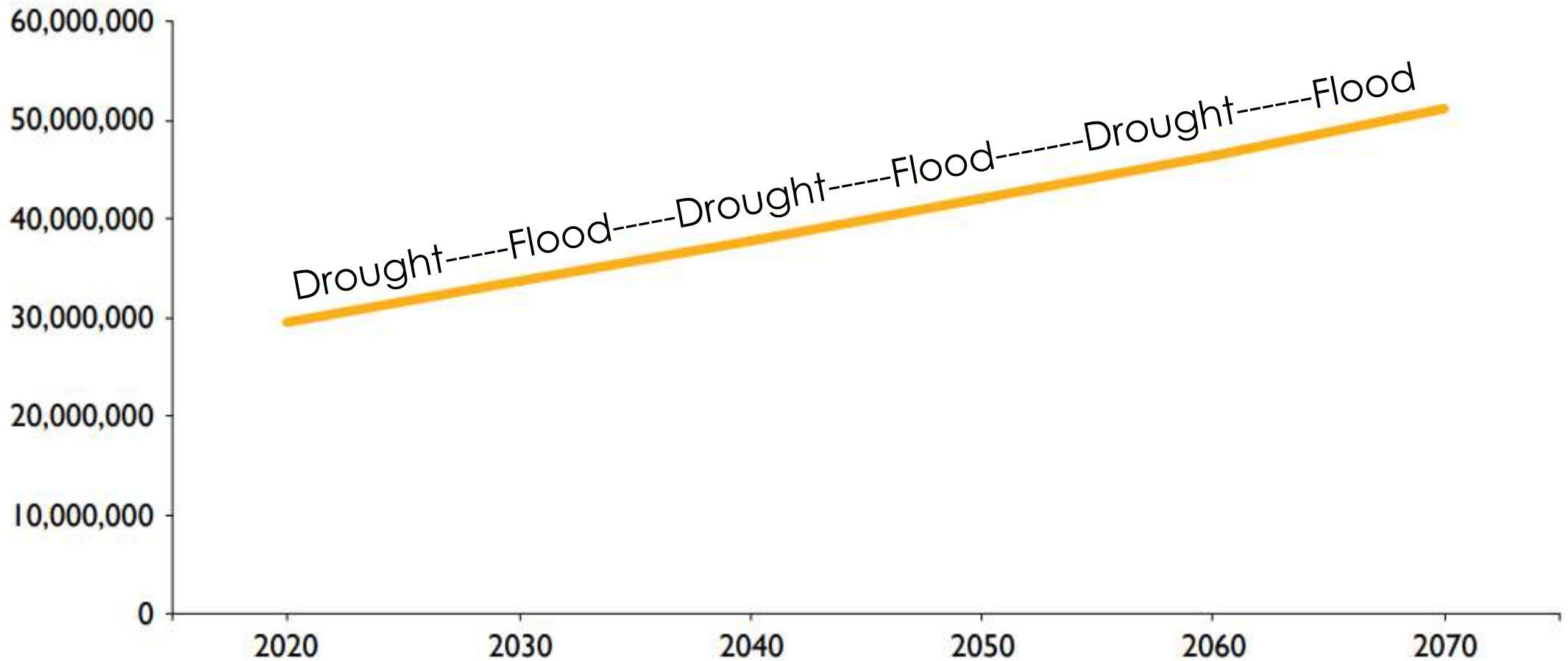
Figure 5.1 - Projected population in Texas



TEXAS DROUGHT/FLOOD CYCLE



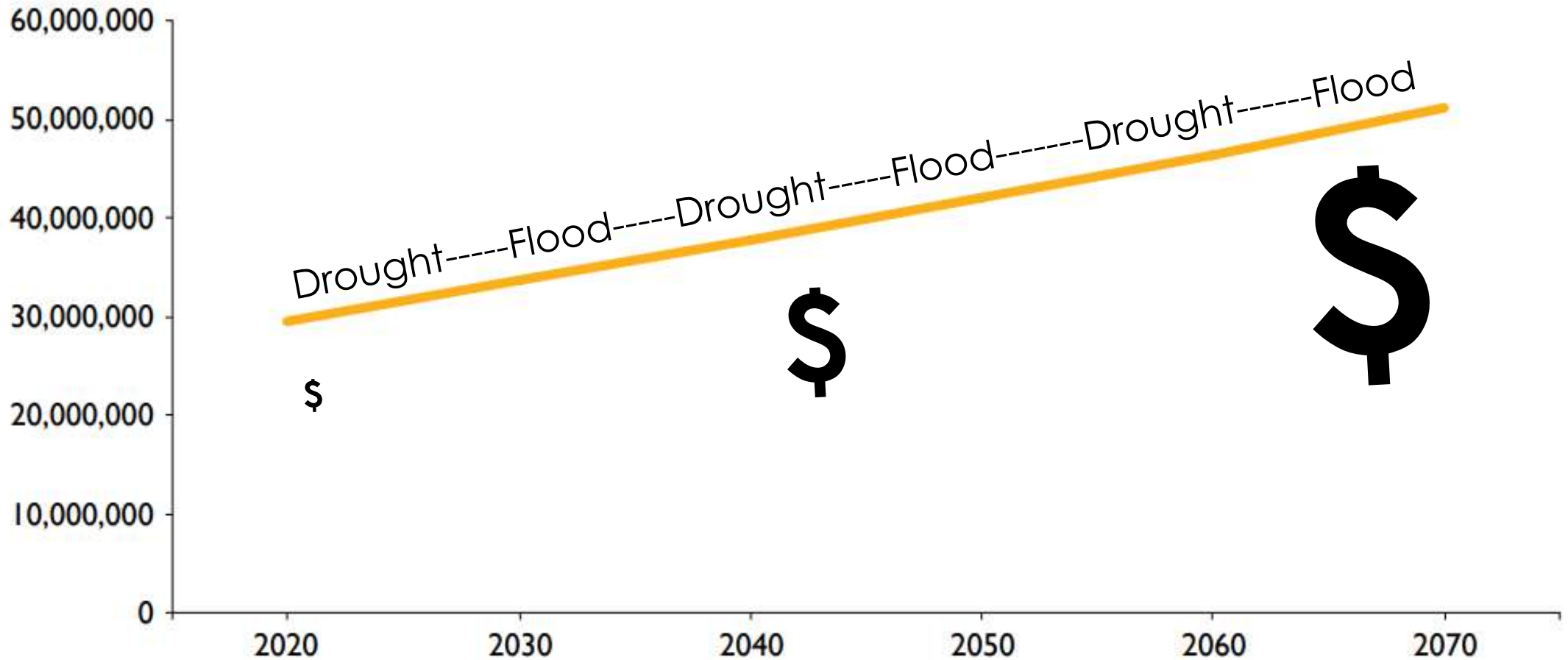
Figure 5.1 - Projected population in Texas



TEXAS INCREASING FLOOD DAMAGES

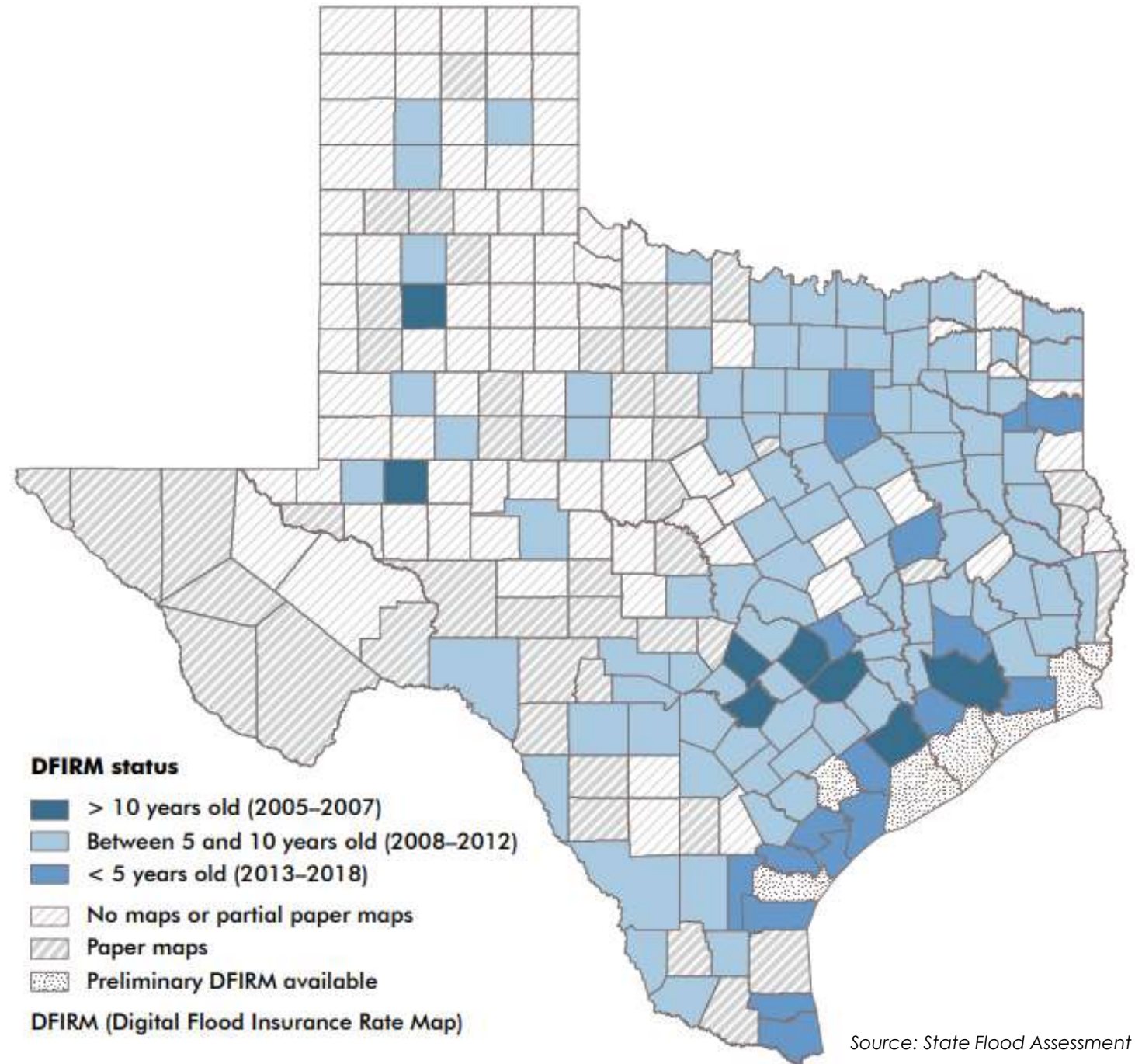


Figure 5.1 - Projected population in Texas



TEXAS FLOOD RISK DATA IS OUTDATED:

- ▶ FEMA FIRM's are used as the best available flood risk information in most communities
- ▶ Much of the FEMA information is dated
- ▶ Currently difficult to plan and mitigate
- ▶ We need to start with current information, updated maps





NOT "ONE SIZE FITS ALL"

- ▶ A single approach will not work for all of Texas
 - Riverine Flood
 - Coastal Flood
 - Urban Flood
 - Residual Risk
 - Dams
 - Levees

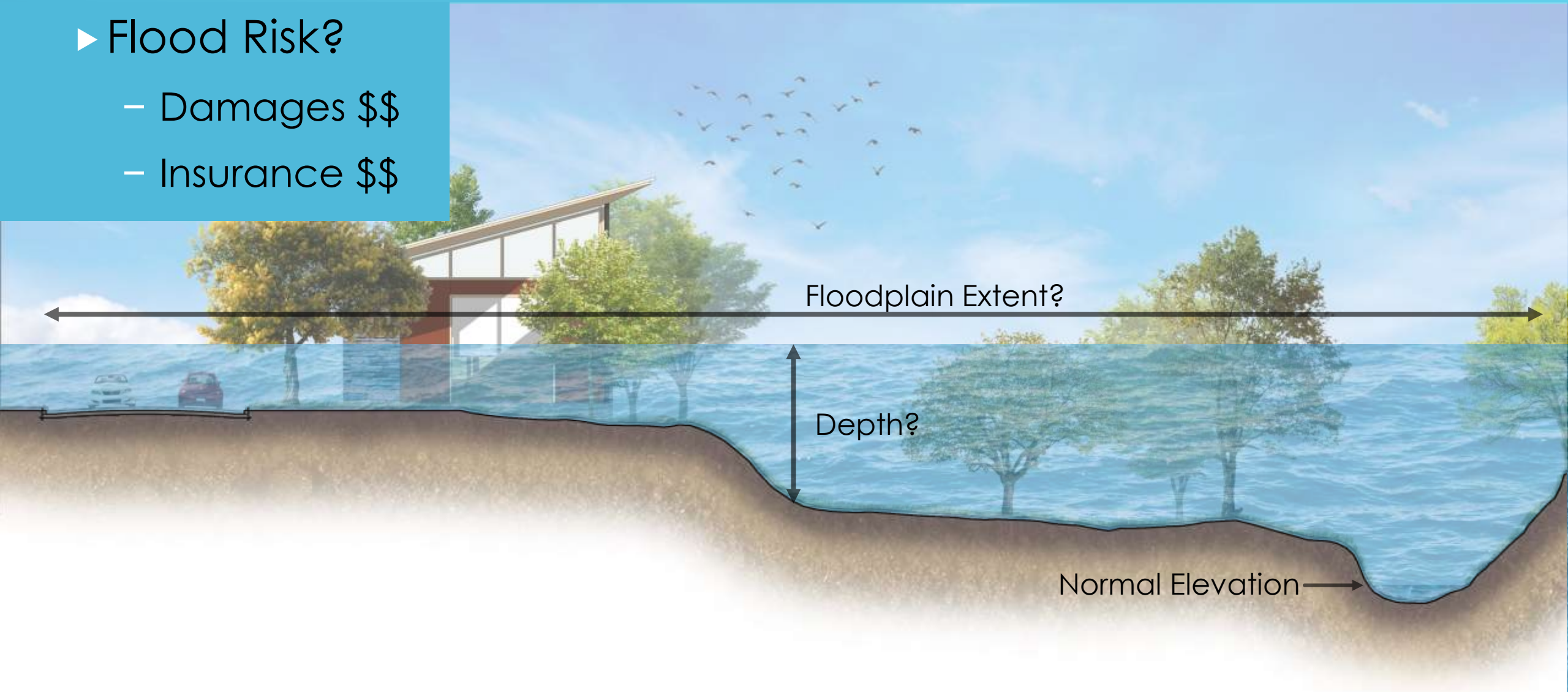


INSUFFICIENT FLOOD RISK INFORMATION



► Flood Risk?

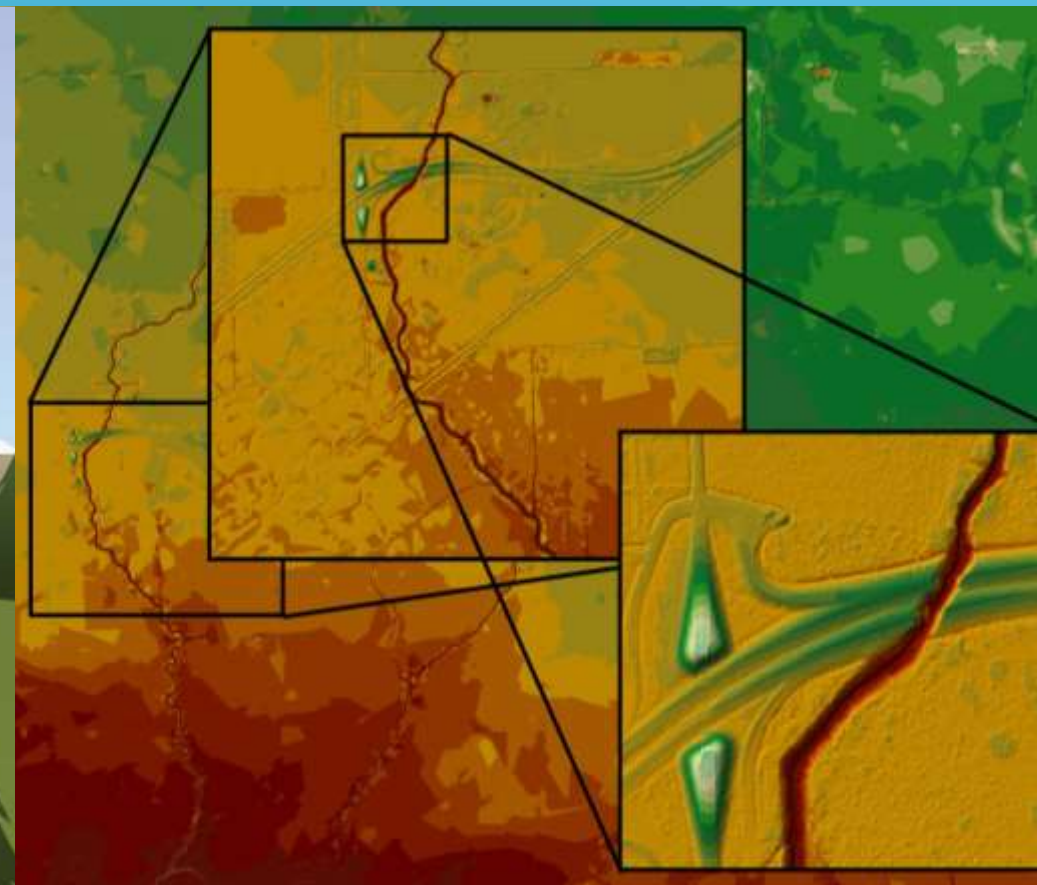
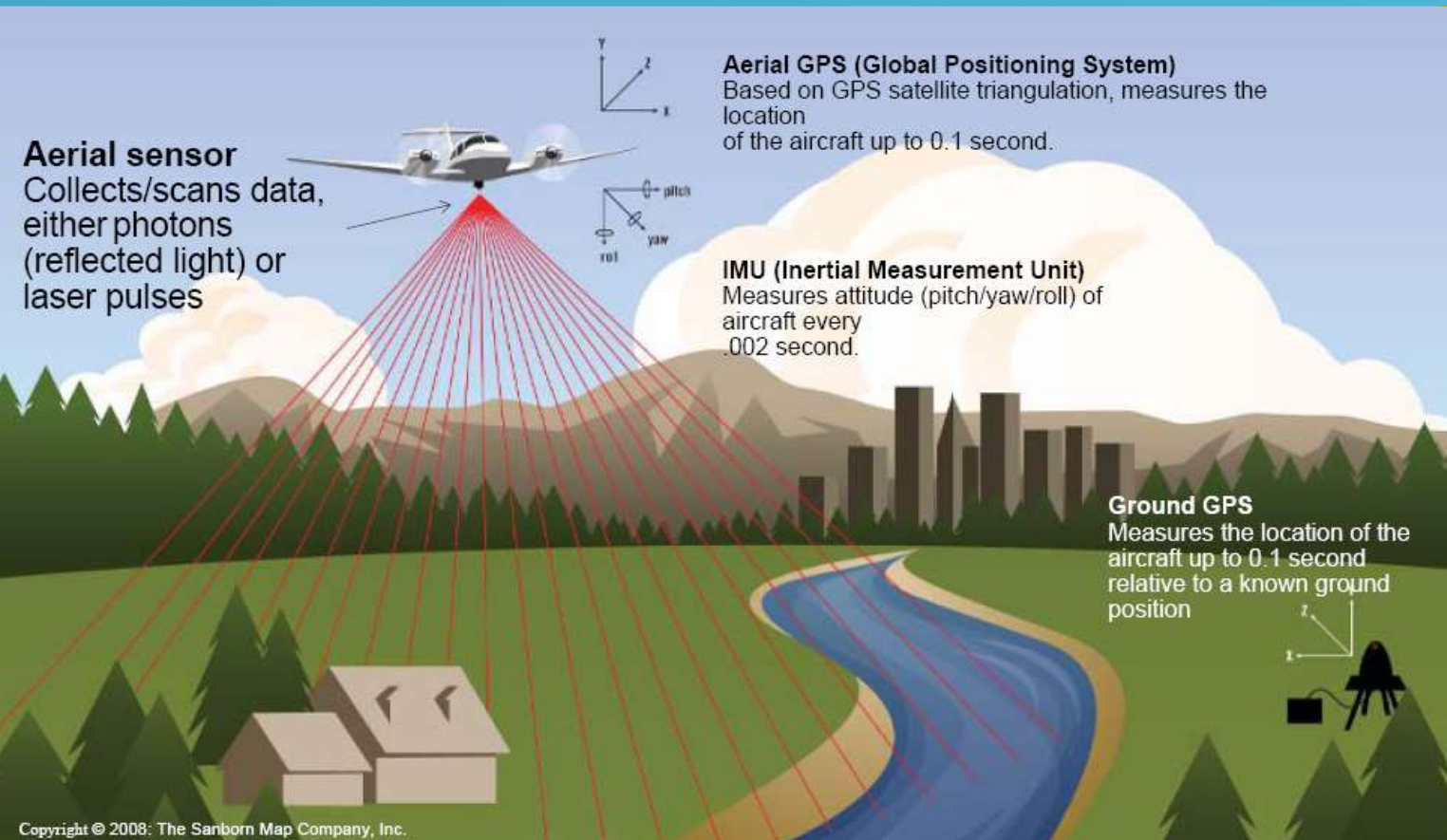
- Damages \$\$
- Insurance \$\$



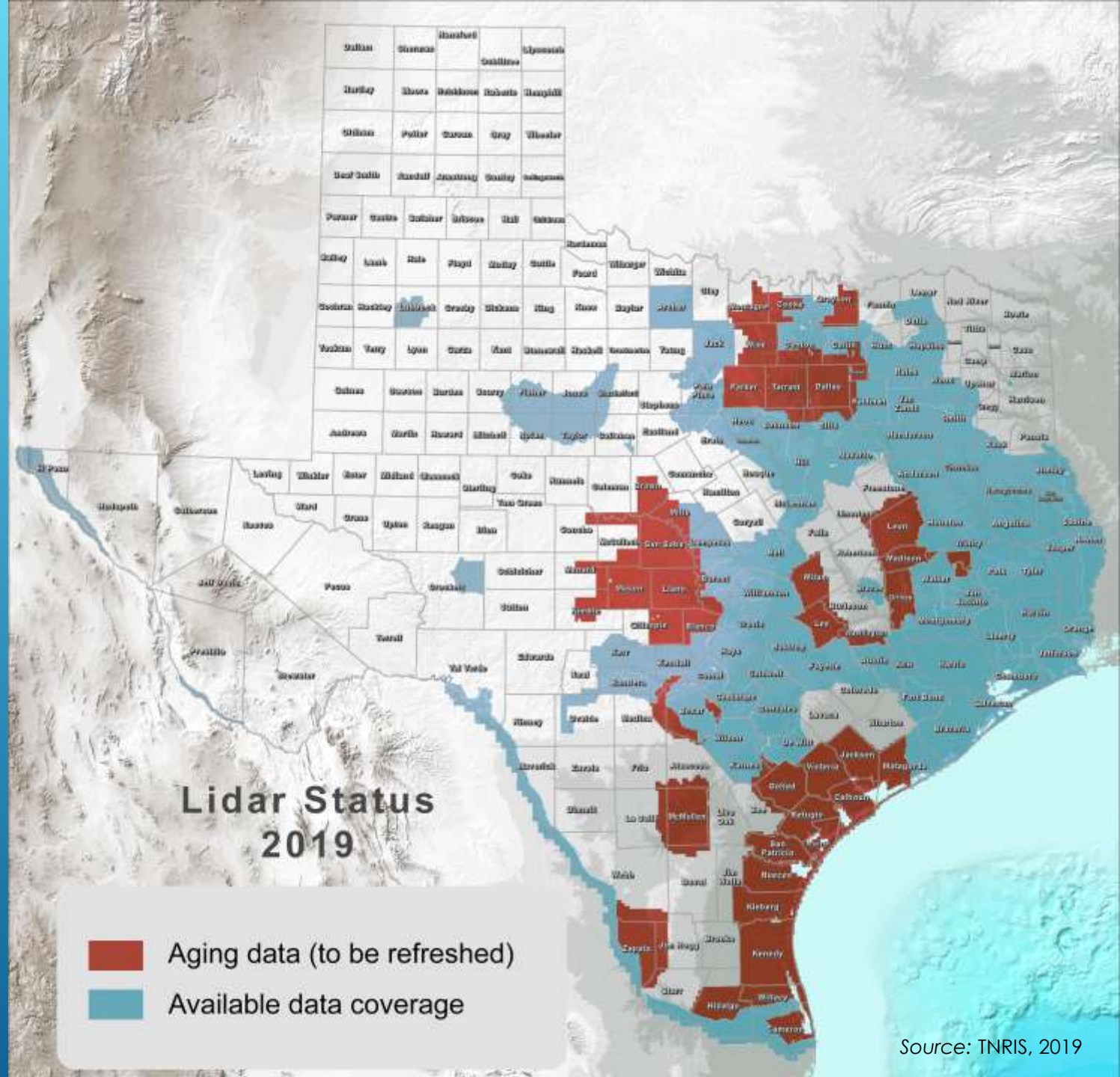


LIGHT DETECTION AND RANGING (LIDAR)

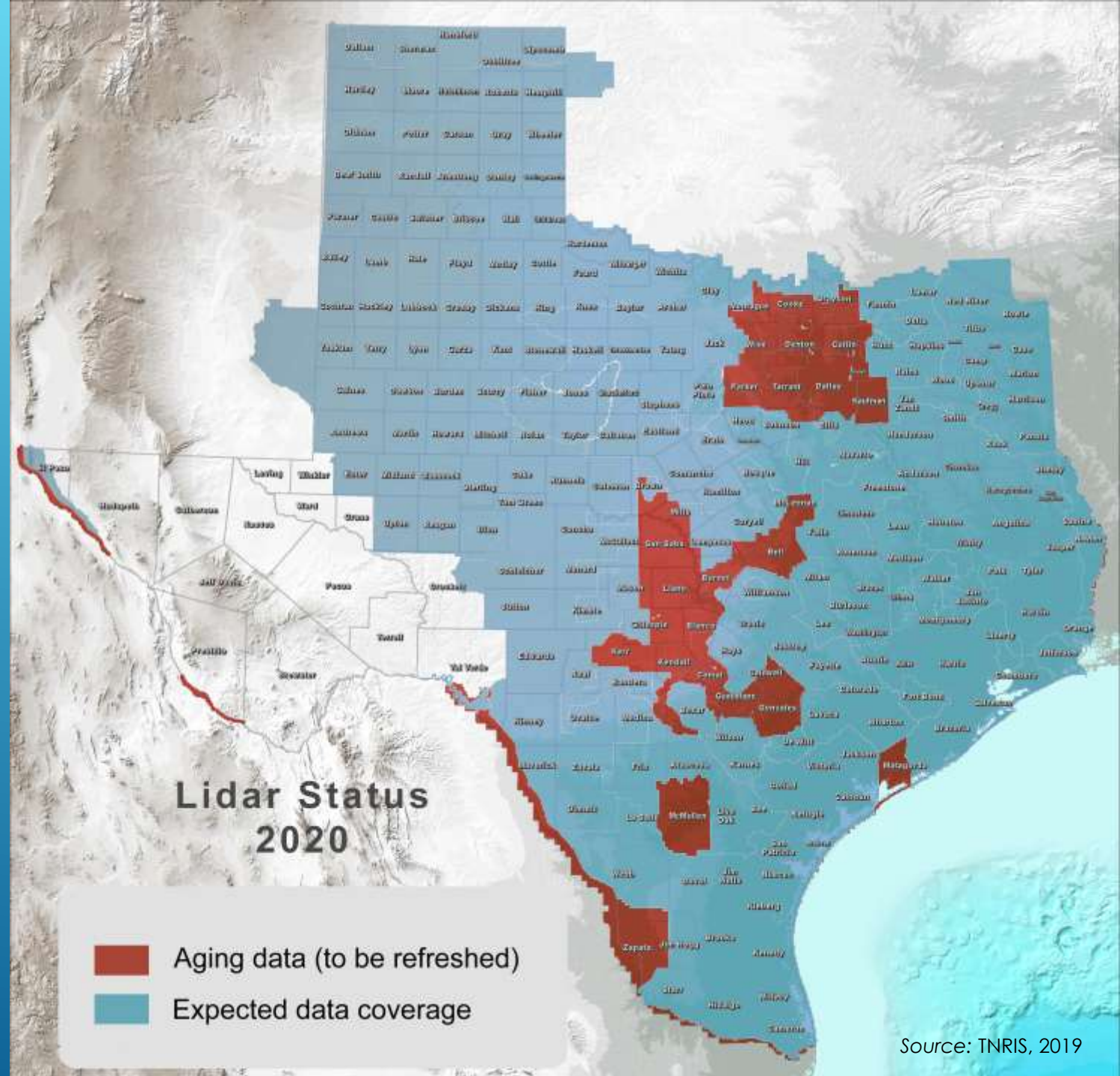
- ▶ Remote sensing system that uses laser light to measure distances



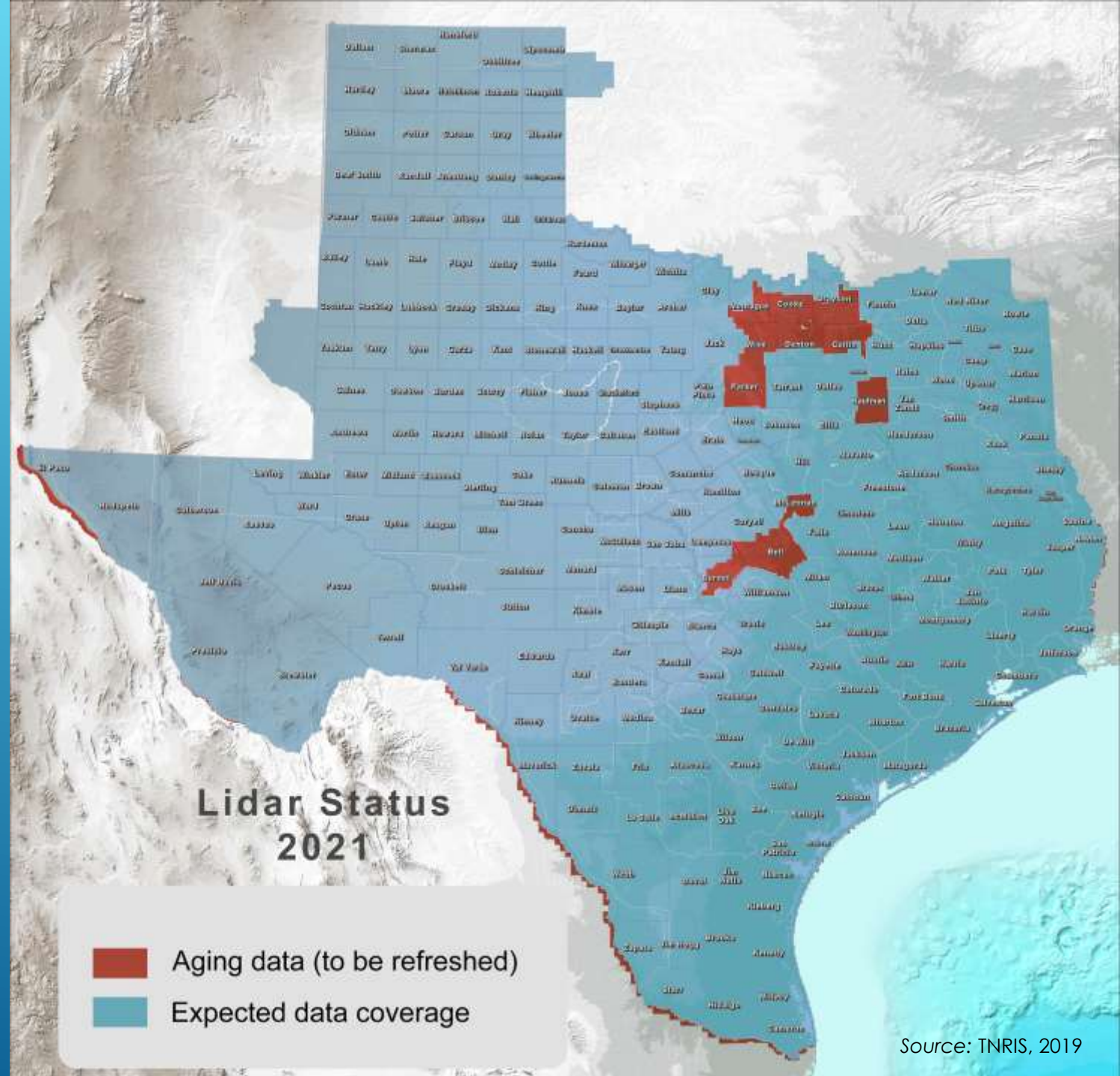
LIDAR STATUS: 2019



LIDAR STATUS: 2020



LIDAR STATUS: 2021



CHANGING RAINFALL DATA FOR TEXAS



1961 TP-40

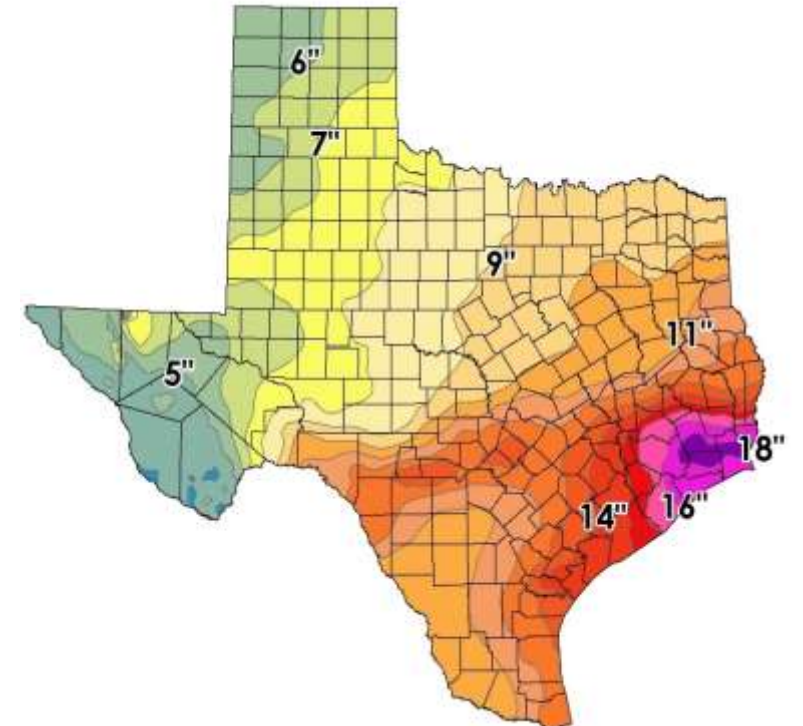
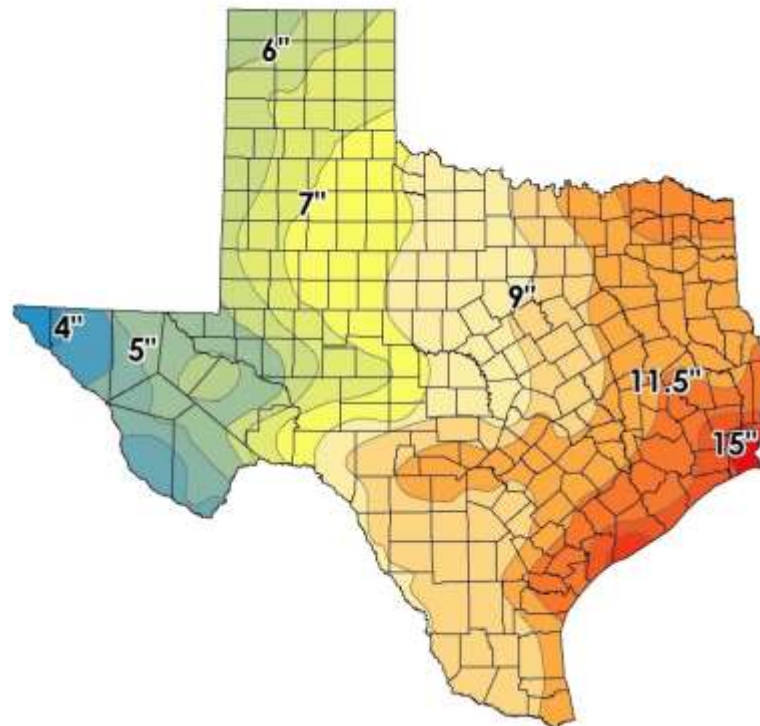
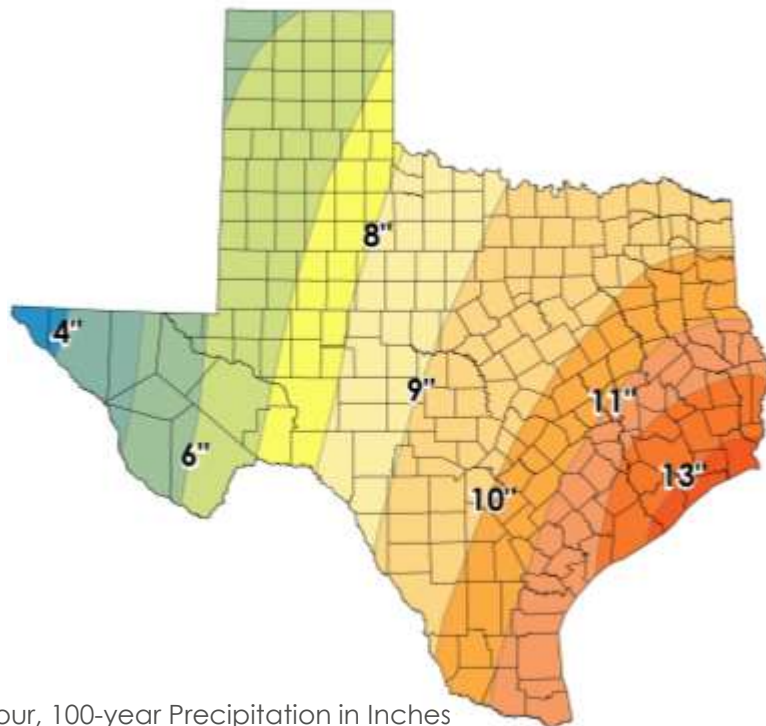
- ▶ Weather Bureau Technical Paper 40
 - Rainfall up to 1958

1998 USGS

- ▶ Depth-Duration Frequency of Precipitation for Texas
 - Rainfall up to 1994

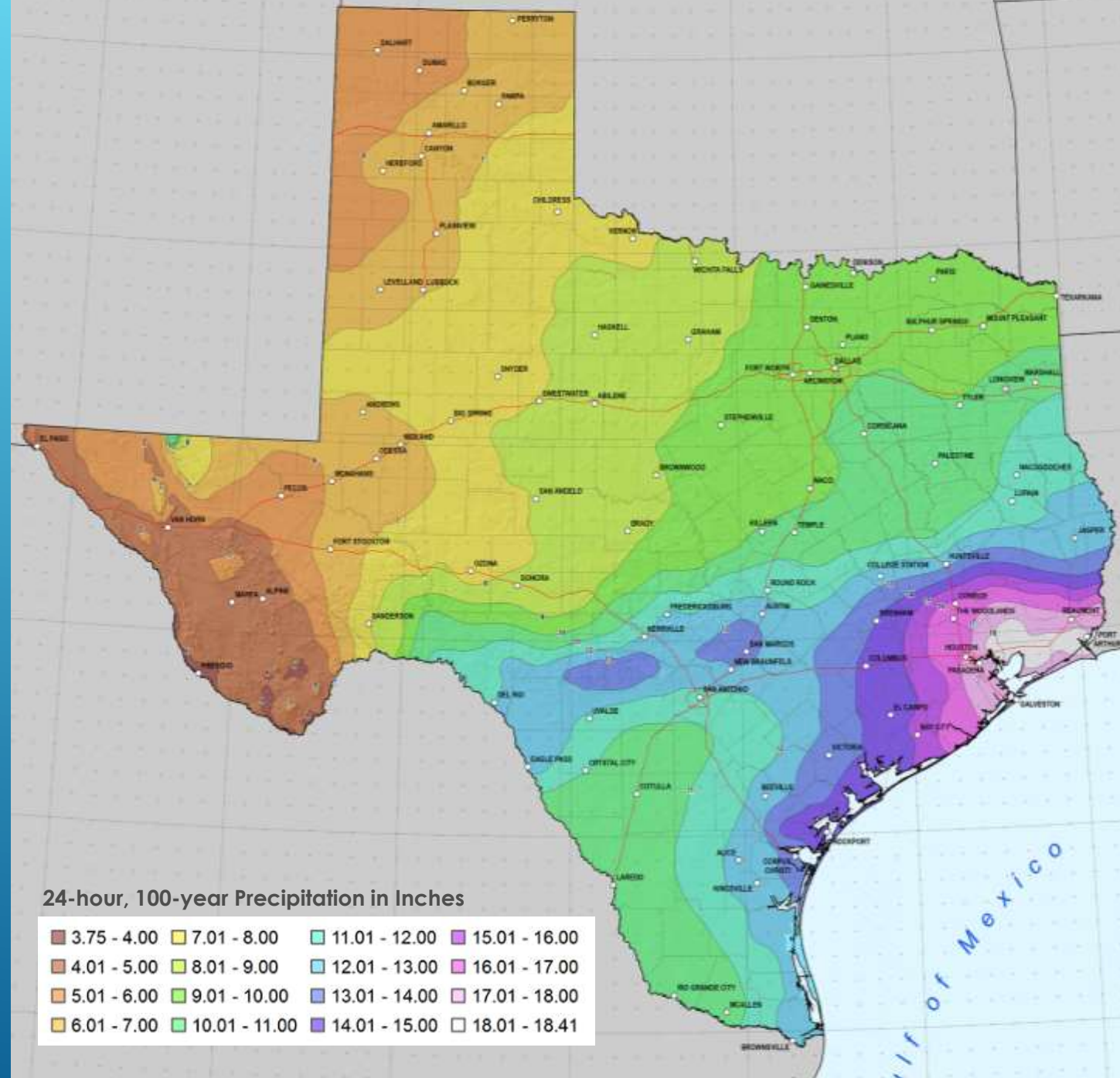
2018 Atlas 14

- ▶ NOAA Atlas 14, Volume 11 Precipitation Frequency Atlas of the United States, Texas
 - Rainfall up to 2017



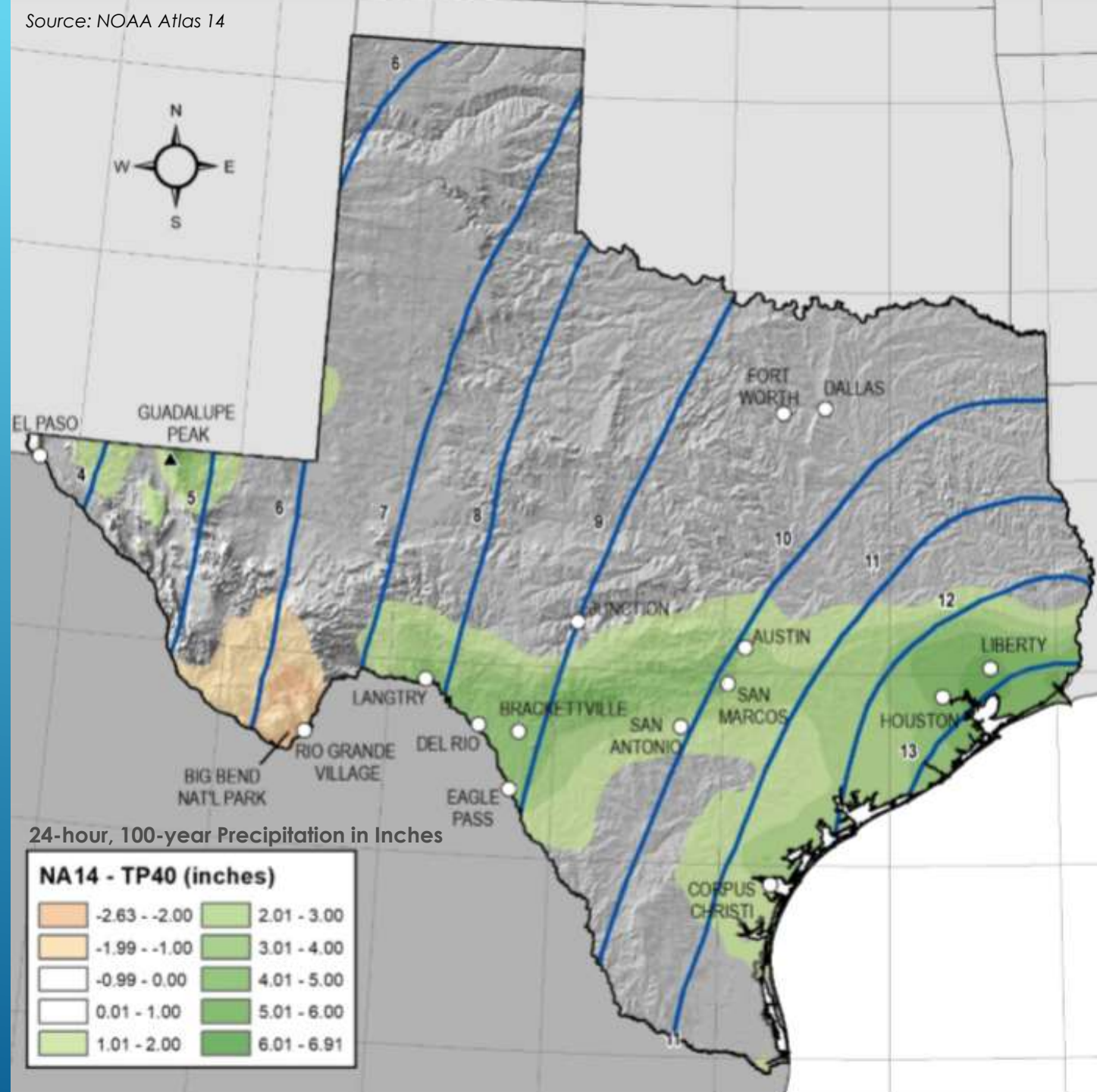
ATLAS 14 RAINFALL

- ▶ Released September 27, 2018
- ▶ Atlas 14 indicates that the 1% (100-year) annual chance event may be greater than what we previously considered.
- ▶ The greatest rainfall changes occur in central Texas and along the Texas coast.



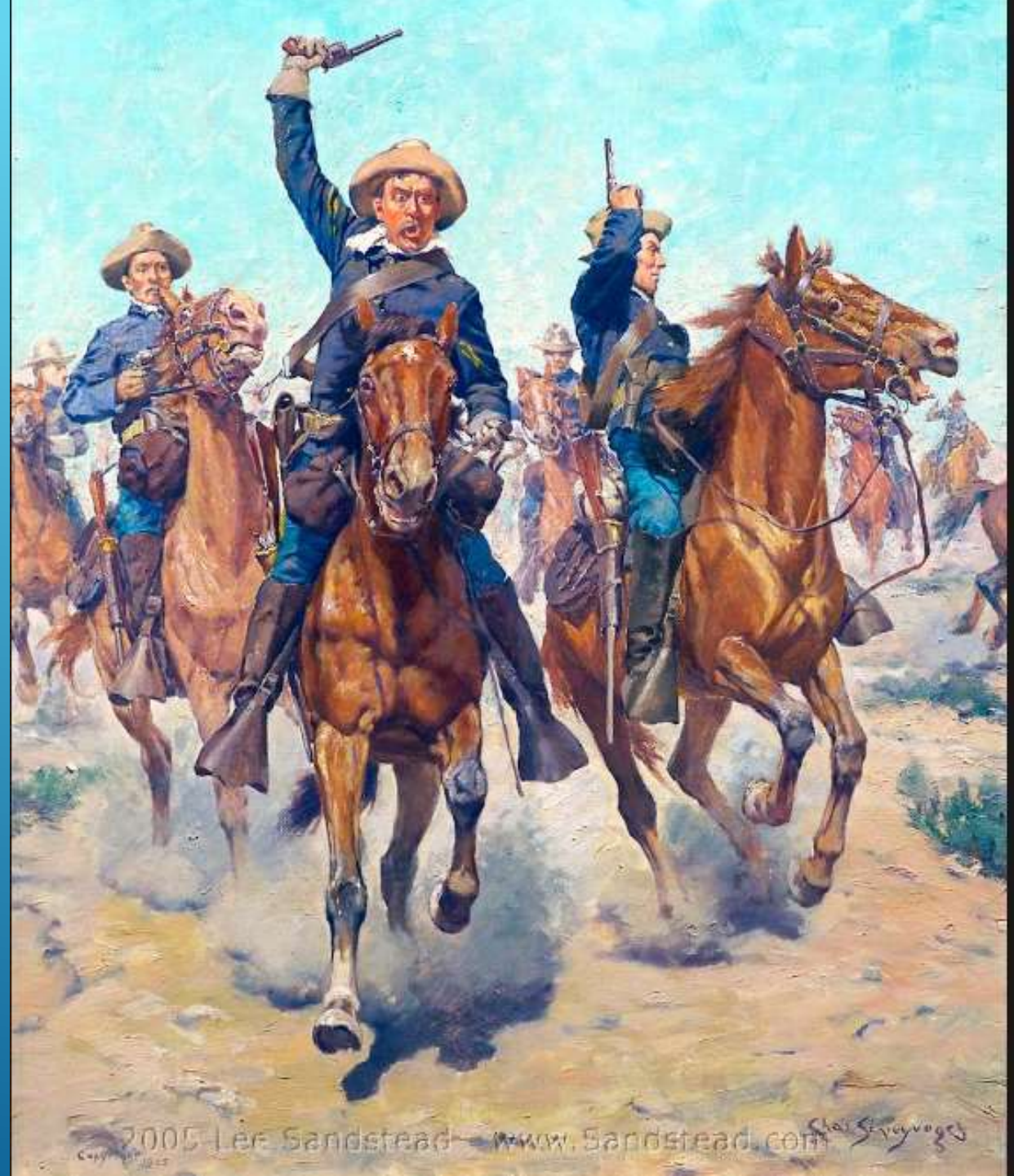
ATLAS 14 RAINFALL

- ▶ Atlas 14 compared to TP-40
 - Adds almost 60 years of data
 - Many additional gages



HELP IS ON THE WAY!

- ▶ Informed by the TWDB State Flood Assessment
- ▶ Tremendous Local Support
- ▶ 86th Legislation passed 3 Bills
 - SB 7 (Infrastructure Funding)
 - HJR 4 (Constitution Amend)
 - SB 8 (State Flood Plan)



State Flood Assessment



**REPORT TO THE
LEGISLATURE**

86TH LEGISLATIVE SESSION



TWDB STATE FLOOD ASSESSMENT

▶ Charts a path to flood resilience:

1. Mapping
2. Planning
3. Mitigation

<http://www.texasfloodassessment.com/doc/State-Flood-Assessment-report-86th-Legislation.pdf>

SENATE BILL (SB) 7



- ▶ Infrastructure funding for planning, design, and construction
- ▶ Recovery and Resiliency
- ▶ Structural and non-structural flood projects
- ▶ Will be managed by the TWDB
- ▶ Loans, low interest (down to “zero”), and grants
- ▶ TWDB will develop rules for this fund
- ▶ Encourages federal involvement
- ▶ Looks for water supply
- ▶ Complicated, ask a banker



HOUSE JOINT RESOLUTION (HJR) 4

- ▶ Amend the Constitution to set up infrastructure fund
- ▶ Public vote this fall
- ▶ Get out the vote



SENATE BILL (SB) 8

- ▶ Requires TWDB to develop rules by **Sep 2021**
- ▶ Requires regional watershed based plans be developed for each river basin by cities, counties, river authorities, special districts, utilities, etc. by **Sep 2023**
- ▶ Requires development of a statewide flood plan by **Sep 2024**
- ▶ To be **updated** every subsequent **five years**

SB 8



- ▶ Designate flood planning regions corresponding to each river basin
- ▶ Provide financial and technical assistance to flood planning groups
- ▶ Designate representatives from each flood planning region
- ▶ Regional flood planning groups can then add additional members
- ▶ Evaluate condition and adequacy of existing flood infrastructure
- ▶ Ranked statewide list of ongoing and proposed flood control and mitigation projects and strategies

STATEWIDE FLOOD PLAN FUNDING



▶ Requested State Funding

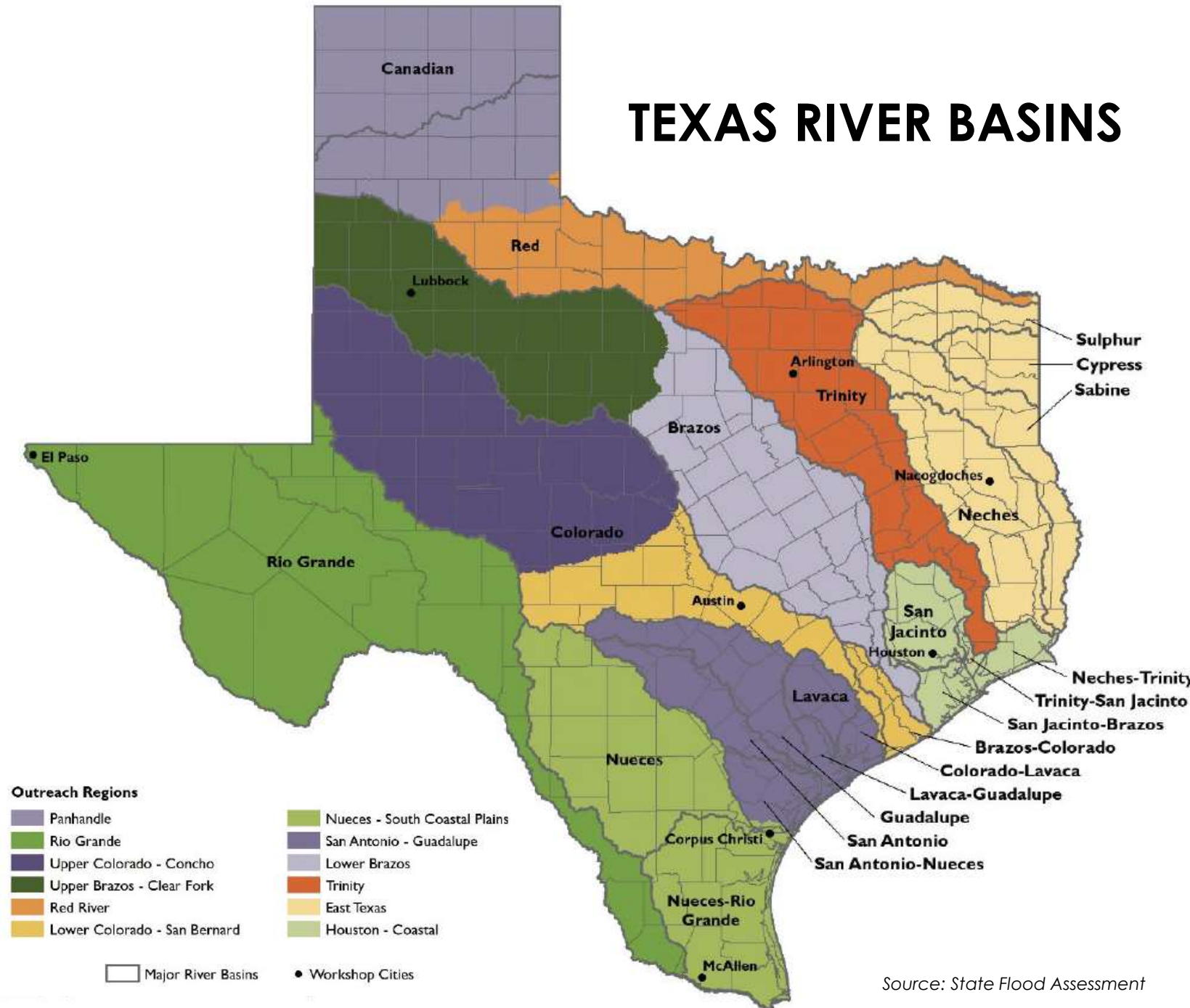
- FY 2020-2021: \$47 Million
- FY 2022-2023: \$87 Million
- FY 2024-2025: \$43 Million



WATERSHED FLOOD PLANS

- ▶ Local flood plans roll up to a....
- ▶ Regional (watershed) flood plans roll up to a ...
- ▶ Statewide flood plan!

TEXAS RIVER BASINS



Source: State Flood Assessment

IMPROVED FLOOD RISK INFORMATION

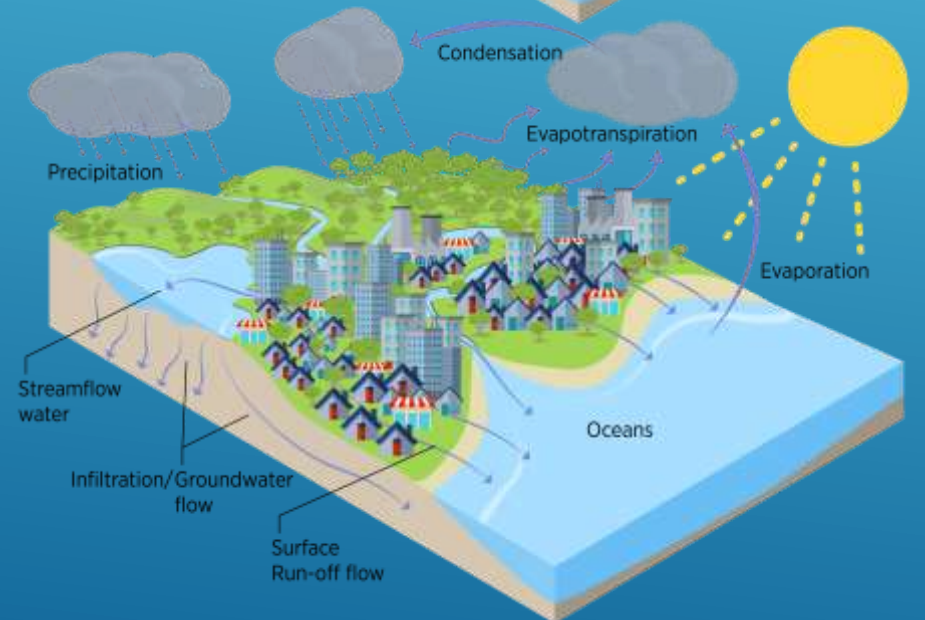
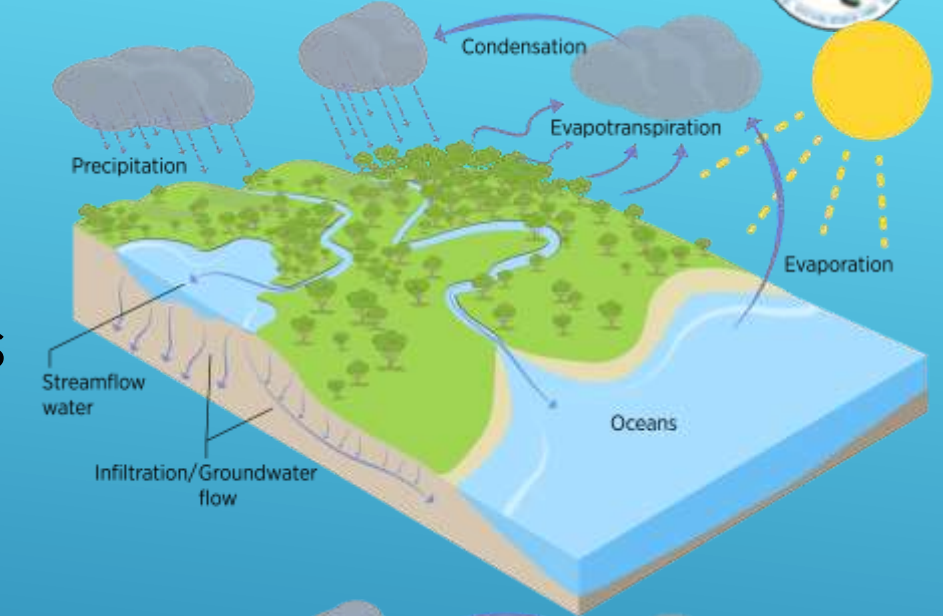


► Hydrology

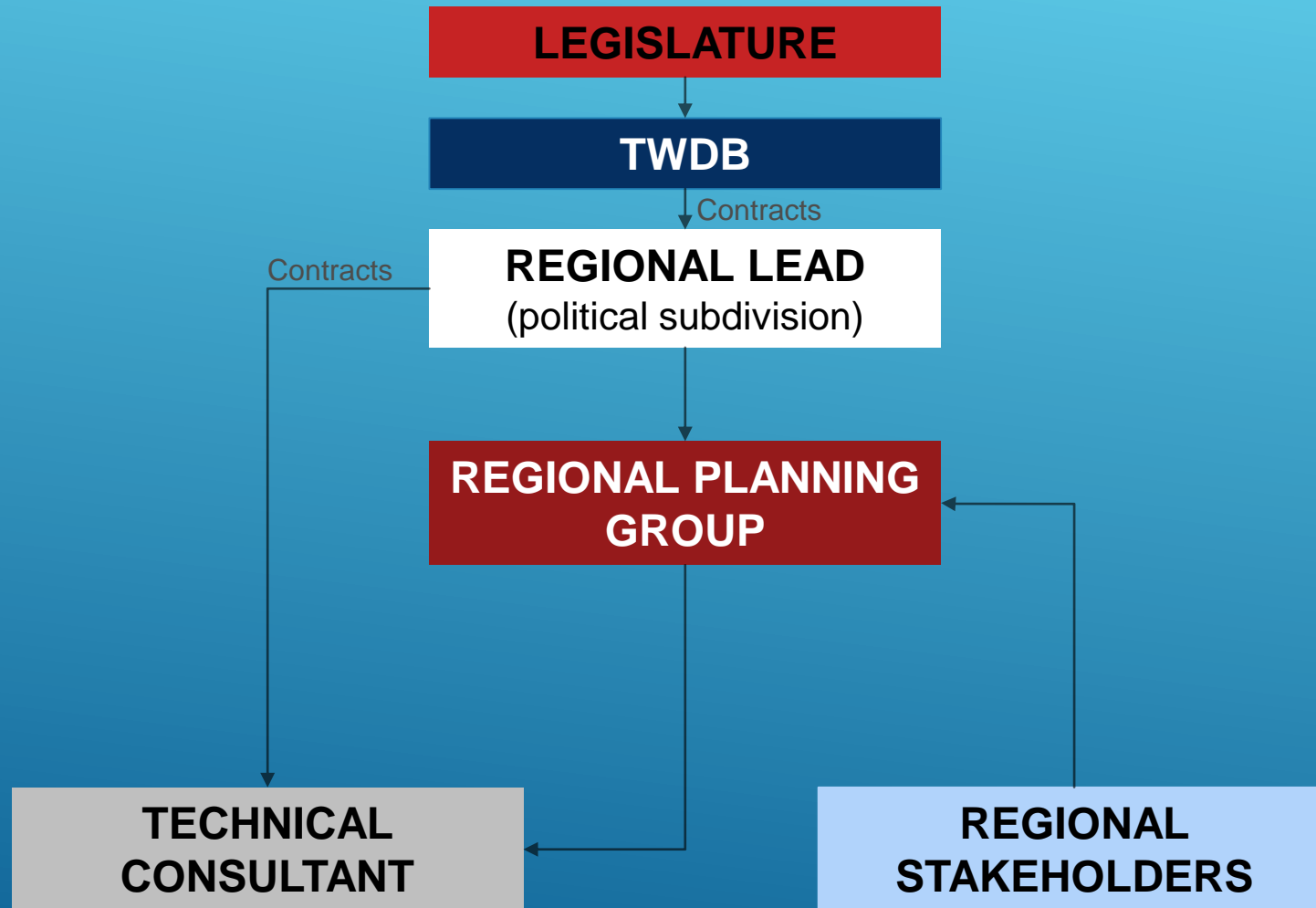
- How much water enters our systems
- When does the water enter the systems
- Integrate new rainfall
- Combined impacts

► Hydraulics

- How high does the water get
- How fast is it moving
- What is the impact



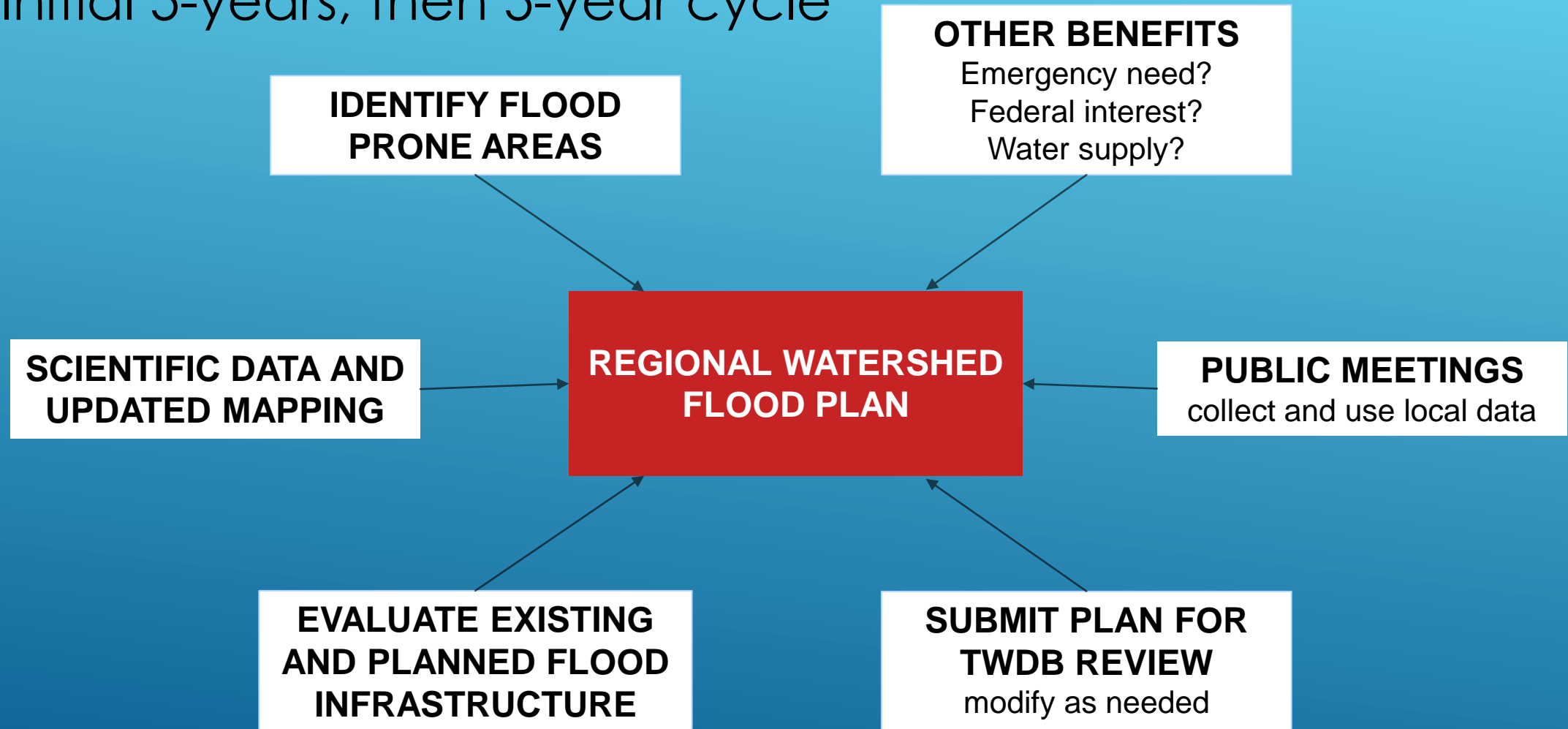
SIMILARITY TO STATE WATER PLANNING?



STATE FLOOD PLAN OBJECTIVES (SB 8)



- ▶ Initial 5-years, then 5-year cycle



LATEST FROM TWDB:



Dear friends,



As you may already know, Governor Abbott recently signed legislation creating new flood financing programs and a state flood planning process to be administered by the Texas Water Development Board (TWDB). These programs will greatly expand the State's efforts to plan for and mitigate flood as well as provide funding for drainage and flood projects.

For more information on the programs, please view our newly released [frequently asked questions](#).

To ensure we create programs that meet the needs of our diverse state, we will be asking for comments from the public and as many stakeholders as possible. Later this summer we will be holding meetings around the state and will have a process in place to receive comments as we develop our administrative rules for the programs.

To receive all our information on that process, please sign up for our [email updates](#). The link will take you to a sign-up page that allows you to choose various topics for which you would like to receive our emails. Be sure to check the box for TWDB Flood Information.

For more information, please email flood@twdb.texas.gov or call 512-463-8725.

We hope you will join us in this critical effort.

Sincerely,
Jeff Walker
Executive Administrator
Texas Water Development Board

NCTCOG CRS USERS GROUP/ELECTED OFFICIALS

BASE LEVEL ENGINEERING (BLE) OVERVIEW & BENEFITS

JULY 18, 2019

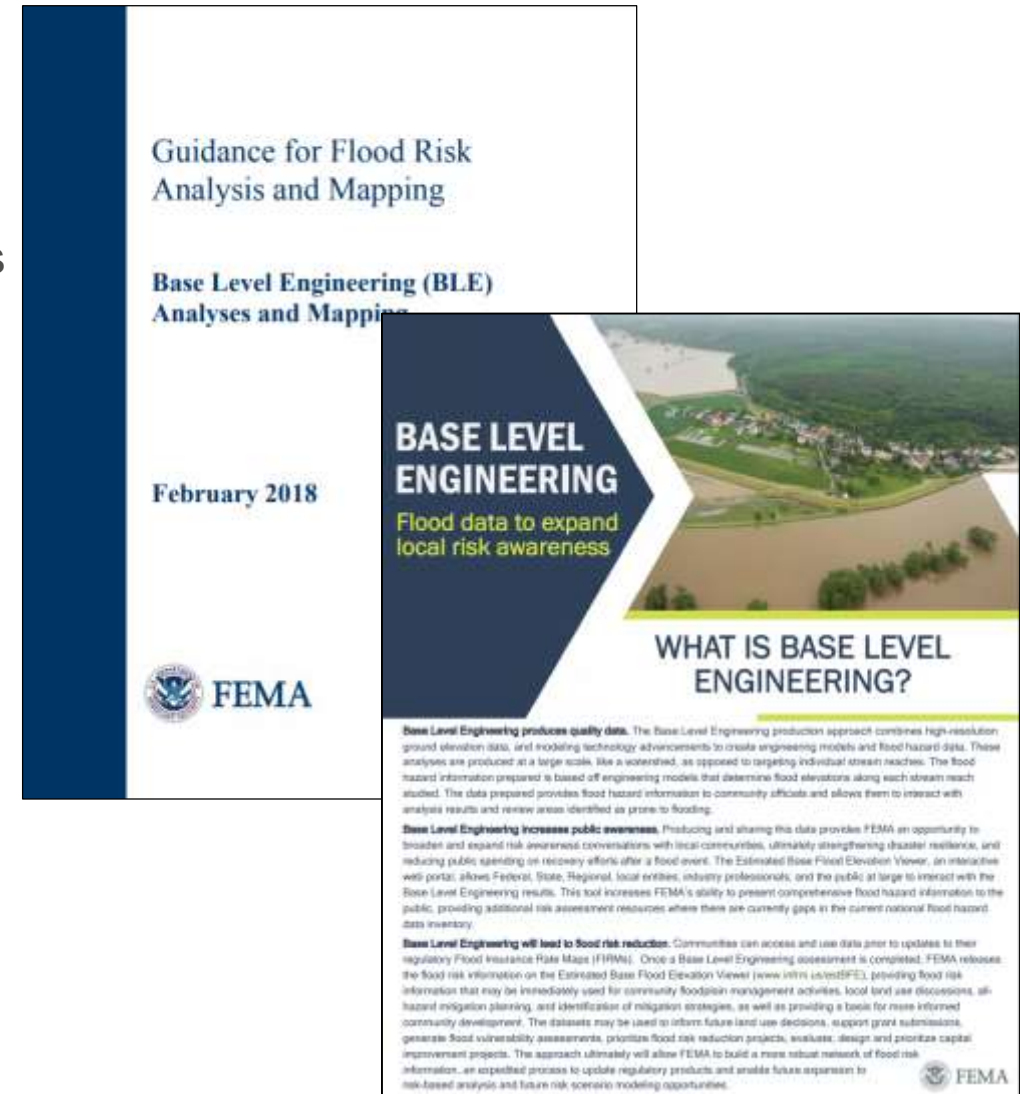
PRESENTATION TOPICS

1. Description of BLE
2. BLE Process and Development
3. Purpose
4. Deployment
5. Benefits and Uses
6. BFE Viewer Tutorial

BLE OVERVIEW | DESCRIPTION

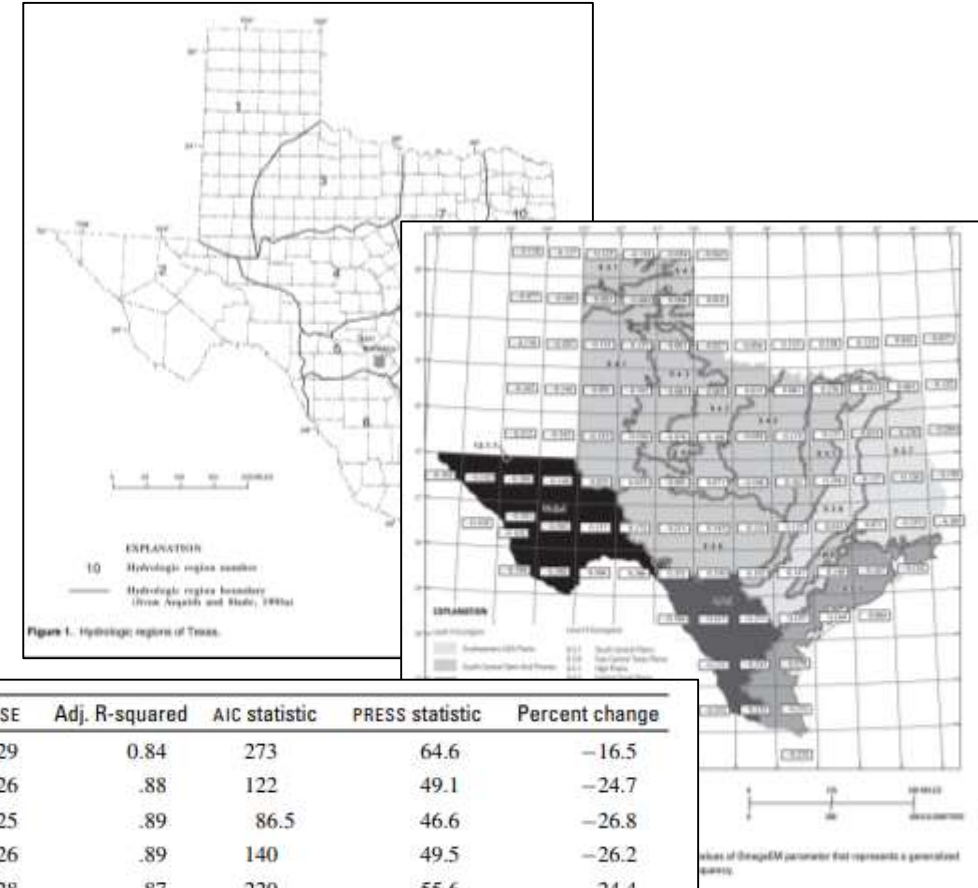
WHAT IS BLE?

- “BLE is an **automated riverine hydrologic and hydraulic modeling** approach, usually generated for large scale watersheds (HUC 8) with high-resolution topography to create and determine flood hazard data
- Engineering models are created during a Base Level Engineering assessment, producing information that **meets the mapping Standards** for Flood Risk Projects (FEMA Policy Memo FP 204-078-1) to produce Zone A (1-percent-annual-chance flood) information. BLE data is intended to represent the base level of investment needed for all flood study efforts FEMA will undertake”



HYDROLOGY (1D)

- Utilizes 1996 and 2009 Regional Regression Equations to calculate peak discharges
- Results are adjusted based on existing stream gage and dam storage data if available
- Drainage areas are autogenerated and peak discharges calculated for the 10-, 25-, 50-, 100-, and 500-year storm events



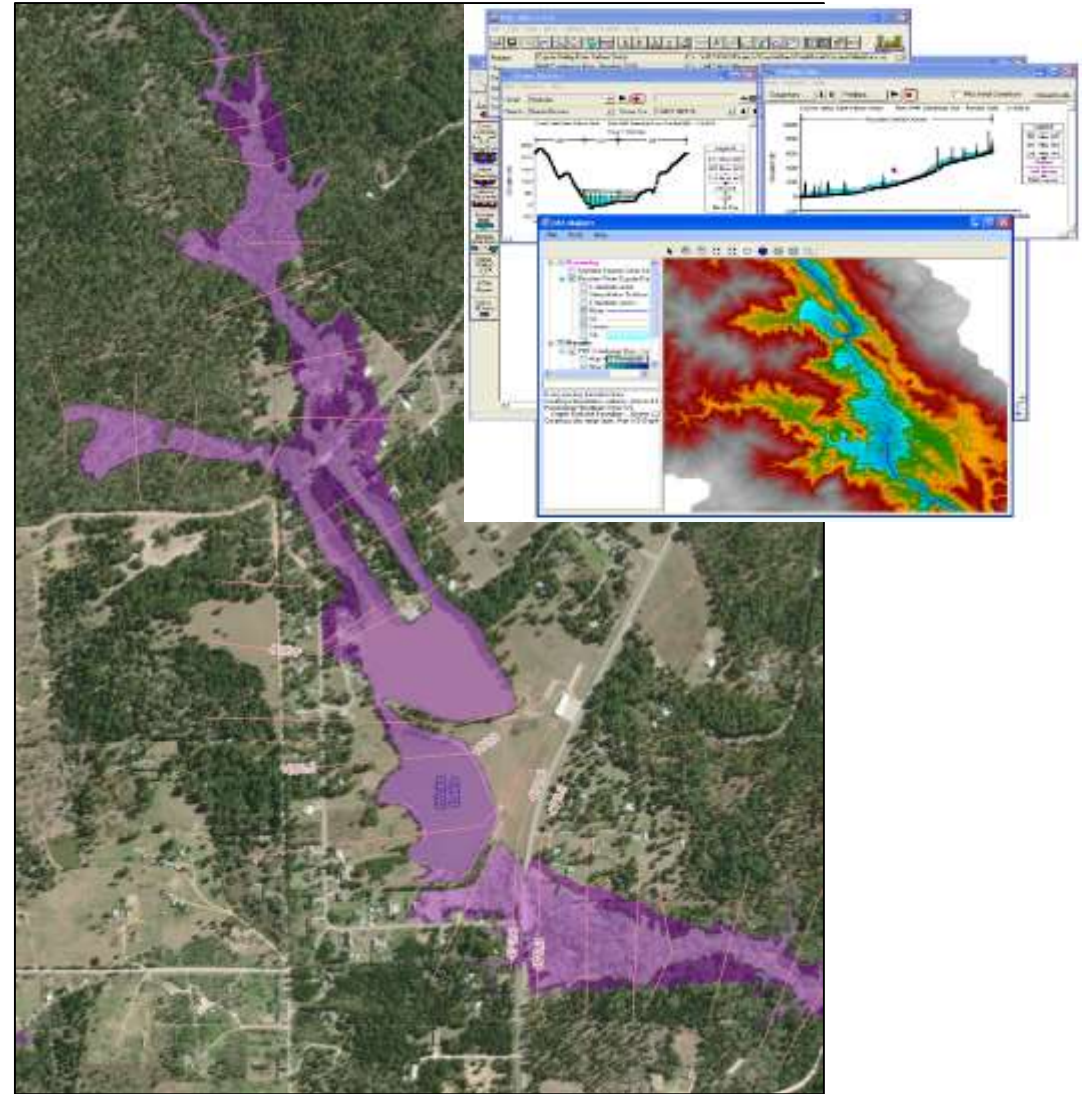
Region 4 (sites with contributing drainage area less than 32 square miles) ²						
2 yr	$Q_2 = 97.1 A^{.620}$	A: 0.19 to 81.1	0.49	134	0.44	28
5 yr	$Q_5 = 196 A^{.650} SH^{.257}$		.70	96	.35	28
10 yr	$Q_{10} = 293 A^{.687} SH^{.281}$	SH: 0.05 to 6.52	.74	92	.34	28
25 yr	$Q_{25} = 455 A^{.741} SH^{.311}$		.75	99	.36	28
50 yr	$Q_{50} = 53 A^{.927} SL^{.558} SH^{.333}$	SL: 13.5 to 226	.74	107	.38	28
100 yr	$Q_{100} = 51 A^{.988} SL^{.627} SH^{.353}$		.72	120	.41	28
Region 4 (sites with contributing drainage area greater than 32 square miles) ²						
2 yr	$Q_2 = 0.00660 A^{1.29} SL^{2.01}$	A: 12 to 19,819	.68	72	.28	39
5 yr	$Q_5 = 0.0212 A^{1.24} SL^{2.18}$		.76	51	.21	39
10 yr	$Q_{10} = 0.0467 A^{1.20} SL^{2.18}$	SH: 0.49 to 19.7	.76	49	.20	39
25 yr	$Q_{25} = 0.102 A^{1.16} SL^{2.18}$		.70	54	.22	39
50 yr	$Q_{50} = 0.166 A^{1.13} SL^{2.19}$	SL: 3.52 to 36.1	.64	60	.24	39
100 yr	$Q_{100} = 0.252 A^{1.11} SL^{2.19}$		.57	69	.27	39

Regression equation	RSE	Adj. R-squared	AIC statistic	PRESS statistic	Percent change
$Q_2 = P^{1.398} S^{0.270} \times 10^{[0.776 \frac{SL}{A} + 50.98 - 50.30A^{-0.0018}]}$	0.29	0.84	273	64.6	-16.5
$Q_5 = P^{1.308} S^{0.372} \times 10^{[0.885 \frac{SL}{A} + 16.62 - 15.32A^{-0.0215}]}$	.26	.88	122	49.1	-24.7
$Q_{10} = P^{1.203} S^{0.403} \times 10^{[0.918 \frac{SL}{A} + 13.62 - 11.97A^{-0.0289}]}$	.25	.89	86.5	46.6	-26.8
$Q_{25} = P^{1.140} S^{0.446} \times 10^{[0.945 \frac{SL}{A} + 11.79 - 9.819A^{-0.0574}]}$	.26	.89	140	49.5	-26.2
$Q_{50} = P^{1.105} S^{0.476} \times 10^{[0.961 \frac{SL}{A} + 11.17 - 8.997A^{-0.0424}]}$	.28	.87	220	55.6	-24.4
$Q_{100} = P^{1.071} S^{0.507} \times 10^{[0.969 \frac{SL}{A} + 10.82 - 8.448A^{-0.0467}]}$	.30	.86	320	64.8	-21.7
$Q_{200} = P^{1.034} S^{0.531} \times 10^{[0.975 \frac{SL}{A} + 10.61 - 8.058A^{-0.0504}]}$	.33	.84	436	77.2	-19.0
$Q_{250} = P^{1.021} S^{0.541} \times 10^{[0.977 \frac{SL}{A} + 10.56 - 7.943A^{-0.0516}]}$	.34	.83	474	81.9	-18.1
$Q_{500} = P^{0.988} S^{0.569} \times 10^{[0.976 \frac{SL}{A} + 10.40 - 7.605A^{-0.0554}]}$	.37	.81	591	98.7	-15.6

BLE OVERVIEW | PROCESS & DEVELOPMENT

HYDRAULIC MODELING (1D)

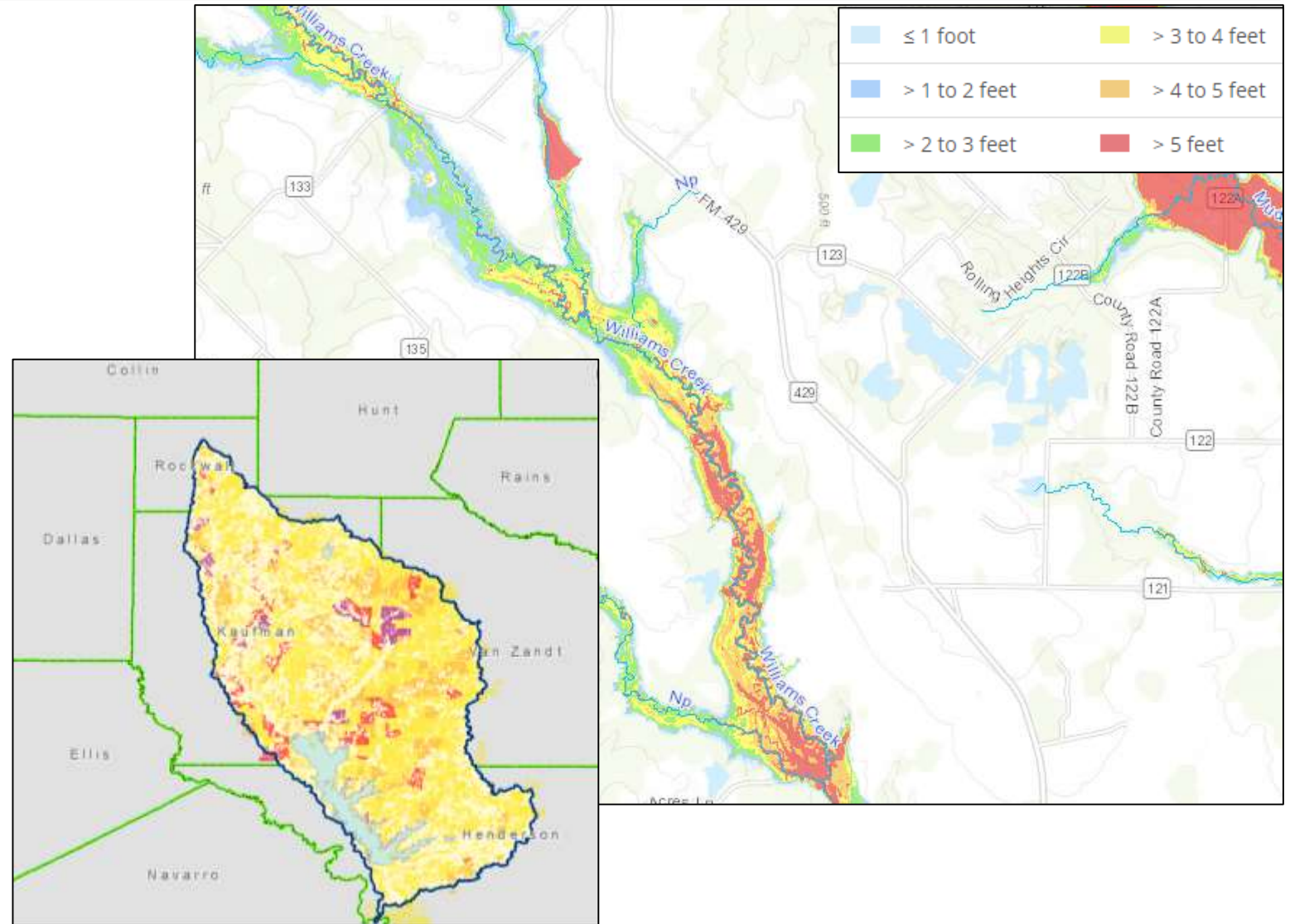
- For the North Texas region automated hydraulic building tools are used to generate HEC-RAS models based on high-resolution topographic data and incorporate the regional regression peak discharges
- Models do not contain infrastructure (dams, levees, culverts, bridges, diversions, etc.) or survey data
- Mapping and water surface elevation grids are autogenerated for the 10-, 100-, 500-year storm events



BLE OVERVIEW | PROCESS & DEVELOPMENT

NON-REGULATORY PRODUCTS

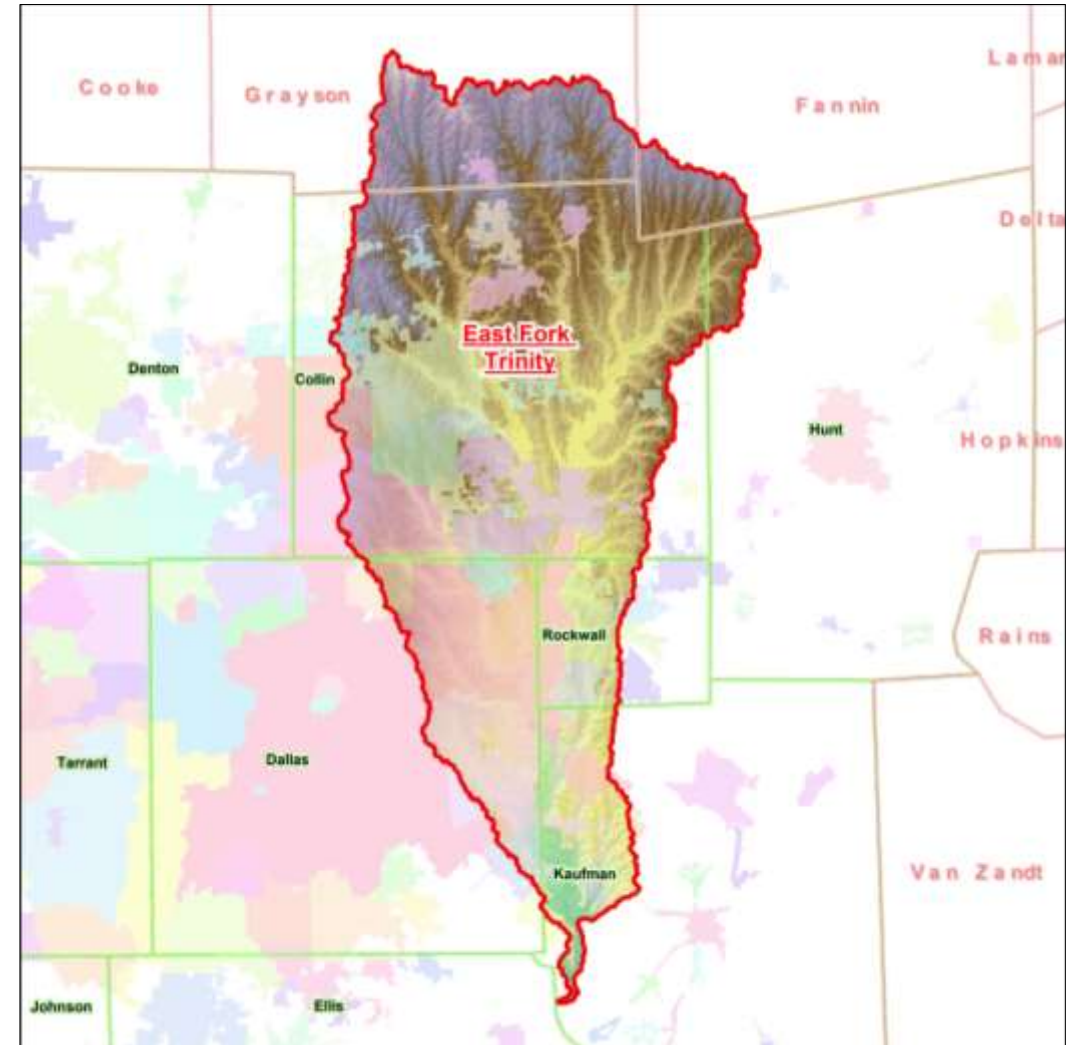
- Depth and Analysis Grids for the 100- and 500-year storm events
- Areas of Expanded Flood Risk
- Flood Risk Assessment – Hazus



BLE OVERVIEW | PURPOSE

GOALS OF BLE

- Quickly generate model backed mapping with base flood information at a HUC-8 or countywide scale
- Identify flood risk based on current topographic conditions
- Provide quality data for local planning and decision making
- Aid in Discovery process
- Provide base models for future conversion to detailed studies (Zone AE with and w/o floodways)
- Increase public awareness



BLE OVERVIEW | PURPOSE

BLE DOES NOT

- Replace existing limited or detailed studies
- Account for effects of routing storage within a stream or detention from dams
- Include hydraulic impacts of creek/stream crossings such as bridges and culverts



BLE OVERVIEW | DEPLOYMENT



PHASE 0



LiDAR Acquisition
Base Level Engineering

PHASE 1



Watershed Needs
Coordination

PHASE 2



Engineering Studies

PHASE 3

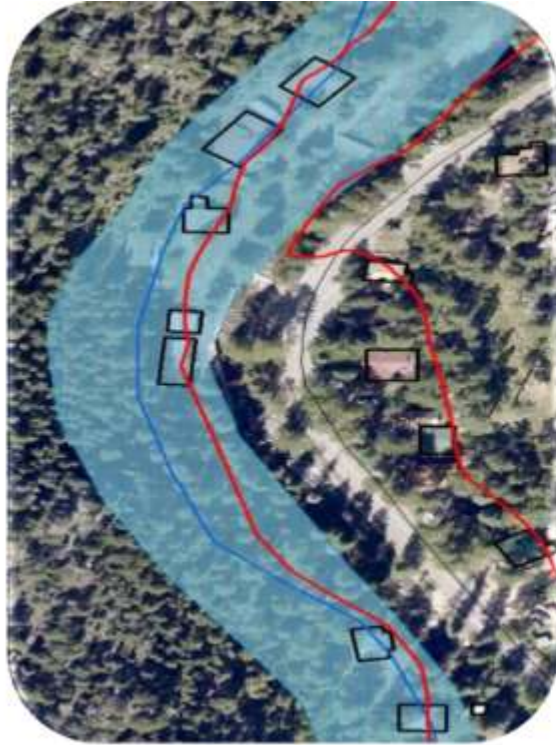


FEMA Region 6

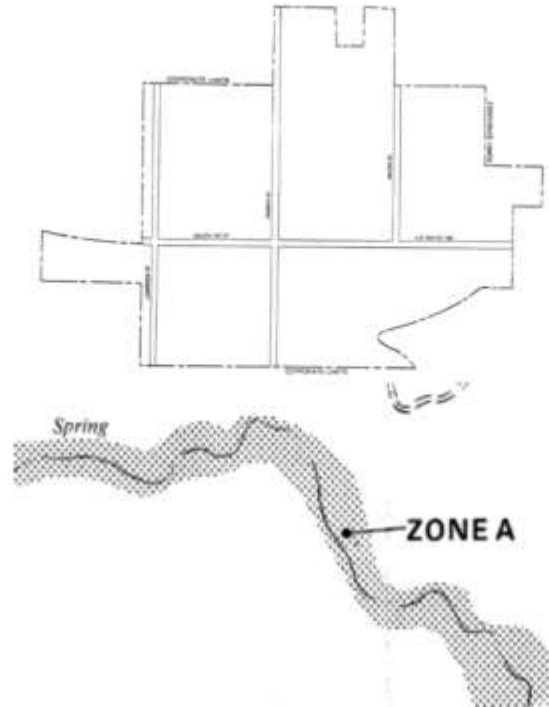


Continued Community
Update of Models and
Maps

BLE - FOCUS AREAS



**UNKNOWN &
UNVERIFIED MILES**



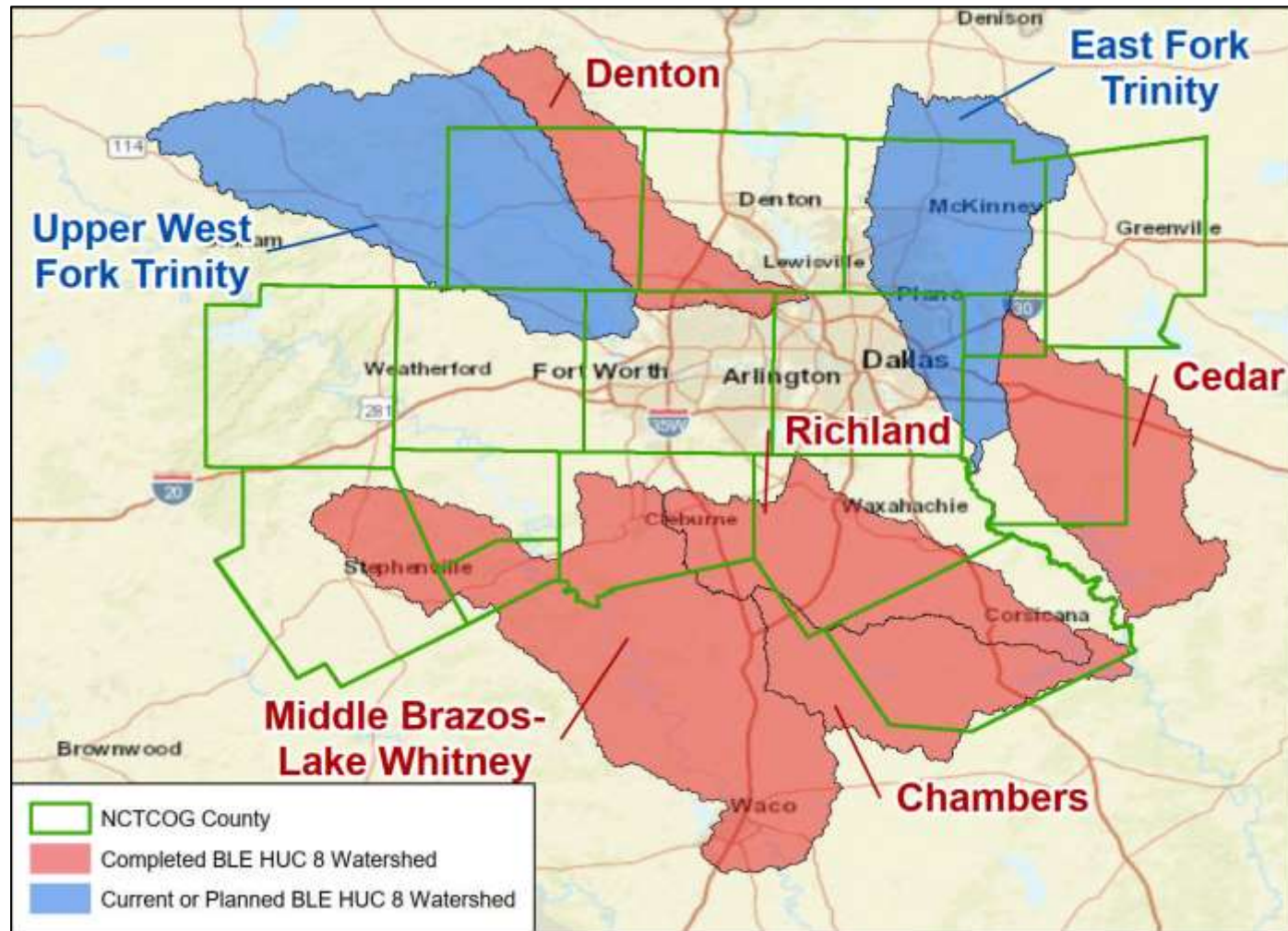
**UNMODERNIZED
COMMUNITIES**



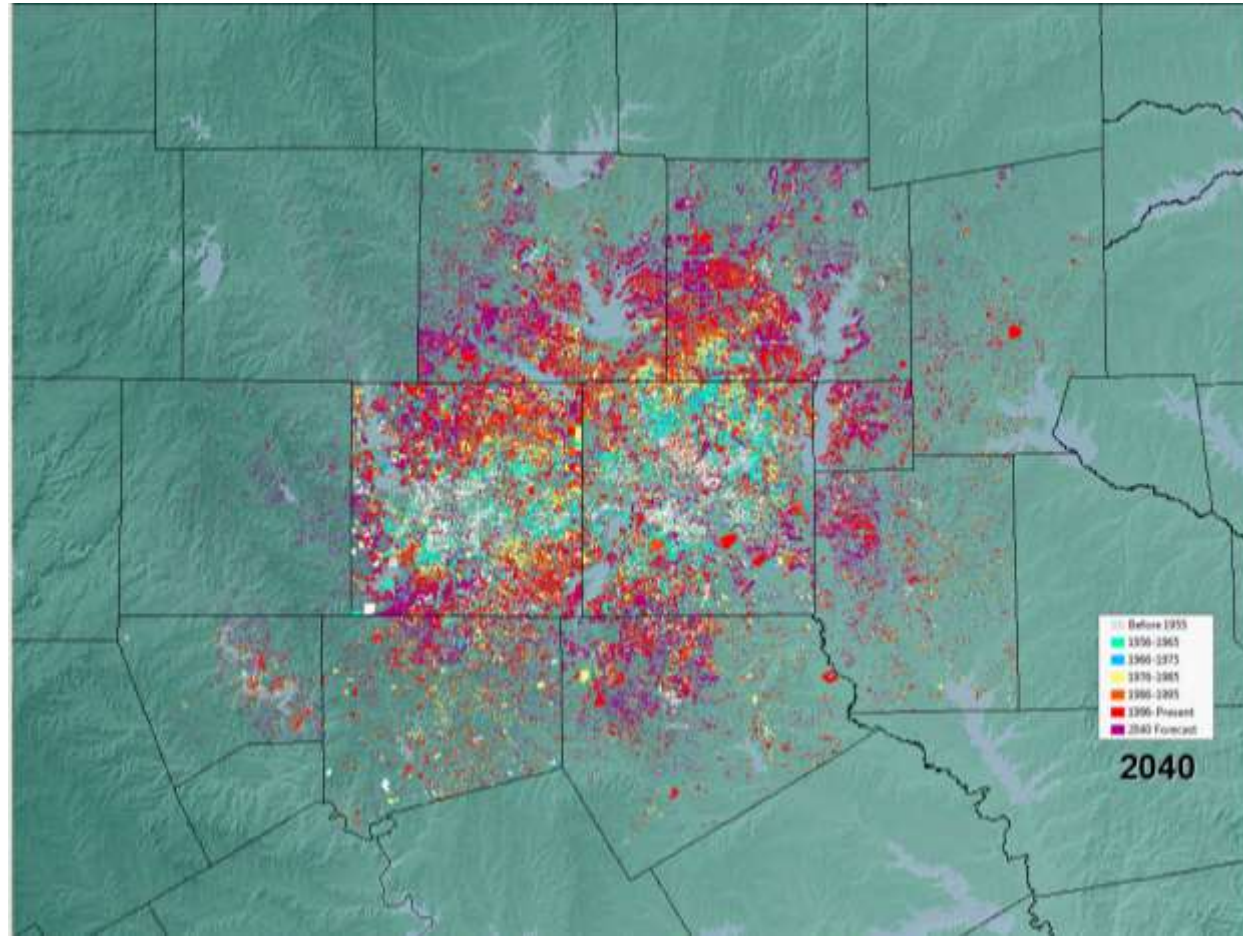
UNMAPPED MILES

*Source: FEMA R6 BLE for Community's Local Officials
And Decision Makers*

BLE – NORTH TEXAS (NCTCOG REGION)



NORTH CENTRAL TEXAS GROWTH 1950-2040



COMMUNITY OFFICIALS AND DECISION MAKERS



COMMUNICATION &
PERMITTING



MITIGATION
PLANNING



INSURANCE
RATING



20



LOMAs

Source: FEMA R6 BLE for Community's Local Officials
And Decision Makers

COMMUNICATION AND PERMITTING

- Communication of Updated Risk
 - Community Staff
 - Stakeholders (Public & Industry)
- Permitting
 - Identify updated floodplain limits
 - Provide starting model to meet local criteria

FLOODPLAIN DEVELOPMENT PERMIT

Permit Number _____ Page 3
Date _____

To Be Filled Out by the Floodplain Administrator

Floodplain Determination

The proposed development is located on FIRM Panel No. _____ Dated: _____

The proposed development is: Substantial improvement Yes No

The Proposed Development:

Is NOT located in a Special Flood Hazard Area (Notify the applicant that the application review is complete a PERMIT IS REQUIRED).

Is located in a Special Flood Hazard Area. FIRM zone designation is _____
100-Year flood elevation at the site is _____

Elevation Required by the Community _____
Freeboard Required by Community _____

The proposed development is located on FIRM Panel No. _____

Permit applicant shall provide a copy of page _____

An elevation certificate is required.
If an elevation certificate is required, the applicant shall provide a completed elevation certificate to the Floodplain Administrator of the structure.



MITIGATION PLANNING

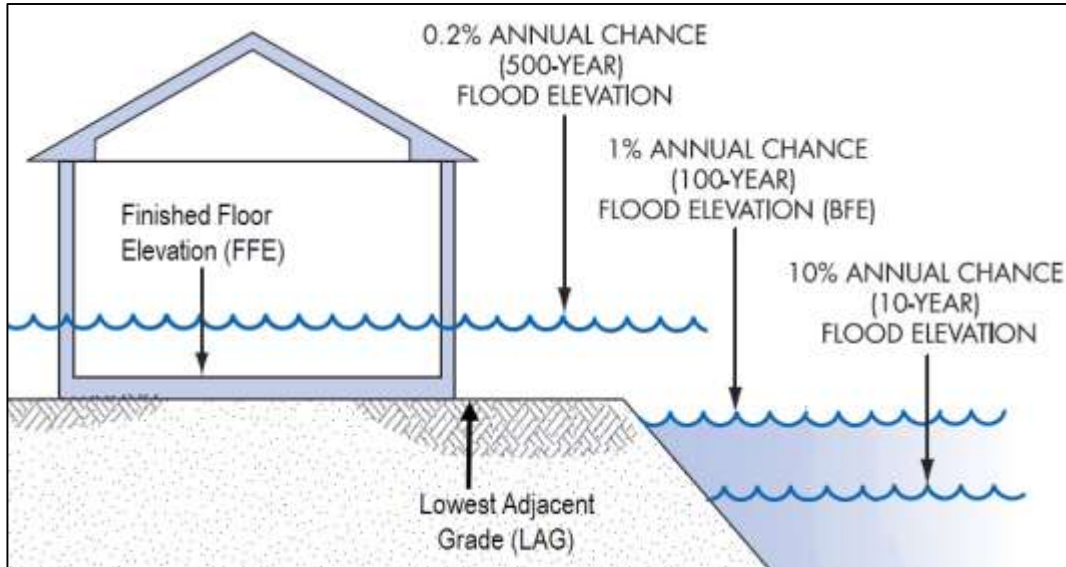
- Prioritize Capital Improvement Projects
- Update models to detailed studies
- Utilize modeling to scale projects
- Planning for future development
- Identify populations at risk
- Identify possible voluntary buyout properties



BLE OVERVIEW | BENEFITS

INSURANCE RATING AND LOMAS

- Generate BFE's from FEMA's BFE Viewer
- Determine 100-year WSEL at a property
- Supply BFE back up data to be submitted with LOMAs



U.S. DEPARTMENT OF HOMELAND SECURITY
Federal Emergency Management Agency
National Flood Insurance Program

OMB No. 1660-0008
Expiration Date: November 30, 2018

ELEVATION CERTIFICATE

Important: Follow the instructions on pages 1-9.

Copy all pages of this Elevation Certificate and all attachments for (1) community official, (2) insurance agent/company, and (3) building owner.

SECTION A - PROPERTY INFORMATION

FOR INSURANCE COMPANY USE

A1. Building Owner's Name _____

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. _____

City _____ State _____

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) _____

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____

A5. Latitude/Longitude: Lat. _____ Long. _____ Horizontal Datum _____

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance. _____

A7. Building Diagram Number _____

A8. For a building with a crawlspace or enclosure(s):

a) Square footage of crawlspace or enclosure(s) _____ sq ft

b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above _____ sq in

c) Total net area of flood openings in A8.b _____ sq in

d) Engineered flood openings? Yes No

A9. For a building with an attached garage:

a) Square footage of attached garage _____ sq ft

b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent _____ sq in

c) Total net area of flood openings in A9.b _____ sq in

d) Engineered flood openings? Yes No

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number _____ B2. County Name _____

B4. Map Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. BFE
----------------------	------------	---------------------	---------------------------------------	-------------------	---------

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in item B9:
 FIS Profile FIRM Community Determined Other/Source: _____

B11. Indicate elevation datum used for BFE in item B9: NGVD 1929 NAVD 1988 Other _____

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area?
 Designation Date: _____ CBRS OPA

FEMA Form 086-0-33 (7/15) Replaces all previous editions.

DEPARTMENT OF HOMELAND SECURITY - FEDERAL EMERGENCY MANAGEMENT AGENCY
APPLICATION FORM FOR SINGLE RESIDENTIAL LOT OR STRUCTURE AMENDMENTS TO
NATIONAL FLOOD INSURANCE PROGRAM MAPS

O.M.S. NO. 1660-0015
Expires February 28, 2016

PAPERWORK BURDEN DISCLOSURE NOTICE

Public reporting burden for this data collection is estimated to average 2.4 hours per response. The burden estimate includes the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the form. This collection of information is required to obtain or retain benefits. It is not required to provide information unless a valid OMB control number is displayed on this form. Send comments regarding this burden estimate and any suggestions for reducing the burden for Information Collection Project Management, Department of Homeland Security, Federal Emergency Management Agency, 1400 South Bell Street, Arlington, VA 22204-3000, Paperwork Reduction Project (1660-0015). **NOTE: Do not send your completed form to this address.**

This form should be used to request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) remove a single structure or legally recorded parcel of land or portion thereof, described by metes and bounds, certified by a registered professional engineer or licensed land surveyor, from a designated Special Flood Hazard Area (SFHA), an area that would be inundated by the Flood having a 1% chance of being equaled or exceeded in any given year (base flood), as a Letter of Map Amendment (LOMA). It shall not be used for requests submitted by developers, for requests involving multiple structures or lots, for property in special-use areas, for property located within the regulatory floodway, or requests involving the placement of fill (NFIS). Use MT-1 forms for such requests. **Fill** is defined as material from any source (including the subject property) placed that raises the grade to or above the Base Flood Elevation (BFE). The increase in elevation from the existing finished ground elevation, which is at or above the BFE, less the BFE, less the elevation of the first National Flood Insurance Program (NFIP) map showing the area as an SFHA is considered raised grade.

LOMA: _____
 A letter from DHS-FEMA stating that an existing structure or parcel of land that has not been elevated by fill would not be inundated by the base flood.

A - This section may be completed by the property owner or by the property owner's agent. In order to process your request, all information on this form must be completed in its entirety, unless stated as optional. **Incomplete submissions will result in processing delays.**

1. Has fill been placed on your property to raise ground that was previously below the BFE?
 No Yes - If Yes, STOP! - You must complete the MT-1 application form; visit <http://www.fema.gov/Howtoapply/Howtofill.asp> or call the FEMA Map Information Exchange hot line: (877-FEMA-MAP) (877-336-2827)

2. Legal description of Property (Lot, Block, Subdivision or abbreviated description from the Deed) and street address of the Property (required):

3. Are you requesting that a flood zone determination be completed for (check one):
 A structure on your property? What is the date of construction? _____ (MM/YYYY)
 A portion of your legally recorded property? (A registered metes and bounds description and map of the area to be removed, certified by a registered professional engineer or licensed land surveyor, are required. For the preferred format of metes and bounds descriptions, please refer to the MT-02 instructions.)
 Your entire legally recorded property?

All documents submitted in support of this request are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under Title 18 of the United States Code, Section 1585.

Applicant's Name (required): _____	E-mail address (optional) (By checking here you may receive correspondence electronically at the email address provided): _____
Mailing address (include company name if applicable) (required): _____	Daytime Telephone No. (required): _____
	Fax No. (optional): _____
Signature of Applicant (required) _____	Date (required) _____

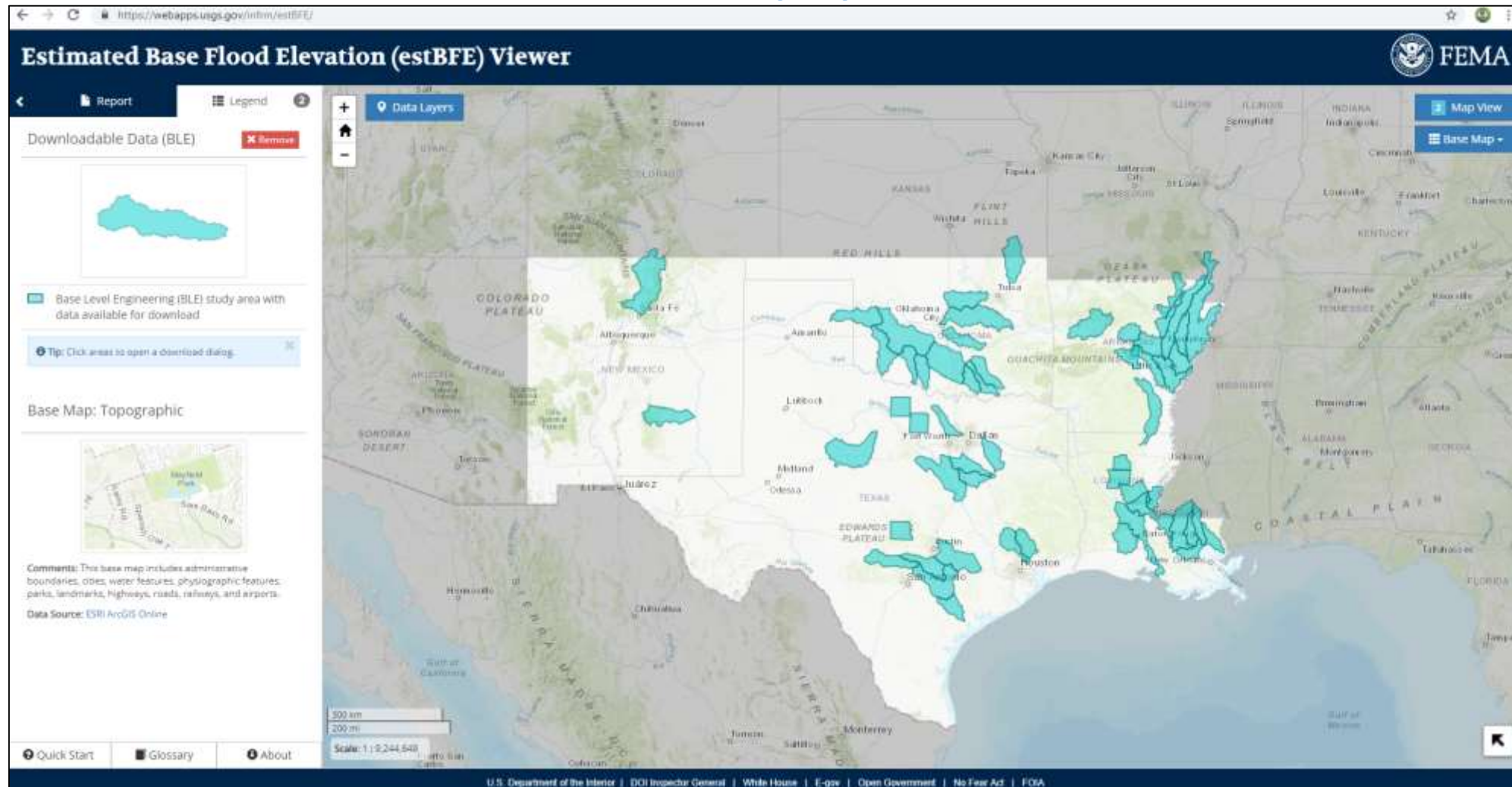
End of section A

DHS - FEMA Form 086-0-02, FEB 11 NF-02 Form Page 1 of 3

North Central Texas
Council of Governments

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>



<https://webapps.usgs.gov/infrm/estBFE/>

Welcome to the

Base Level Engineering assessments are produced using high resolution ground data to create technically credible flood hazard information that may be used to expand and modernize FEMA's current flood hazard inventory.



View Base Level Engineering Data

Access all available Base Level Engineering data without GIS software.

- Click the **DATA LAYERS** button to add or remove map layers.
- Click the **LEGEND** tab to view an explanation of all data shown.
- Click the **MAP VIEW** button to open or close a second viewing window for side-by-side comparisons.

Click a topic to get started!

Estimated Base Flood Elevation Viewer



Download Datasets & Models

Download the Base Level Engineering data presented in the viewer.

- Click the **DATA LAYERS** button and add the **DOWNLOADABLE DATA** layer.
- Click shaded areas in the map to open a dialog for choosing datasets to download.



Property Look Up

Where data is available, produce a property-specific report with estimated base flood information.

- Click the **REPORT** tab to create a flood risk report for a specific location.

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation Viewer

Welcome to the

Base Level Engineering assessments are produced using high resolution ground data to create technically credible flood hazard information that may be used to expand and modernize FEMA's current flood hazard inventory.

I Want to

View Base Level Engineering Data

Access all available Base Level Engineering data without GIS software.

- Click the **DATA LAYERS** button to add or remove map layers.
- Click the **LEGEND** tab to view an explanation of all data shown.
- Click the **MAP VIEW** button to open or close a second viewing window for side-by-side comparisons.

I Want to

Download Datasets & Models

Download the Base Level Engineering data presented in the viewer.

- Click the **DATA LAYERS** button and add the **DOWNLOADABLE DATA** layer.
- Click shaded areas in the map to open a dialog for choosing datasets to download.

I Want to

Property Look Up

Where data is available, produce a property-specific report with estimated base flood information.

- Click the **REPORT** tab to create a flood risk report for a specific location.

Click a topic to get started!

Click Start

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation (estBFE) Viewer

FEMA

Map View
Base Map

Report Legend

Flood Depth (1%) Remove

Estimated water depths above land surface during a 1% annual chance storm event (a storm that has a 1/100 chance of occurring in any calendar year).

Base Map: Topographic

Comments: This base map includes administrative boundaries, cities, water features, physiographic features, parks, landmarks, highways, roads, railways, and airports.
Data Source: ESRI ArcGIS Online

Quick Start Glossary About

U.S. Department of the Interior | DOI Inspector General | White House | E-gov | Open Government | No Fear Act | FOIA

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation (estBFE) Viewer

FEMA

Report Legend

Estimated Flood Extent (1% and 0.2%) [Remove]

High risk (1% flood zone)
Low to moderate risk (0.2% flood zone)

Comments: Properties within high risk areas have a 1 percent (1/100) chance of flooding in any year, while properties within low to moderate risk areas have a 0.2 percent (1/500) chance of flooding in any year.

Flood Depth (1%) [Remove]

≤ 1 foot > 1 to 2 feet > 2 to 3 feet > 3 to 4 feet > 4 to 5 feet > 5 feet

Comments: Depicts estimated water depths above land surface during a 1% annual chance storm event (a storm that has a 1/100 chance of occurring in any calendar year).

Quick Start Glossary About

U.S. Department of the Interior | DOI Inspector General | White House | E.gov | Open Government | No Fear Act | FOIA

Data Layers

Base Level Engineering (3 shown)

- Estimated flood extent (1% and 0.2%)
- Estimated flood extent (10%)
- Flood depth (1%)
- Flood depth (0.2%)

Opacity: 50%

- 2D BLE elevations
- 1D BLE cross-sections
- Stream center lines
- Stream center line labels

Opacity: 100%

Downloadable Data (BLE)
Detailed Studies (FIRM)

Clear Map Close

Data Layers

Base Level Engineering (1 shown)

- Estimated flood extent (1% and 0.2%)
- Estimated flood extent (10%)
- Flood depth (1%)
- Flood depth (0.2%)

Opacity: 50%

- 2D BLE elevations
- 1D BLE cross-sections
- Stream center lines
- Stream center line labels

Opacity: 100%

Downloadable Data (BLE)
Detailed Studies (FIRM)

Clear Map Close

Map View

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation (estBFE) Viewer

Report Legend

Create a Flood Risk Report

Search for a place

Enter an address or place of interest in the above search box. A popup will appear at the chosen location and you can create a report if BLE data are available there.

OR

My Location

Click this button to zoom the map to your actual location. A popup will appear and you can create a report if BLE data are available there.

Tip: Your web browser must support and have geolocation enabled.

OR

Map Click

Zoom into your area of interest. Click this button and then the map. A popup will appear and you can create a report if BLE data are available there.

Tip: Click on the center of the roof of your home or the most upstream point of your structure.

Quick Start Glossary About

Map View Base Map -

Enter address or city, stream, watershed

Click my location to enable GPS from mobile device

Once Zoomed, use Map Click to place the locator and run a report

U.S. Department of the Interior | DOI Inspector General | White House | E.gov | Open Government | No Fear Act | FOIA

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation (estBFE) Viewer

Report Legend

Create a Flood Risk Report

More Info

Search for a place

Enter an address or place of interest in the above search box. A popup will appear at the chosen location and you can create a report if BLE data are available there.

OR

My Location

Click this button to zoom the map to your actual location. A popup will appear and you can create a report if BLE data are available there.

Tip: Your web browser must support and have geolocation enabled.

OR

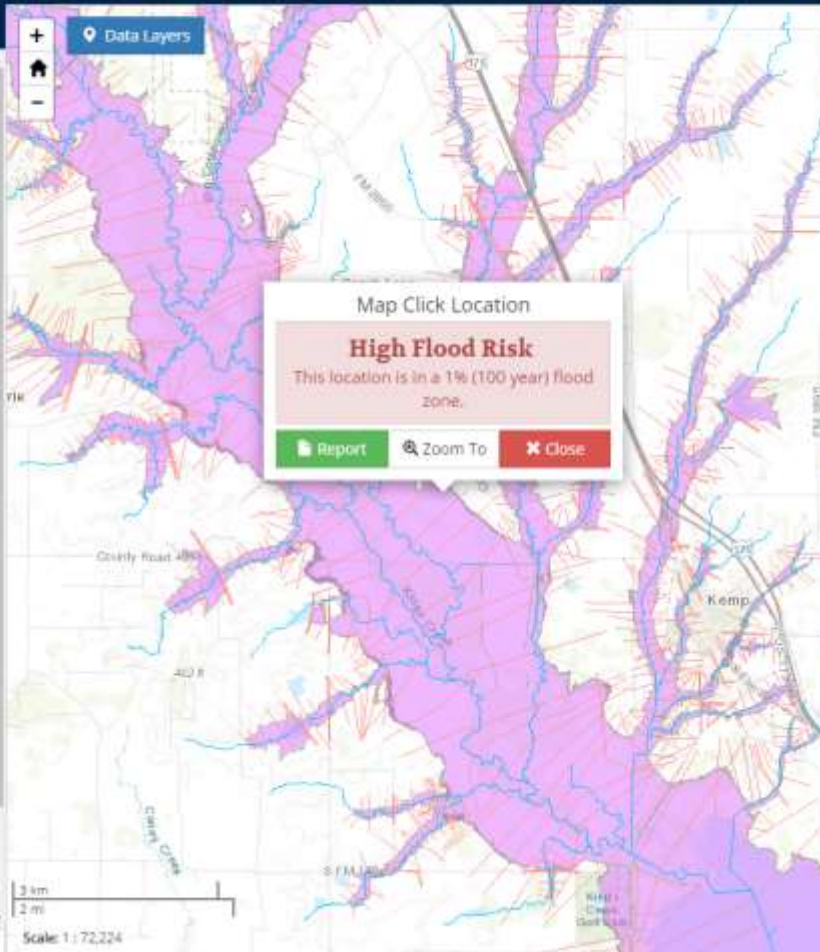
Map Click

Zoom into your area of interest. Click this button and then the map. A popup will appear and you can create a report if BLE data are available there.

Tip: Click on the center of the roof of your home or the most upstream point of your structure.

Quick Start Glossary About

Scale: 1:72,224



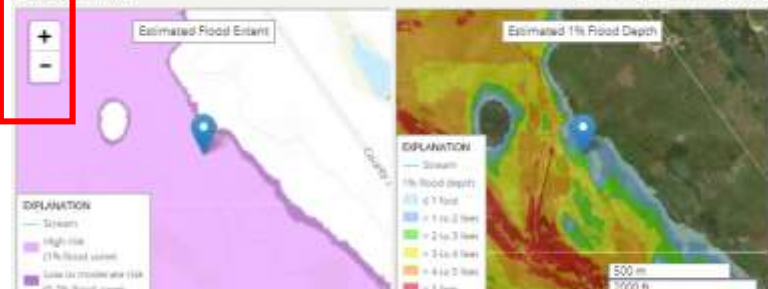
Estimated Base Flood Elevation (estBFE)

FEMA

Flood Risk Information Report

FEMA is providing a look at flood data availability and relative Base Level Engineering analysis through the Estimated Base Flood Elevation Viewer (Estimated BFE Viewer). Base Level Engineering uses high resolution ground elevation data, flood flow calculations, and fundamental engineering modeling techniques to define flood extents for streams. The viewer is an effective tool for property owners, community officials, and land developers to identify flood risk, estimated flood elevations, and flood depths for watersheds where Base Level Engineering has been prepared.

Kaufman County, Texas Latitude: 32.457° Longitude: -96.270°



EXPLANATION

- Streams
- High risk (1% flood extent)
- Low to moderate risk (0.2% flood extent)

EXPLANATION

- Streams
- 1% Flood depth
- 1 to 2 feet
- 2 to 3 feet
- 3 to 4 feet
- 4 to 5 feet
- 5 feet

Flood Event	Estimated Flood Depth*	Estimated Base Flood Elevation*
1 Percent (100 Year)	2.2 feet above land surface	343.1 feet NAVD 1988
0.2 Percent (500 Year)	3.6 feet above land surface	344.4 feet NAVD 1988

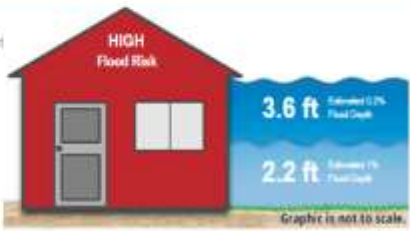
*The information included in this report is based on the location marker shown in the map. Results are not considered an official determination.

Information made available from the Estimated BFE Viewer needs to be accepted by local community officials to be used for insurance rating purposes.

Knowing Your Risk

Base level engineering data availability and analysis information is important because it can be used to:

- Inform floodplain management decisions and ordinance administration;
- Identify significant floodplain changes;
- Serve as base modeling for map revisions; and
- Support the Zone A BFE information for a Letter of Map Amendment (LOMA) request.



BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Print

Tip: The maps zoom level can be adjusted by using the +/- zoom buttons. Users should zoom in and verify the location of the marker prior to printing.

Tip: The web address can be used to share or bookmark the report for this location.

Estimated Base Flood Elevation (estBFE)

Flood Risk Information Report

FEMA is providing a look at flood data availability and relative Base Level Engineering analysis through the Estimated Base Flood Elevation Viewer (Estimated BFE Viewer). Base Level Engineering uses high resolution ground elevation data, flood flow calculations, and fundamental engineering modeling techniques to define flood extent for streams. The viewer is an effective tool for property owners, community officials, and land developers to identify flood risk, estimated flood elevations, and flood depths for watersheds where Base Level Engineering has been prepared.

Kaufman County, Texas Latitude 32.4576 Longitude -96.2701

Using This Data

Consult the local floodplain manager and building department in your community before making any building or land modifications. Local officials may use this information to regulate development near flooding sources to create more flood-resilient communities. Local building and permitting requirements vary by community and are based on local decisions and ordinances.

Everyone is at risk. The chances of experiencing a flood can vary due to unevaluated conditions, such as the unstudied effects of community growth and development or intense storms uncharacteristic to historical trends. Maintaining or obtaining a flood insurance policy is essential to ensure a property owner is covered if a flood occurs. Visit <http://FloodSmart.gov> for more information on the costs of flooding and to locate an insurance agent in your area.

Base Level Engineering and the Estimated BFE Viewer tool help identify the BFE in effective Zone A. If a property owner believes that a structure is above or outside of the base flood extent in an effective Zone A, a LOMA request may be submitted and the flood risk report from the Estimated BFE Viewer should be included. To complete an application, use the online web-based tool or download the paper forms (<https://www.fema.gov/letter-map-changes>). Items needed to apply include the following:

- Copy of a **plat map** that identifies the property and includes the locality's recording information
- OR
- Copy of the **property deed** with both locality's recording information and the property's written legal description and a **parcel or tax map** identifying the location.
- **Elevation information** indicating the lowest adjacent grade to the building certified by a licensed land surveyor or registered professional engineer, except for buildings **clearly** shown outside the SFHA. If built recently, building permit files may contain this information. Note the professional may use the estimated BFE (estBFE) results for the BFE value on the elevation form or certificate.
- The **Estimated BFE flood risk information report** relative to the property indicating the estimated flood level and model.
- A **letter of acceptance and support from your local floodplain administrator** for the Estimated BFE information included in your report.

Please note other types of development may require additional documentation and possibly an application fee. A LOMA may result in removal of the SFHA designation and the Federal requirement for flood insurance. However, maintaining a flood policy may still be required by the lender. Flood insurance coverage to repair damage caused by flooding is available for areas outside the SFHA.

Using This Data

Consult the local floodplain manager and building department in your community before making any building or land modifications. Local officials may use this information to regulate development near flooding sources to create more flood-resilient communities. Local building and permitting requirements vary by community and are based on local decisions and ordinances.

Everyone is at risk. The chances of experiencing a flood can vary due to unevaluated conditions, such as the unstudied effects of community growth and development or intense storms uncharacteristic to historical trends. Maintaining or obtaining a flood insurance policy is essential to ensure a property owner is covered if a flood occurs. Visit <http://FloodSmart.gov> for more information on the costs of flooding and to locate an insurance agent in your area.

Base Level Engineering and the Estimated BFE Viewer tool help identify the BFE in effective Zone A. If a property owner believes that a structure is above or outside of the base flood extent in an effective Zone A, a LOMA request may be submitted and the flood risk report from the Estimated BFE Viewer should be included. To complete an application, use the online web-based tool or download the paper forms (<https://www.fema.gov/letter-map-changes>). Items needed to apply include the following:

- Copy of a **plat map** that identifies the property and includes the locality's recording information
- OR
- Copy of the **property deed** with both locality's recording information and the property's written legal description and a **parcel or tax map** identifying the location.
- **Elevation information** indicating the lowest adjacent grade to the building certified by a licensed land surveyor or registered professional engineer, except for buildings **clearly** shown outside the SFHA. If built recently, building permit files may contain this information. Note the professional may use the estimated BFE (estBFE) results for the BFE value on the elevation form or certificate.
- The **Estimated BFE flood risk information report** relative to the property indicating the estimated flood level and model.
- A **letter of acceptance and support from your local floodplain administrator** for the Estimated BFE information included in your report.

Please note other types of development may require additional documentation and possibly an application fee. A LOMA may result in removal of the SFHA designation and the Federal requirement for flood insurance. However, maintaining a flood policy may still be required by the lender. Flood insurance coverage to repair damage caused by flooding is available for areas outside the SFHA.

Using Action

You can protect yourself at any time, which is why it is important to be prepared and to take steps before a flood event to protect your property from costly damage. Action measures to consider include the following:

- **Elevating:** Elevating the lowest floor of new or existing buildings above the BFE reduces risk and may lower flood insurance premiums.
- **Interior Modifications:** Flooding the equipment serving the building or lifting documents susceptible to flooding.
- **Dry Floodproofing:** Sealing your structure to prevent floodwaters from entering. Residential property insurance is not reduced if dry floodproofing is used. Only commercial properties receive reduced flood insurance when dry floodproofing is used.
- **Wet Floodproofing and Flood Walls:** Making portions of a building more resistant to flood damage is, in some cases, allowing water to enter during a flood to prevent damage by equalizing pressure on walls and foundations.

Using the right method to mitigate future damage and loss requires an assessment of various factors: the hazards to your home, permit requirements, the technical details of the method, and cost.

Consult the potential mitigation options with your local floodplain administrator and building department to determine the next appropriate steps.

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation (estBFE) Viewer

Report Legend

Create a Flood Risk Report

More info

Search for a place

Enter an address or place of interest in the above search box. A popup will appear at the chosen location and you can create a report if BLE data are available there.

OR

My Location

Click this button to zoom the map to your actual location. A popup will appear and you can create a report if BLE data are available there.

Tip: Your web browser must support and have geolocation enabled.

OR

Map Click

Zoom into your area of interest. Click this button and then the map. A popup will appear and you can create a report if BLE data are available there.

Tip: Click on the center of the roof of your home or the most upstream point of your structure.

Data Layers

- Base Level Engineering (3 shown)
- Downloadable Data (BLE)
- Detailed Studies (FIRM) (1 shown)
- Detailed study available
- Opacity: [slider] Yes
- Tip: Click within a detailed study to launch the FEMA NFHL Viewer where higher resolution FIRM maps can be accessed.

Clear Map Close

Detailed Study

There is a detailed study (Zone AE) shown on the current effective Flood Insurance Rate Map (FIRM) in the area selected. These detailed analyses are the basis of insurance rating within this area and should be reviewed and used.

Leave this viewer and explore more detailed data in the FEMA NFHL Viewer?

Yes No

Scale 1:12,224

U.S. Department of the Interior | DOI Inspector General | White House | E.gov | Open Government | No Fear Act | FOIA

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

The image displays the FEMA's National Flood Hazard Layer (NFHL) Viewer interface. On the left, a 'Print Flood Map' dialog box is open, showing options for 'Size*' (FIRMETTE) and 'File Format*' (PDF). A red box highlights the 'Run' button. The main map area shows a detailed FIRMette for a flood hazard area, with various flood zones and features labeled. A legend on the right provides a key for the map's symbology, including Special Flood Hazard Areas, Other Areas of Flood Hazard, and General Structures. The map includes a scale bar (0 to 2,000 feet) and a north arrow.

FEMA's National Flood Hazard Layer (NFHL) Viewer

Print Flood Map

pin.
2) Choose to create a print-size FIRMette or full-size FIRM.
3) Press "Execute" - The process may take up to 1 minute.*

Size*
FIRMETTE

File Format*
PDF

Run

National Flood Hazard Layer FIRMette

Legend

SEE FIRM REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) Zone 4, 5, X, Y
- With BFE or Depth Zone 1, 2, 3, 4, 5, 6, 7, 8, 9
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone 1
- Future Conditions 1% Annual Chance Flood Hazard Zone 2
- Area with Reduced Flood Risk due to Levees, See Notes Zone 3
- Area with Flood Risk due to Levees Zone 4

OTHER AREAS

- Area of Minimal Flood Hazard Zone 5
- Effective LOMs
- Area of Undetermined Flood Hazard Zone 6

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- Digital Data Available
- No Digital Data Available
- Unmapped

MAP PANELS

- The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards.

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 7/17/2018 at 11:18:26 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unscanned and unmodernized areas cannot be used for regulatory purposes.

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>

Estimated Base Flood Elevation (estBFE) Viewer

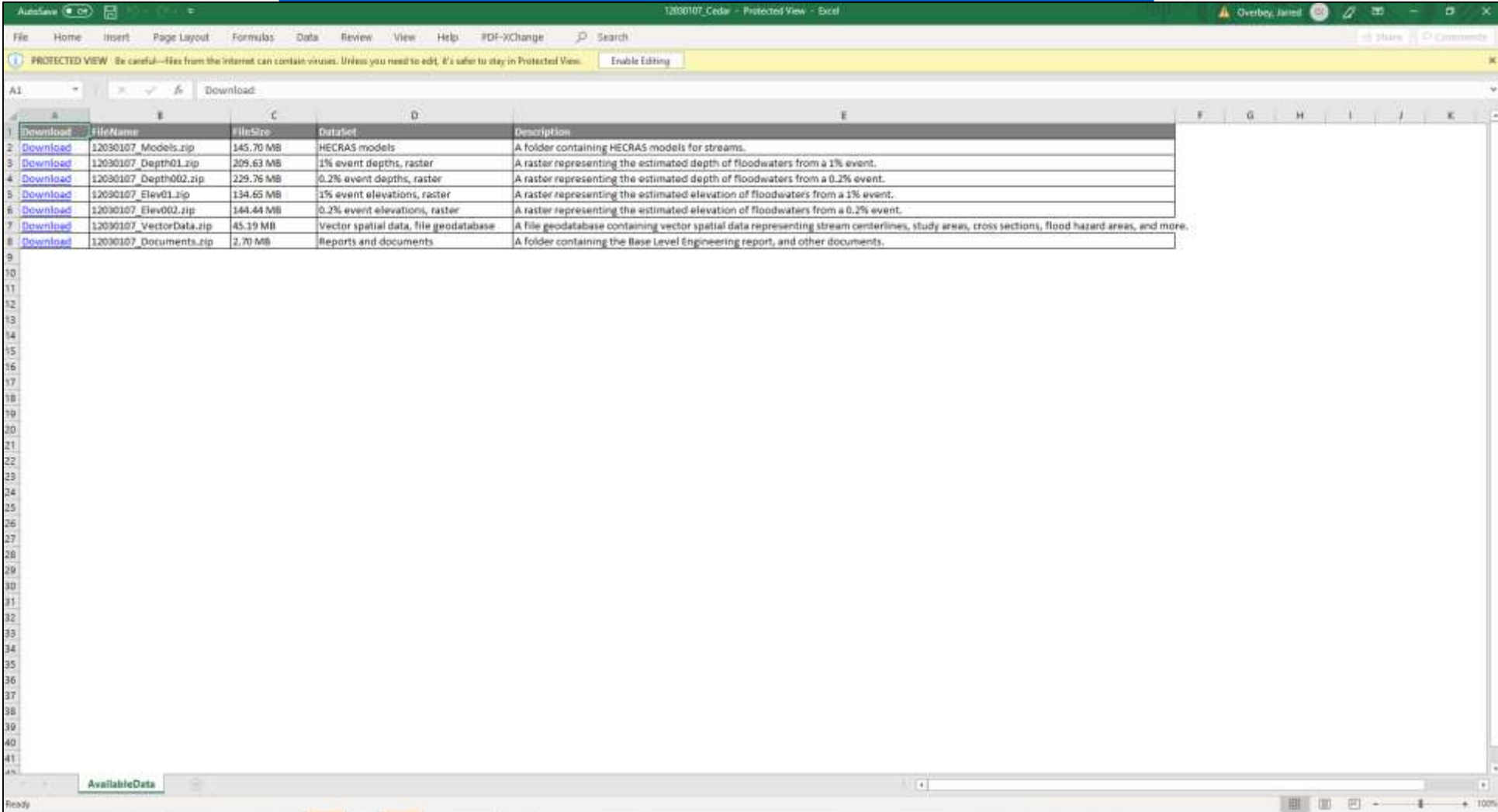
Download Data

Data Set	File Name	Size	Download this table
HECRAS models	12030107_Models.zip	145.70 MB	Description Download
1% event depths, raster	12030107_Depth01.zip	209.63 MB	Description Download
0.2% event depths, raster	12030107_Depth002.zip	229.76 MB	Description Download
1% event elevations, raster	12030107_Elev01.zip	134.65 MB	Description Download
0.2% event elevations, raster	12030107_Elev002.zip	144.44 MB	Description Download
Vector spatial data, file geodatabase	12030107_VectorData.zip	45.19 MB	Description Download
Reports and documents	12030107_Documents.zip	2.70 MB	Description Download

Quick Start Glossary About

BLE OVERVIEW | BFE VIEWER

<https://webapps.usgs.gov/infrm/estBFE/>



	Download	FileName	FileSize	DataSet	Description
1	Download				
2	Download	12030107_Models.zip	145.70 MB	HECRAS models	A folder containing HECRAS models for streams.
3	Download	12030107_Depth01.zip	209.63 MB	1% event depths, raster	A raster representing the estimated depth of floodwaters from a 1% event.
4	Download	12030107_Depth002.zip	229.76 MB	0.2% event depths, raster	A raster representing the estimated depth of floodwaters from a 0.2% event.
5	Download	12030107_Elev01.zip	134.65 MB	1% event elevations, raster	A raster representing the estimated elevation of floodwaters from a 1% event.
6	Download	12030107_Elev002.zip	144.44 MB	0.2% event elevations, raster	A raster representing the estimated elevation of floodwaters from a 0.2% event.
7	Download	12030107_VectorData.zip	45.19 MB	Vector spatial data, file geodatabase	A file geodatabase containing vector spatial data representing stream centerlines, study areas, cross sections, flood hazard areas, and more.
8	Download	12030107_Documents.zip	2.70 MB	Reports and documents	A folder containing the Base Level Engineering report, and other documents.
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					

QUESTIONS?



Benchmarking and Higher Standards

NCTCOG CRS Users Group / Elected Officials
Arlington, Texas



July 18, 2019

PRESENTERS:

Ben Pylant, PE, CFM
John P. Ivey, PE, CFM

THE CHALLENGE

- Approximately 370k flood insurance claims in Texas since 1978
- Almost \$16 billion paid flood insurance claims in Texas since 1978
- Texas ranks No. 2 behind Louisiana for most flood claims in the nation
- Over 33k repetitive loss properties in Texas (2+ claims)

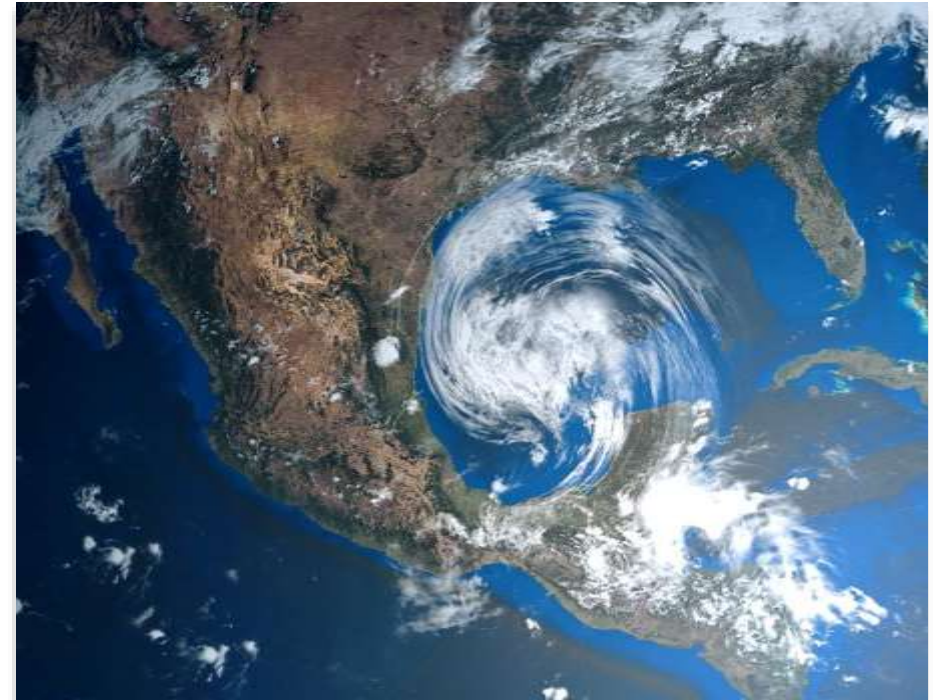
THE CHALLENGE

- Over 5,700 severe repetitive loss properties in Texas (4+ claims – \$5,000 each)
- Since 1980, 70 major hurricanes
- Hurricane Harvey (2017) caused \$125 billion in damages and ranks as the No. 2 most costly hurricane to hit U.S. mainland since 1900
- Texas 2019 population is 29.1 million and increasing more than 140 persons/day

TWDB STATE FLOOD ASSESSMENT REPORT SHOWCASES TEXAS MITIGATION NEEDS

Texas is still recovering from Hurricane Harvey (2017). In January 2019, the TWDB released the State Flood Assessment Report to the 86th Texas Legislature summarizing:

- Texas floods
- Flood risk
- Floodplain management and mapping
- Planning for floods
- Flood mitigation in Texas
- Blueprint of recommendations to make Texas more resilient



NOAA ATLAS 14 PRECIPITATION FREQUENCY

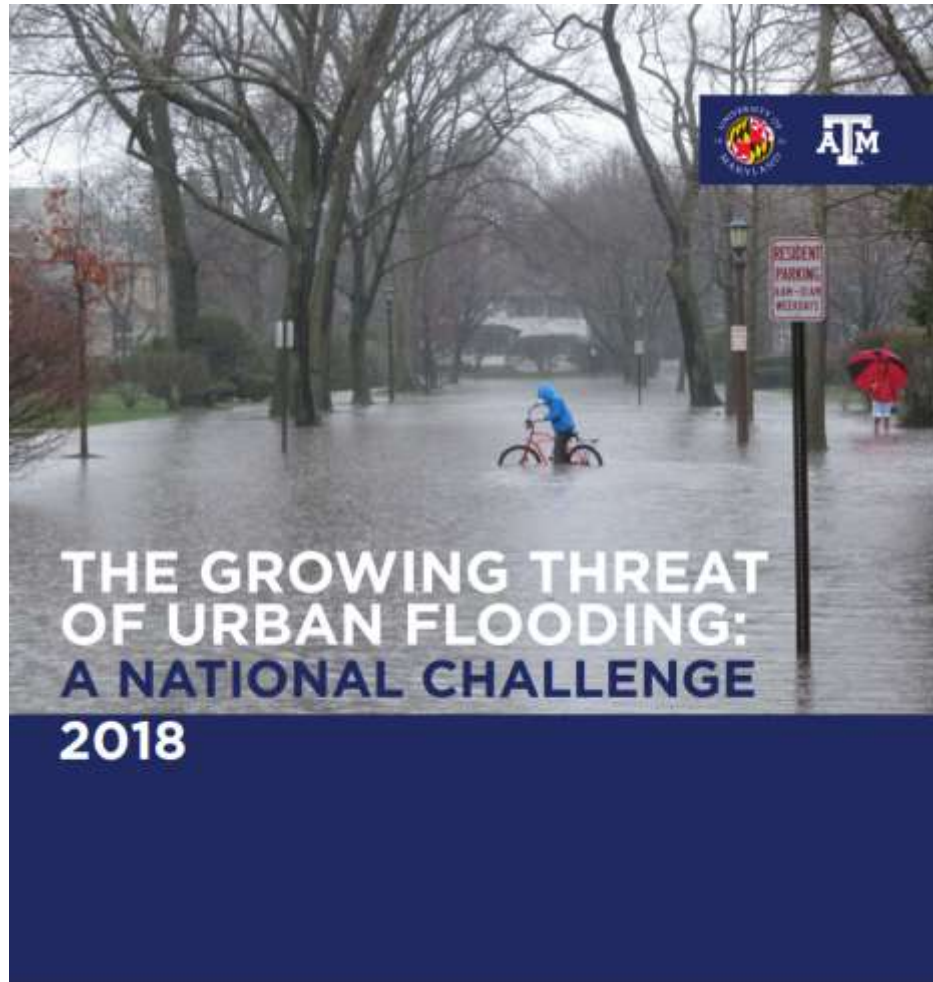
- Updated Texas rainfall frequency values
 - In Austin, 100-year rainfall amounts for 24 hours increased as much as three inches up to 13 inches
 - 100-year estimates around Houston increased from 13 inches to 18 inches and values previously classified as 100-year events are now similar to 25-year events
-

FEMA FLOOD INSURANCE STUDIES AND FIRMS

- Flood damages frequently occur outside of FEMA floodplains
 - Outdated maps
 - Hydrologic changes
 - Local/urban flooding
- **Minimum NFIP standards should not be the only consideration**



LOCAL / URBAN FLOODING

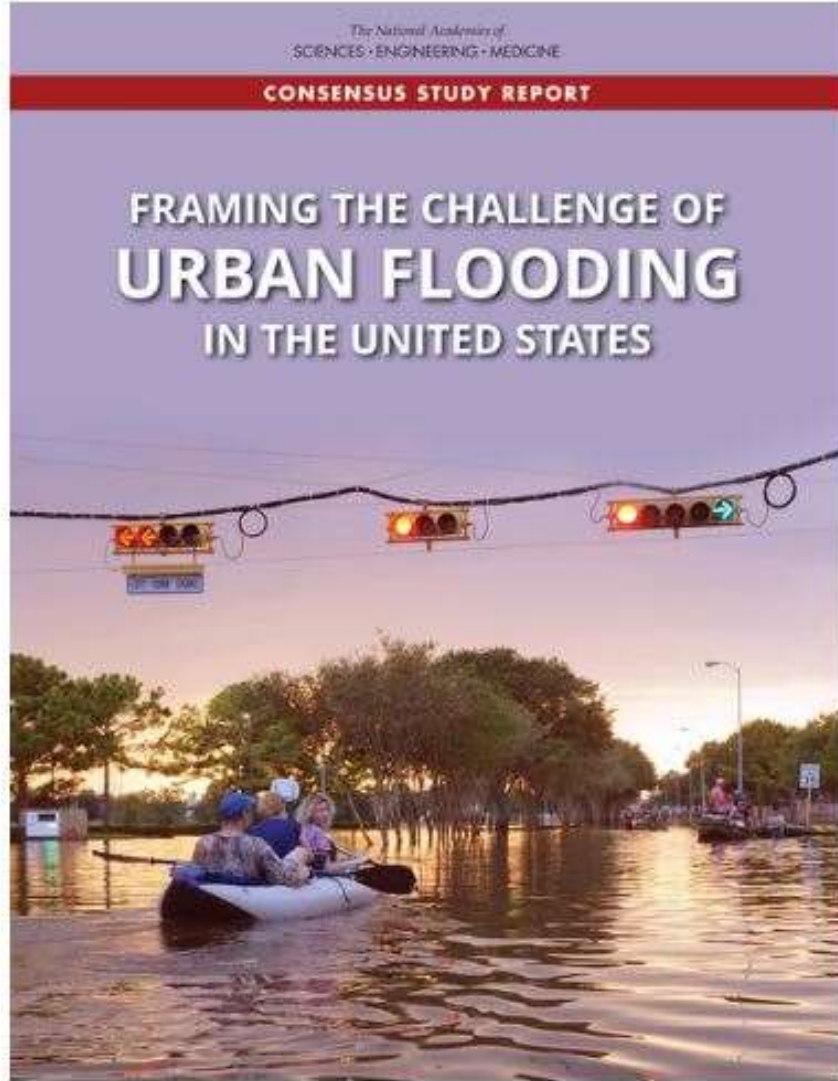


RECOGNIZED NATIONAL ISSUE

Significant flood losses and repetitive loss properties across the U.S. in unmapped areas.

- *The Growing Threat of Urban Flooding: A National Challenge* - 2018
- ASFPM Stormwater Committee
- THE 6TH GILBERT F. WHITE NATIONAL FLOOD POLICY FORUM - Increasing Our Resiliency to Urban Flooding - March 2019

LOCAL / URBAN FLOODING



NATIONAL ACADEMY OF SCIENCE
FRAMING THE CHALLENGE OF
URBAN FLOODING IN THE UNITED
STATES – MARCH 2019

TEXAS POPULATION EXPLOSION = DEVELOPMENT PRESSURES IN FLOOD-PRONE AREAS

Year	Population (million)	Growth rate
2011	25.65	n/a
2012	26.07	1.64%
2013	26.47	1.53%
2014	26.94	1.78%
2015	27.43	1.82%
2016	27.86	1.57%
2017	28.45	2.12%
2018	28.95	1.72%
2019	29.1	1.80%

+140 persons/day

ENOUGH ABOUT THE CHALLENGE. WHAT CAN WE DO ABOUT IT?

- The solution is sitting in this room
 - Community representatives can initiate grass roots, community-initiated solutions to flood problems in Texas
-

NATIONAL CFM PROGRAM

- TFMA established a Certified Floodplain Manager (CFM) Program in 1996, three years before the National CFM Program was established by ASFPM
 - TFMA is an accredited chapter of ASFPM and manages the National CFM Program in Texas
 - TFMA has trained and certified more than 3,000 CFM's in Texas
-

TEXAS QUICK GUIDE

- In 1998, TFMA prepared the first Texas Quick Guide as a layman's floodplain management handbook
 - In 2015, TWDB updated the Texas Quick Guide and posted it on the TWDB website
 - https://www.twdb.texas.gov/flood/resources/doc/Texas_Quick_Guide.pdf
-

FEMA, TWDB AND TFMA STATEWIDE FLOODPLAIN MANAGEMENT TRAINING EFFORT

- FEMA's four-day course, "Managing Floodplain Development through the NFIP"
 - TWDB one-day course, Floodplain Management 101
 - TWDB online webinars
 - TFMA's one-day course, "Federal, State and NFIP Programs"
 - TFMA's three-day Floodplain Management Course (2019)
 - TFMA's "Ethics in Floodplain Management" shared with the Texas Board of Professional Engineers
 - TFMA's short course, "FEMA's Elevation Certificate", approved by the Texas Board of Professional Land Surveying
 - TFMA conducts two annual conferences in Texas, which average more than 1,200 attendees
-

TFMA HIGHER STANDARDS AND WHITE PAPERS

- TFMA members helped create the ASFPM (National) Higher Standards Guide in 2011 and the 2013 update.
http://www.floods.org/ace-files/documentlibrary/committees/3-13_Higher_Standards_in_Floodplain_Management2.pdf
 - TFMA Higher Standards Guide developed in 2015 and updated in 2018
 - In 1999, TFMA submitted a white paper to the Governor's Office, *How to Improve Floodplain Management in Texas*. Wes Birdwell updated the white paper in 2018
-

HIGHER STANDARD ORDINANCES AND REGULATIONS

- **Dallas, Austin and several others** regulate development to floodway (no rise) standards
 - Houston area communities follow the higher standards outlined in the **Houston-Galveston Area Council Floodplain Management Handbook**
 - **Harris County and City of Houston** adopted the most stringent flood regulations in the nation.
 - NCTCOG cities and counties regulate development in the **Trinity River corridor following Common Vision standards** to the 500-year level
 - NCTCOG communities have adopted higher **stormwater standards**, including No Adverse Impacts
-

HIGHER STANDARDS

- Other States have adopted higher standards
 - CRS Participation (Florida)
 - Corridor Preservation and Permitting (Vermont)
 - State-mandated freeboard (New York, Oregon, Montana, and others)
 - Floodway encroachment requirement less than one foot (New York, Oregon, Montana, and others)
 - There are no higher floodplain management standards mandated by state law in Texas
 - TFMA's annual Higher Standards Survey documents 334 out of 1255 NFIP communities in Texas have adopted and enforce higher FPM standards
-

TFMA'S 2019 HIGHER STANDARDS SURVEY TEXAS BEST MANAGEMENT PRACTICES

- 334 (26 percent) Texas communities submitted surveys. Of those respondents:
 - 288 (86 percent) require Freeboard for new development
 - 141 (42 percent) require Freeboard based on fully developed watersheds
 - 180 (54 percent) require detention or mitigation of downstream impacts
 - 249 (75 percent) require an engineering study to define the floodway and BFE's
-

HARRIS COUNTY'S JAN. 1, 2018 FLOODPLAIN REGULATIONS AMONG "BEST FLOODPLAIN REGULATIONS IN THE NATION"

- **Zones A and V** – Lowest floor elevated more than two feet above 0.2 percent (500-year) flood
 - **Zone X (shaded)** – In cases where the structure is located geographically in the 0.2 percent or 500-year flood plain and the ground is lower than the 0.2 percent or 500-year level but higher than the one percent or 100-year level, the finished floor elevation shall be elevated at or above the 0.2 percent or 500-year level.
 - **Zone X (unshaded)** – The finished floor shall be a minimum of 12 inches above the highest adjacent natural grade when measured 10 feet from the edge of the slab, or 12 inches above the crown of the adjacent street which ever results in the highest elevation (whichever is higher).
 - Critical facilities must be elevated more than three feet above 0.2% (500-year) flood
-

NCTCOG iSWM



Stormwater Criteria Community Inventory

MAY 23, 2019

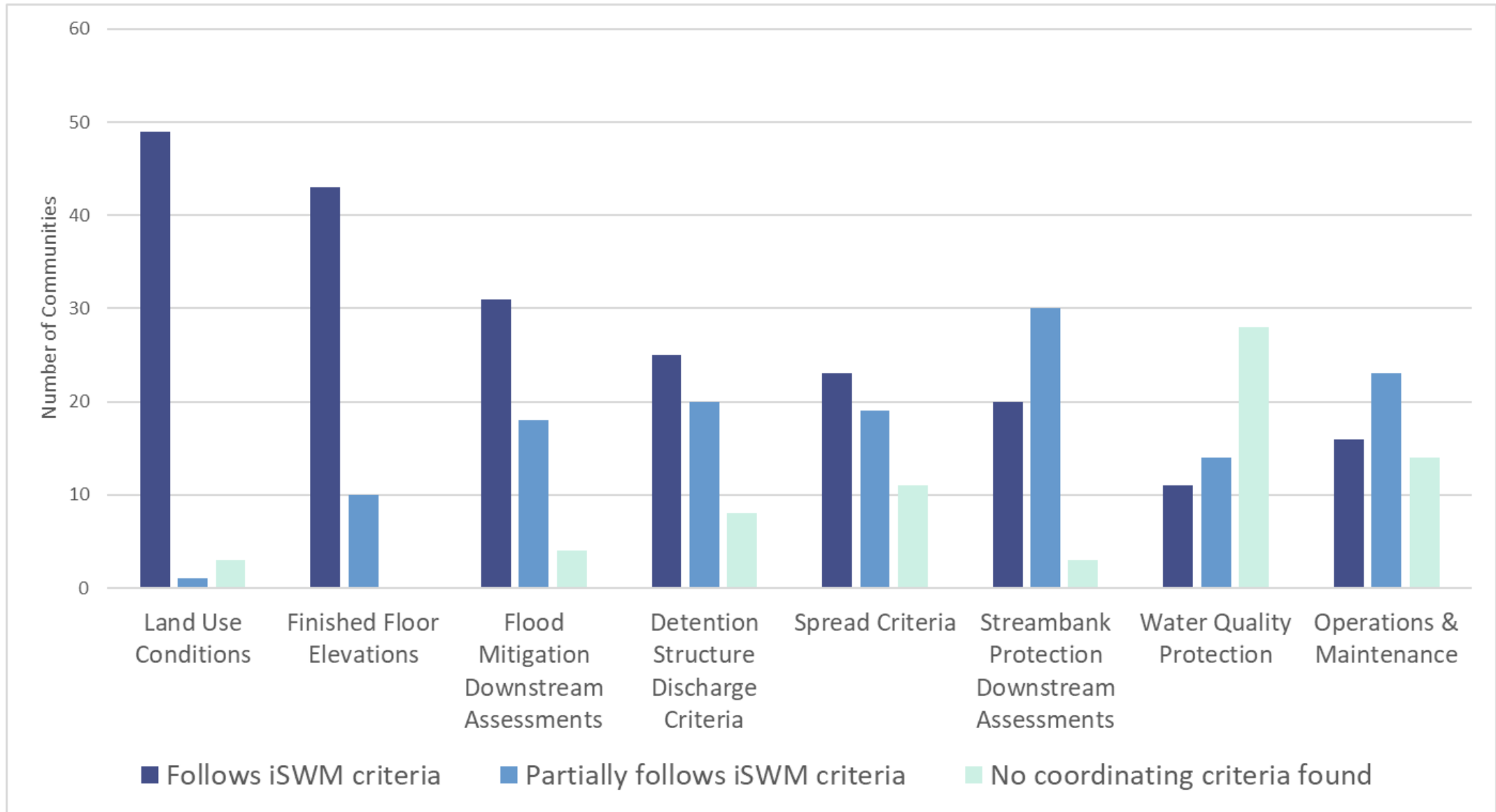
WHAT IS THIS INVENTORY?

- Ordinances and Drainage Criteria Manuals of fifty-three (53) communities were reviewed and compared to eight (8) iSWM Design Criteria:
 - Fully-developed land use conditions
 - Detention structure discharge
 - Streambank protection
 - Flood mitigation/downstream assessments
 - Operations and maintenance
 - Spread
 - Finished floor elevations
 - Water quality protection
- Data was also collected from an NCTCOG email survey completed in December 2018 asking if use of fully-developed land use conditions was required in drainage criteria.
- The iSWM criteria review was based off of the NCTCOG Tiered Measurement Form:
http://iswm.nctcog.org/Documents/iSWM_Implementation_Tiered_Measurement.pdf
- Upon review, each criteria reviewed for each community was placed in one of the three categories:
 - Follows iSWM criteria
 - Partially follows iSWM criteria
 - No coordinating criteria found

PLEASE NOTE




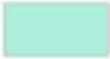
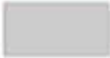
- This will always be a working inventory, there may have been a separate document that was not initially reviewed and these criteria and ordinances are ever changing. If any changes or updates need to be made, please contact the NCTCOG Department of Environment & Development.

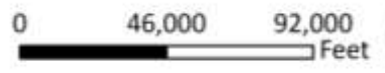
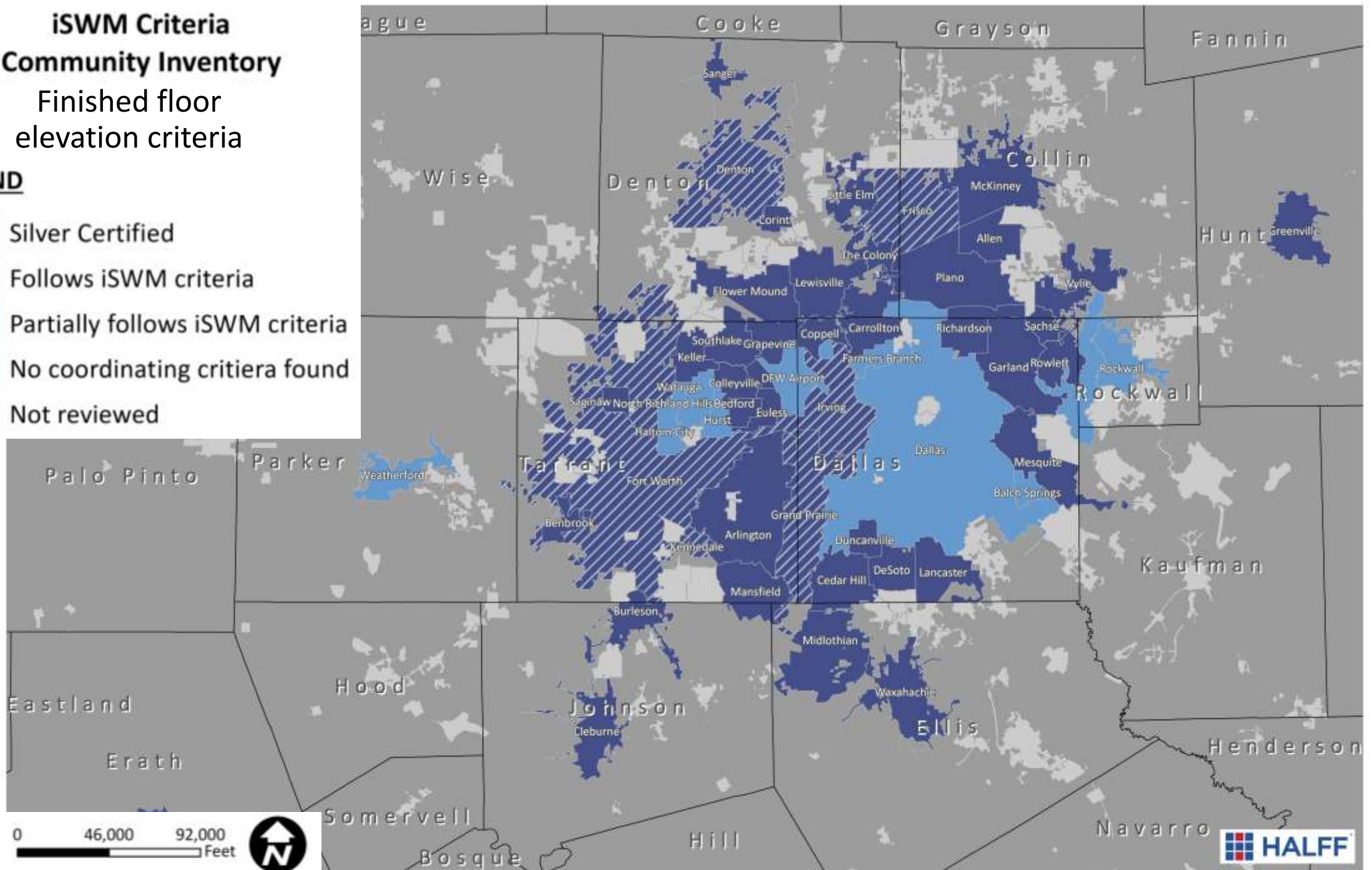
ISWM INVENTORY OVERVIEW



**iSWM Criteria
Community Inventory**
Finished floor
elevation criteria

LEGEND

-  Silver Certified
-  Follows iSWM criteria
-  Partially follows iSWM criteria
-  No coordinating critiera found
-  Not reviewed




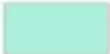



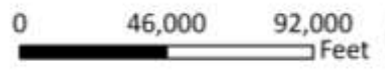
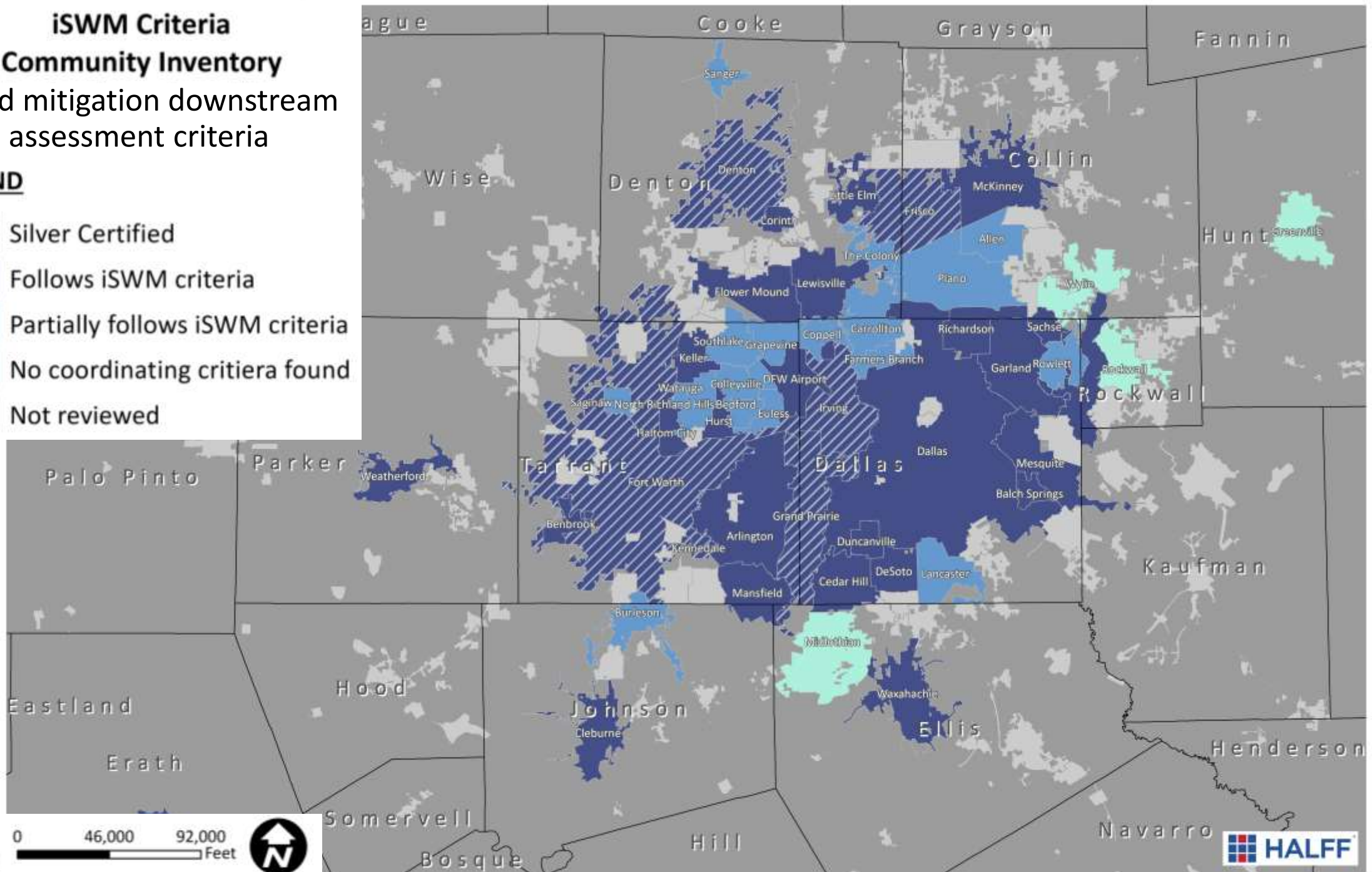
iSWM Criteria

Community Inventory

Flood mitigation downstream assessment criteria

LEGEND




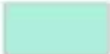

-  Silver Certified
-  Follows iSWM criteria
-  Partially follows iSWM criteria
-  No coordinating criteria found
-  Not reviewed

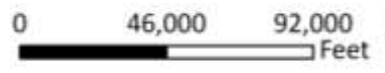
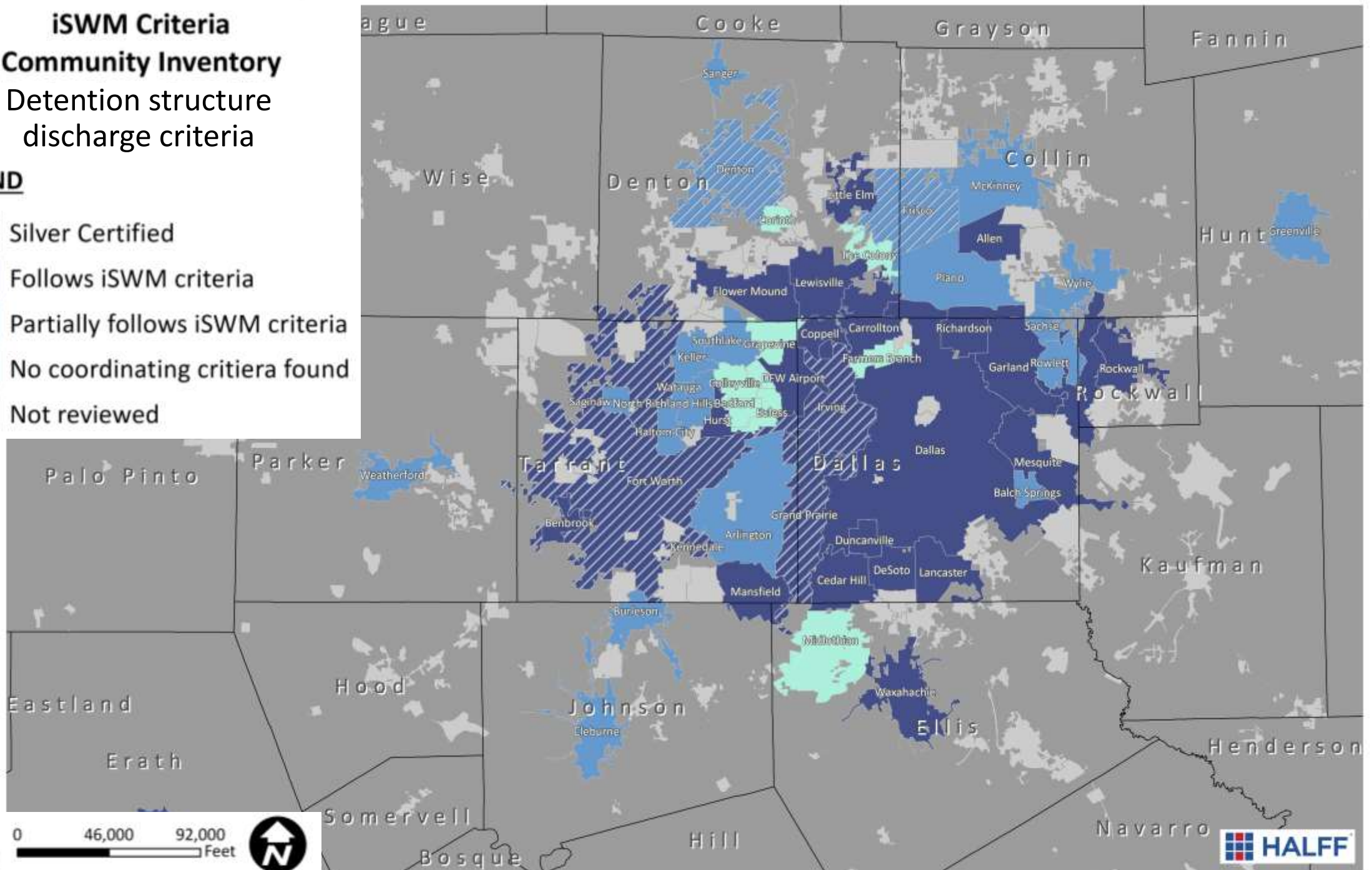


iSWM Criteria

Community Inventory
Detention structure
discharge criteria




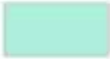
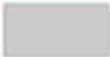
LEGEND

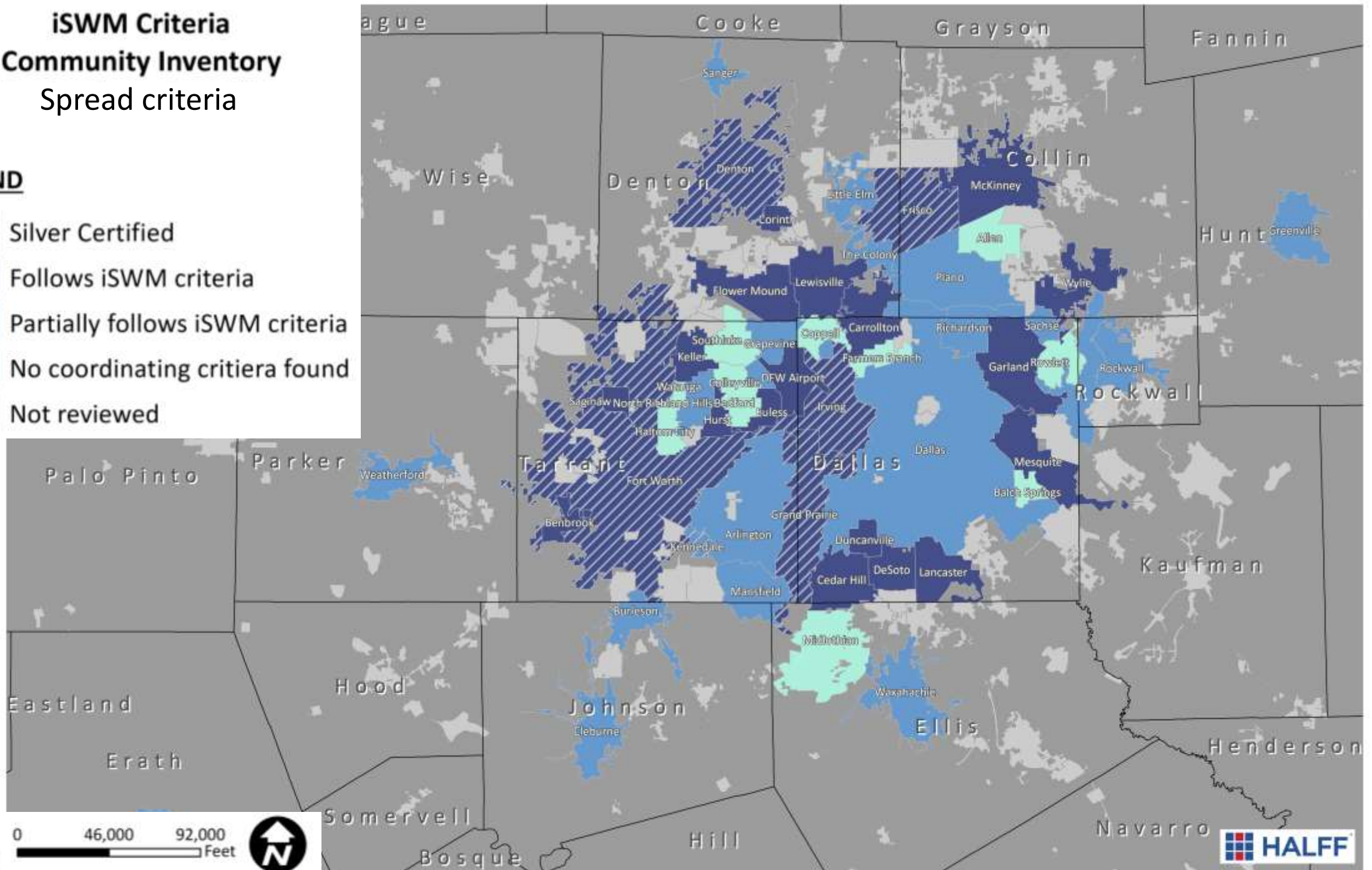
-  Silver Certified
-  Follows iSWM criteria
-  Partially follows iSWM criteria
-  No coordinating critiera found
-  Not reviewed



iSWM Criteria Community Inventory Spread criteria

LEGEND

-  Silver Certified
-  Follows iSWM criteria
-  Partially follows iSWM criteria
-  No coordinating critiera found
-  Not reviewed




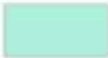
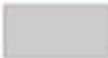


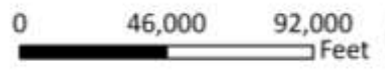
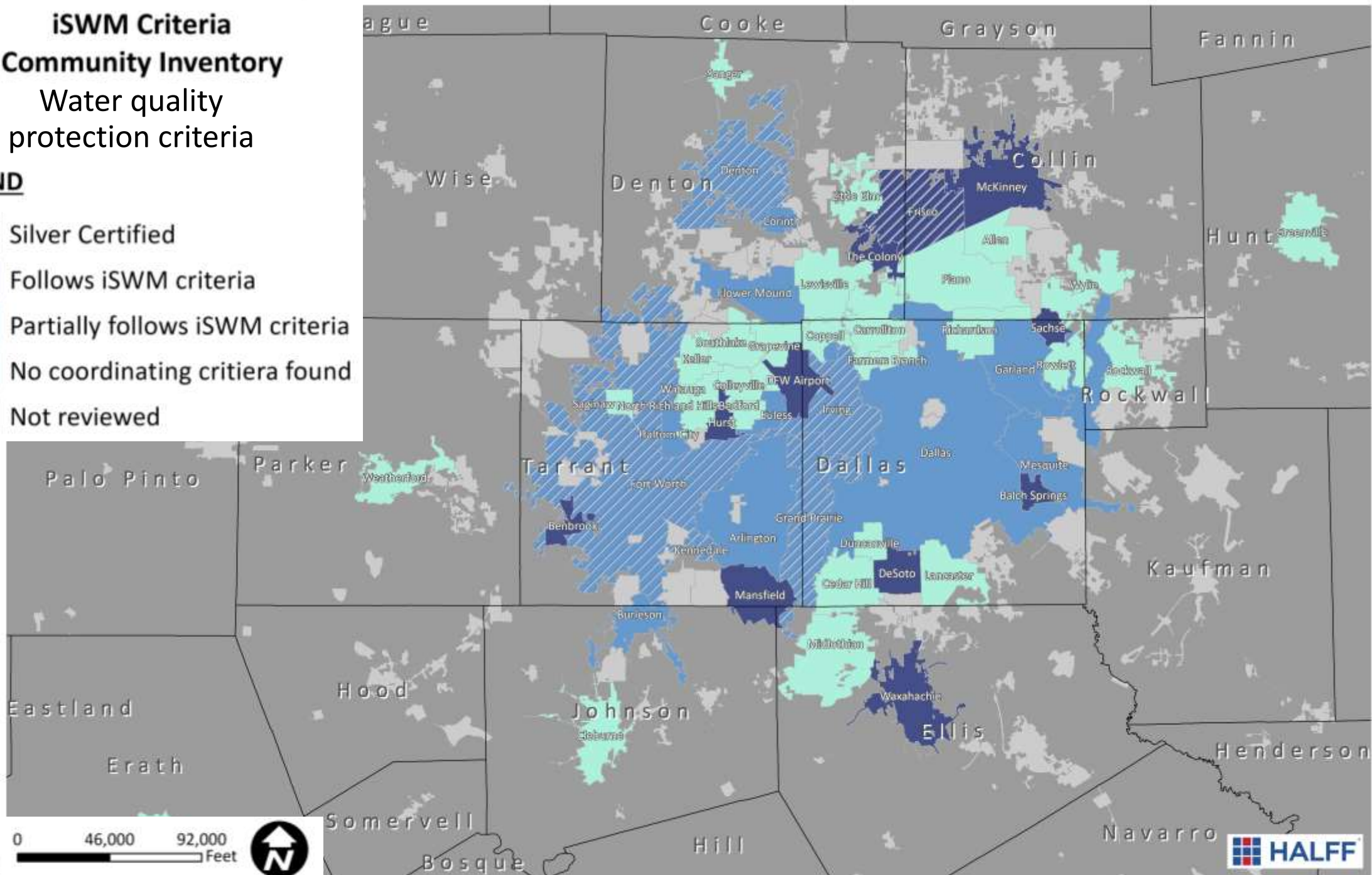
0 46,000 92,000 Feet



**iSWM Criteria
Community Inventory
Water quality
protection criteria**

LEGEND

-  Silver Certified
-  Follows iSWM criteria
-  Partially follows iSWM criteria
-  No coordinating critiera found
-  Not reviewed



HOW TO SOLVE THE PROBLEM

- Working together, Texas can reduce flood risks, reduce loss of life from flooding and minimize flood damages, but it will take a joint effort from:
 - State agencies, such as TWDB, TDEM, TxDOT, TGLO and TDI
 - Federal agencies, such as FEMA, USACE, NOAA/NWS, USGS, NRCS and HUD;
 - Associations such as TFMA; Building Professional Institute, Bayou Preservation, Texas Water Conservation Association and others
 - River authorities and water districts
 - Special districts, such as HCFCD
 - Regional planning commissions, such as NCTCOG and HGAC
 - Taking advantage of mitigation grants administered by FEMA, TWDB, TxDDEM and TxGLO

Benchmarking and Higher Standards

NCTCOG CRS Users Group / Elected Officials
Arlington, Texas



July 18, 2019

PRESENTERS:

Ben Pylant, PE, CFM
John P. Ivey, PE, CFM



NCTCOG CHARM Exercise

July 18, 2019

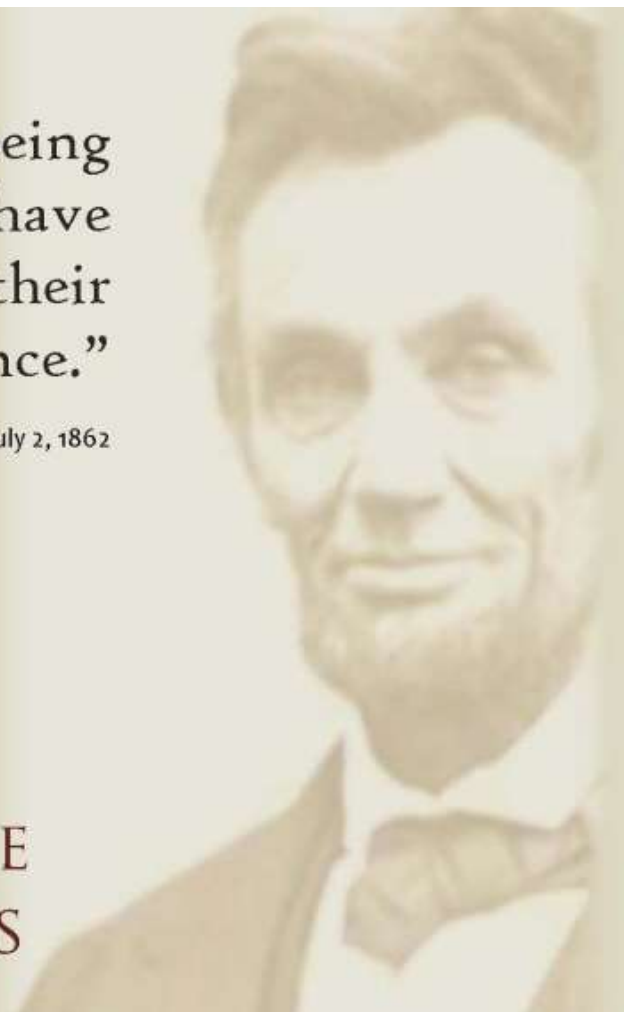


“The land grant university system is being built on behalf of the people, who have invested in these public universities their hopes, their support, and their confidence.”

Abraham Lincoln, upon signing the Morrill Act, July 2, 1862

SERVING YOU TODAY

TRUSTED RESEARCH
LOCAL EDUCATORS...
EXTENDING KNOWLEDGE
PROVIDING SOLUTIONS



The planning literature is clear:

The best laid plans...

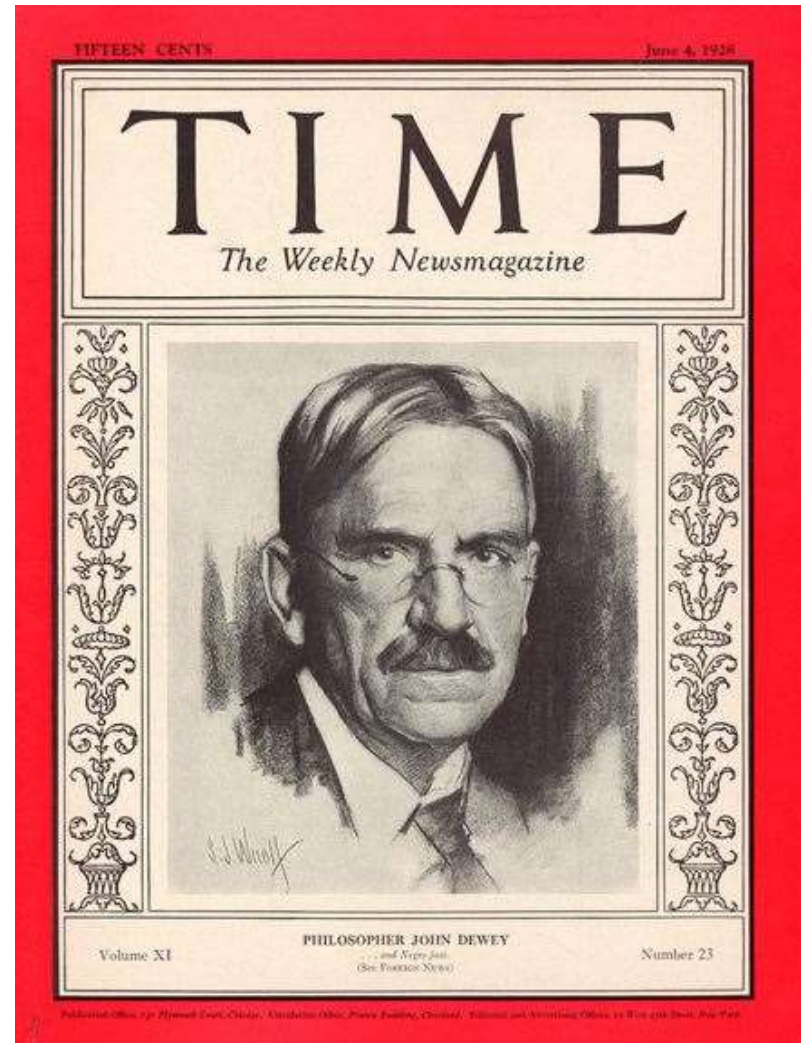


... involve extensive
citizen involvement
and participation

“The man who wears the shoe knows best that it pinches and where it pinches, even if the expert shoemaker is the best judge of how the trouble is to be remedied.

John Dewey

The Public and Its Problems



Community Health And Resource Management







Critical Facilities Exercise

FEMA Resiliency Workshop
Rockport TX, March 2016



Go/No-Go Exercise

FEMA Resiliency Workshop
Jackson Co, June 2016



Future Land Use Exercise

FEMA Resiliency Workshop
Galveston, September 2016





Buy Out Exercise

FEMA Resiliency Workshop
Hays Co, August 2017

SOVI Exercise

FEMA Resiliency Workshop
Liberty Co, April 2018



Mitigation Exercises

FEMA Resiliency Workshop
Brazoria Co, April 2018





Resilience Index

CRI-CHARM Workshop
Santa Rosa FL, December 2018

Discovery Workshops

LAN Consulting & HCFCDC Cedar, Luce & Jackson Bayous
November 2018



Foster & Facilitate Dialogue Asking Better Questions



Participant Goals

- ✓ Facilitate dialogue about values, practical knowledge, and vision
- ✓ Allow participants to directly participate in scenario analysis and view planning and mitigation impacts in real time
- ✓ Engage in collaborative problem solving and catalyze action
- ✓ Advance the conversation about effective planning and mitigation practices





U.S. National Atmospheric and Oceanic Administration

U.S. Department of Commerce National Oceanic and Atmospheric Administration

NATIONAL MARINE SANCTUARIES

National Marine Sanctuaries







EXIT

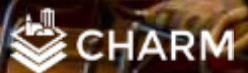
EDNA
FIRE
DEPARTMENT

EDNA
FIRE
DEPARTMENT





City of Corpus Christi



“This has changed my thinking...”





“We are talking”



GIS/Commu
nity Viz

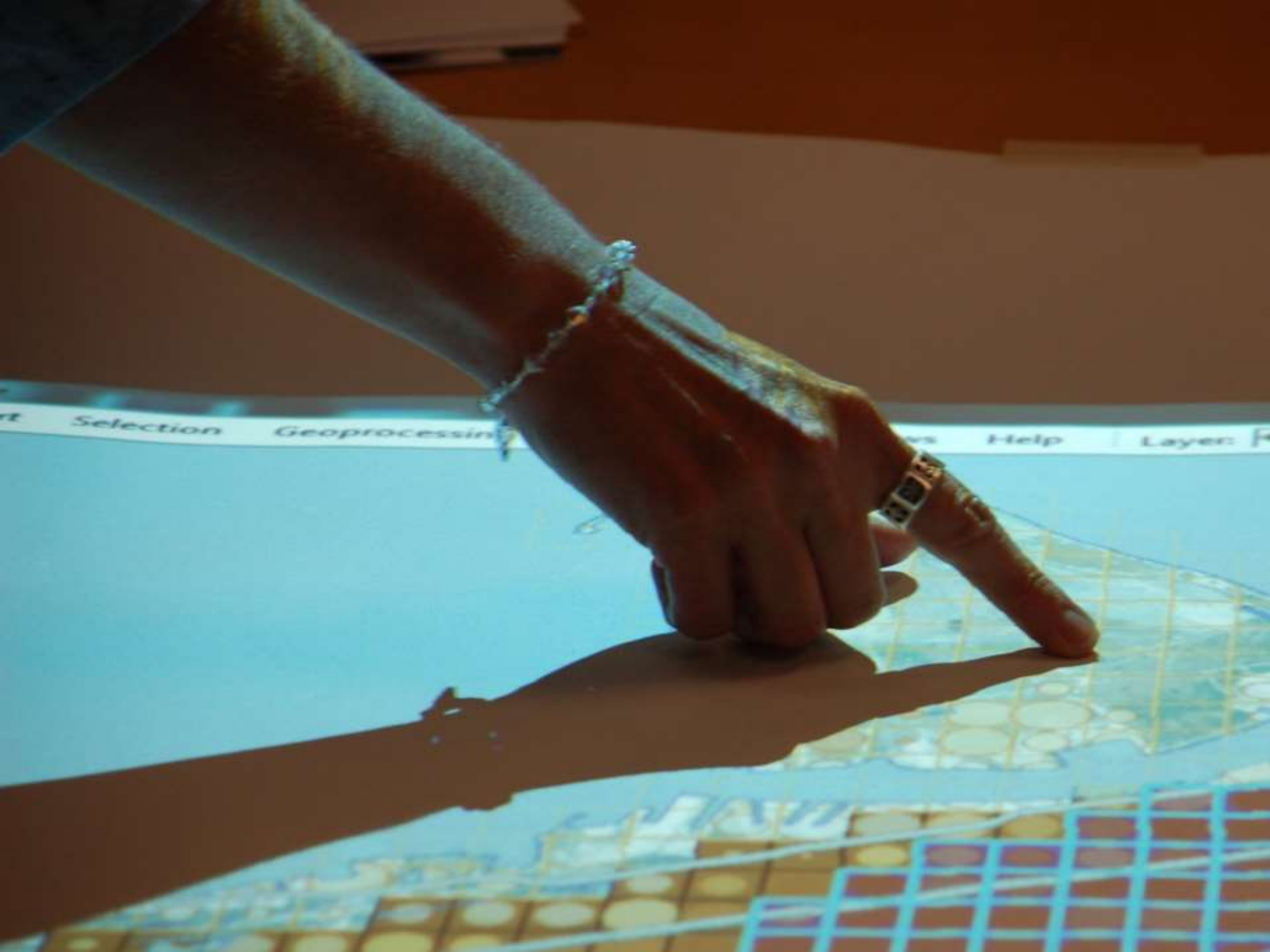
WeTable

CHARM
Layer & Ref
Data

CHARM Platform

WeTable









2.5-Acre Grid



FEMA





SUBURB RANCHETTES

Residential (Ret.)
Business (Bus.)

POST

SUB

ACR

WAGE

Centralized Treatment



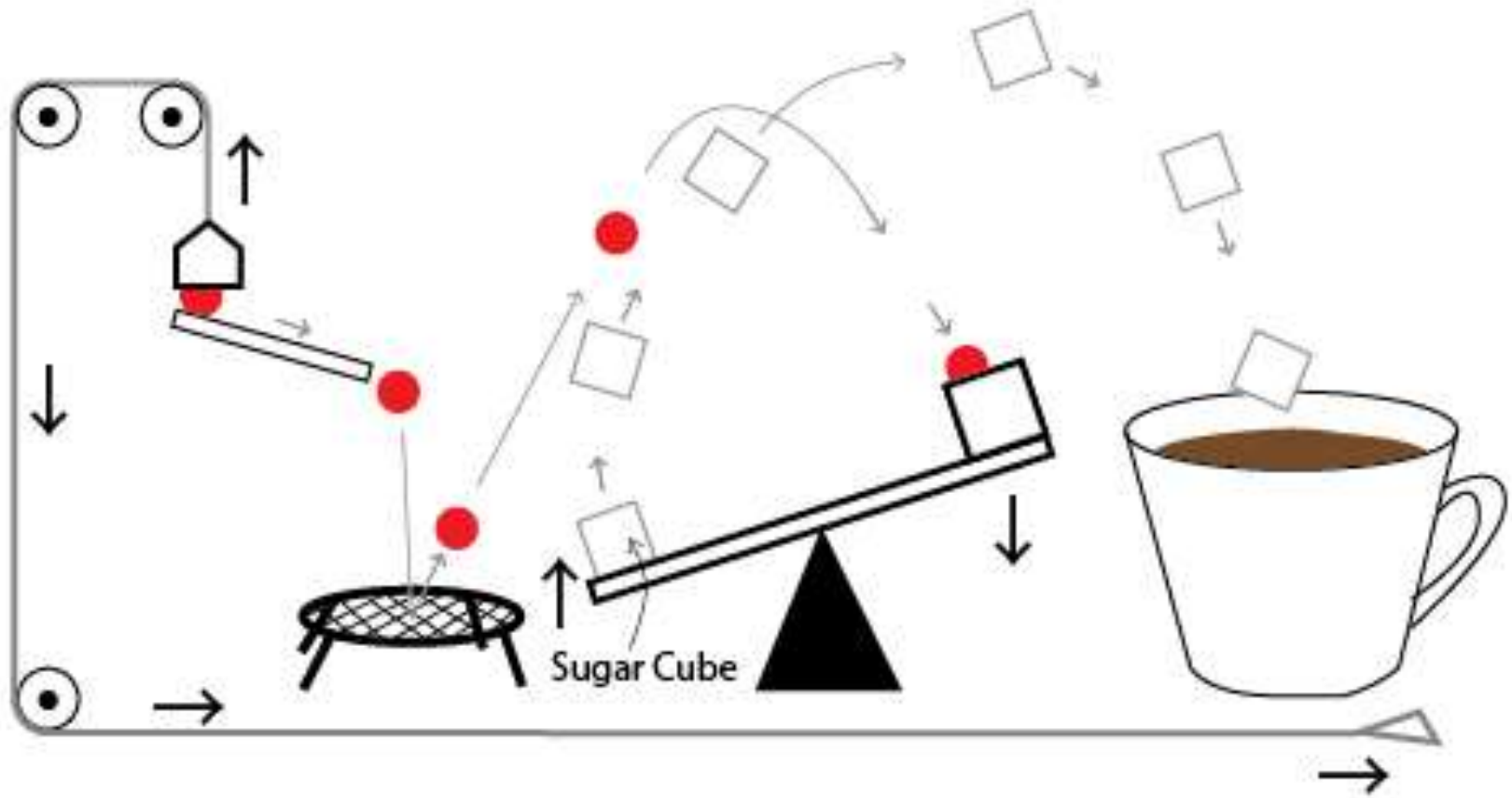
Smart Growth

Walking Friendly

Transit Friendly

TOWN CENTER MIXED USE

Geographic Information System (GIS or Computer Mapping)



CHARM by the numbers

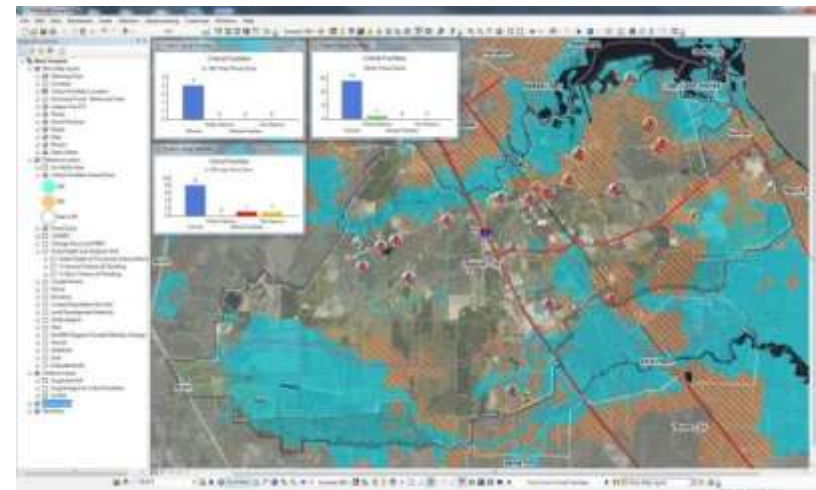
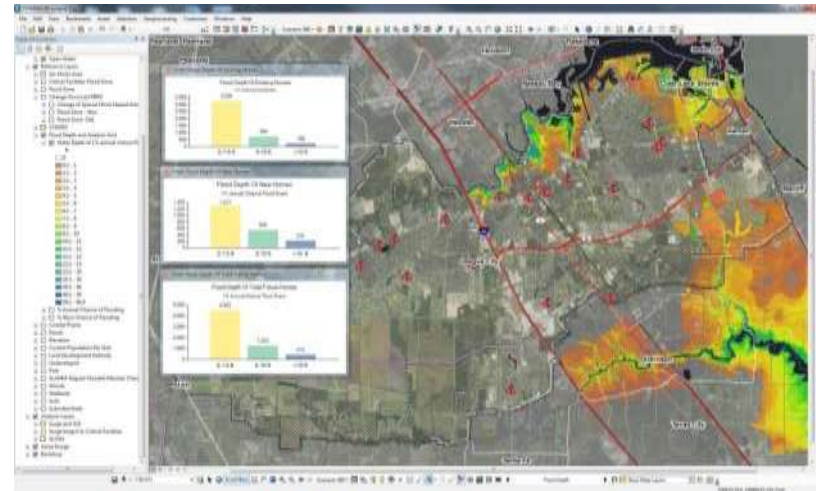
Up to 10 Participants per tables

30+ Map Layers

60 Live Updates

14 Development Styles

20 Analytic Layouts





CHARM

TCWP.tamu.edu

CommunityCHARM.org

Steven Mikulencak, AICP

TCWP Planning Team Lead & Project Manager

smikulencak@tamu.edu

TCWP offers technical and facilitative support for Texas communities. Please reach out to us to discuss options.

