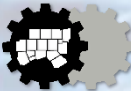


# 2021 Combined CRS Users Group/Elected Officials Seminar

July 29, 2021



# Welcome and Introductions

- Thanks for attending!
- Please mute your line.
- Unmute your line when you would like to speak during question and discussion time.
  - We will also watch the chat box for questions

# Agenda

1. Overview of Flood Activities and New Initiatives at the Trinity RFPG
  - *Glenn Clingenpeel, TRA*
2. Texas Infrastructure Report Card
  - *Mark Boyd, ASCE*
3. Hazard Resistant Building Codes: Floodplain Management and FEMA Grant Funding
  - *Donald Leifheit, FEMA*
4. Risk Rating 2.0
  - *Gilbert Giron, FEMA*

# Contact

## **Breanne Johnson**

Environment & Development Planner  
North Central Texas Council of Governments

[bjohnson@nctcog.org](mailto:bjohnson@nctcog.org)

817.695.9148

# Connect



Facebook.com/nctcogenv



@nctcogenv



nctcogenv



youtube.com/user/nctcoged



EandD@nctcog.org



nctcog.org/envir



# Elected Officials Floodplain Seminar

Glenn Clingenpeel

Chairman, Region 3 Regional Flood Planning Group



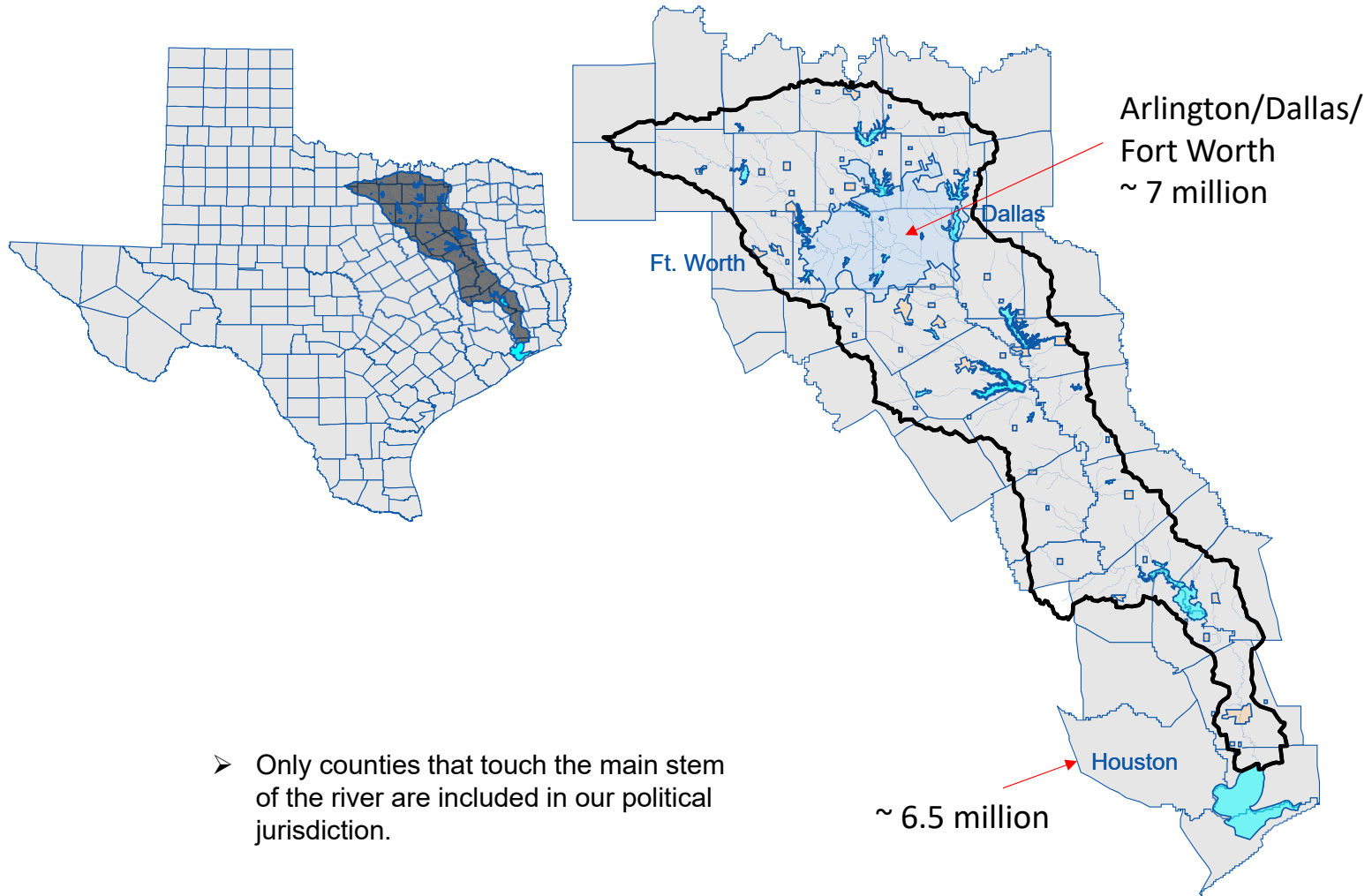
# TRINITY

## Regional Flood Planning

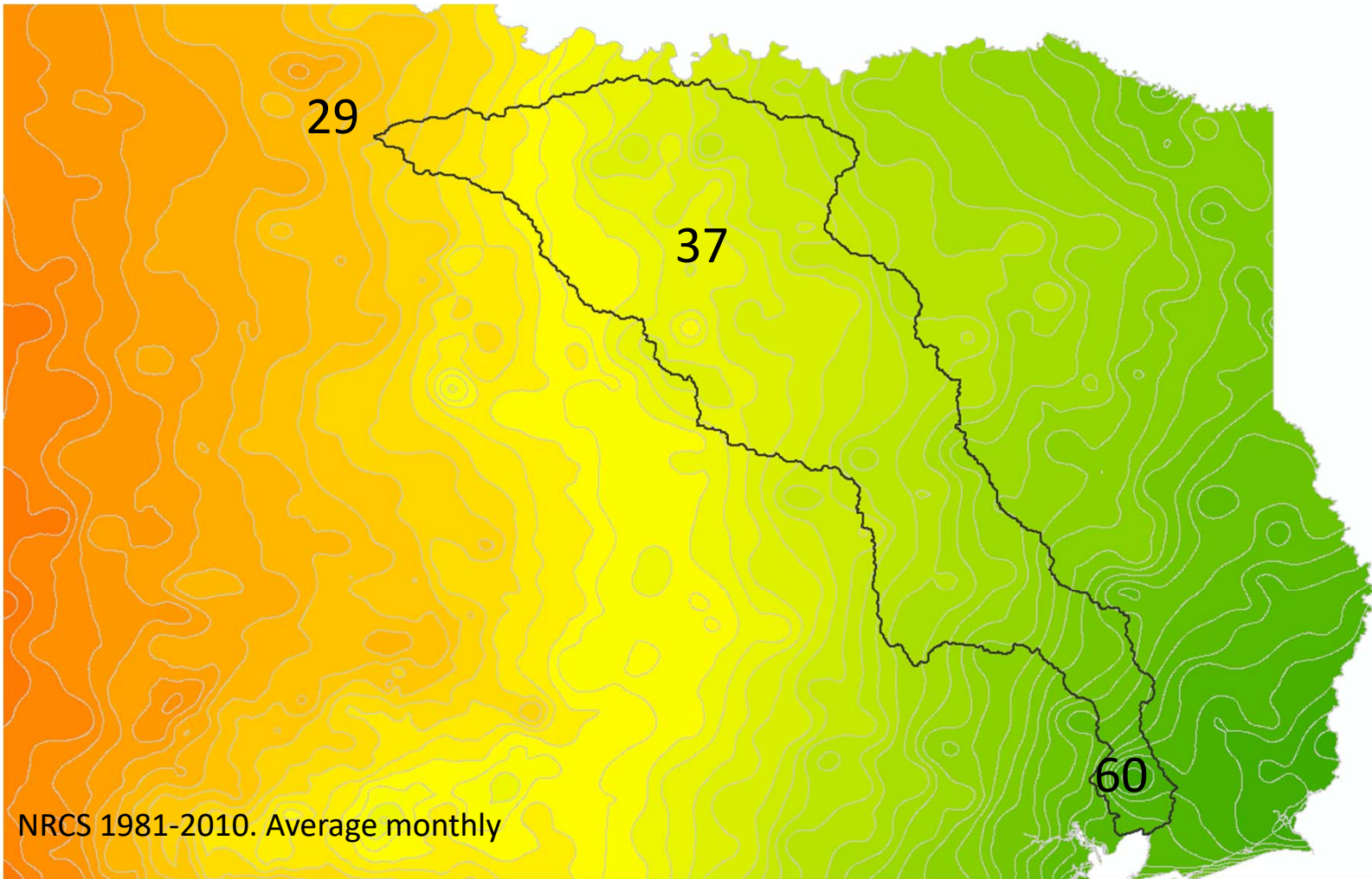
- **Trinity Basin Weather**
- **Water Planning**
- **Flood Planning**



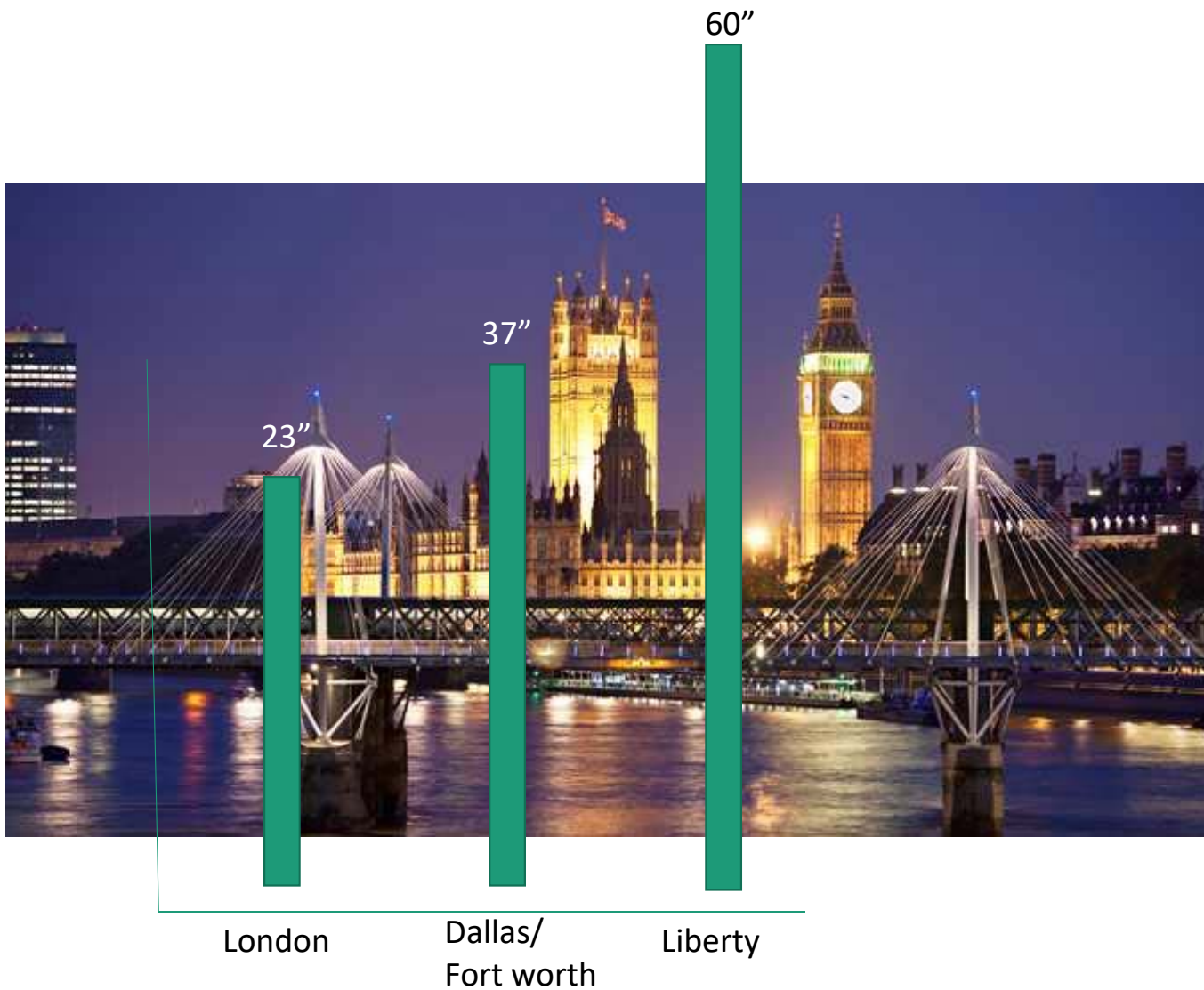
# Trinity River Basin and TRA



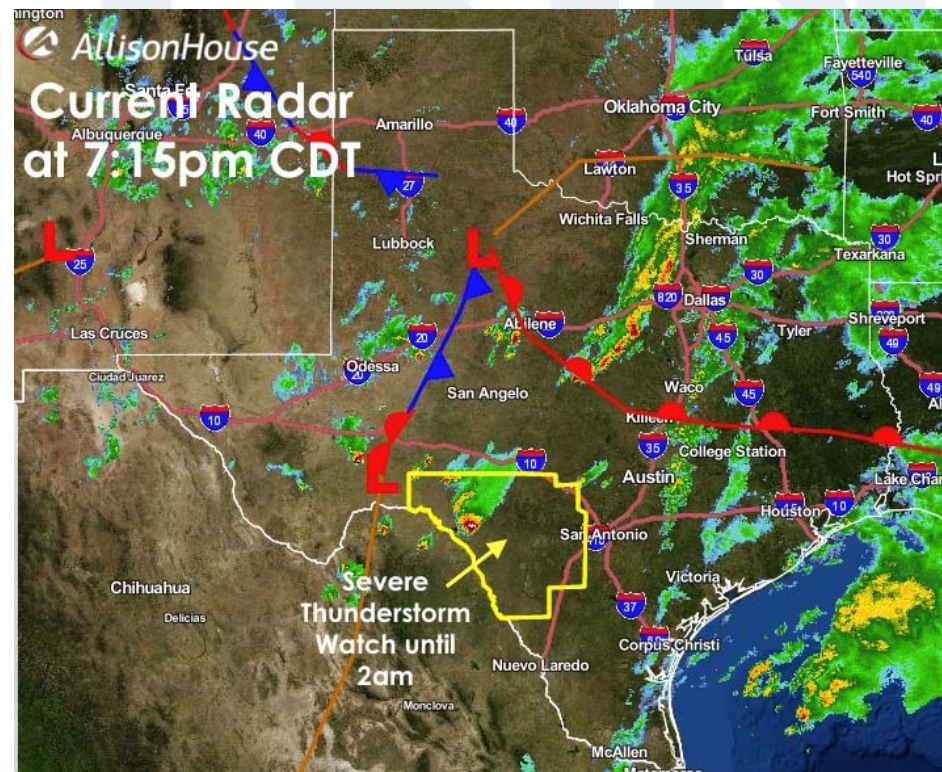
# Rainfall Across the Trinity Basin



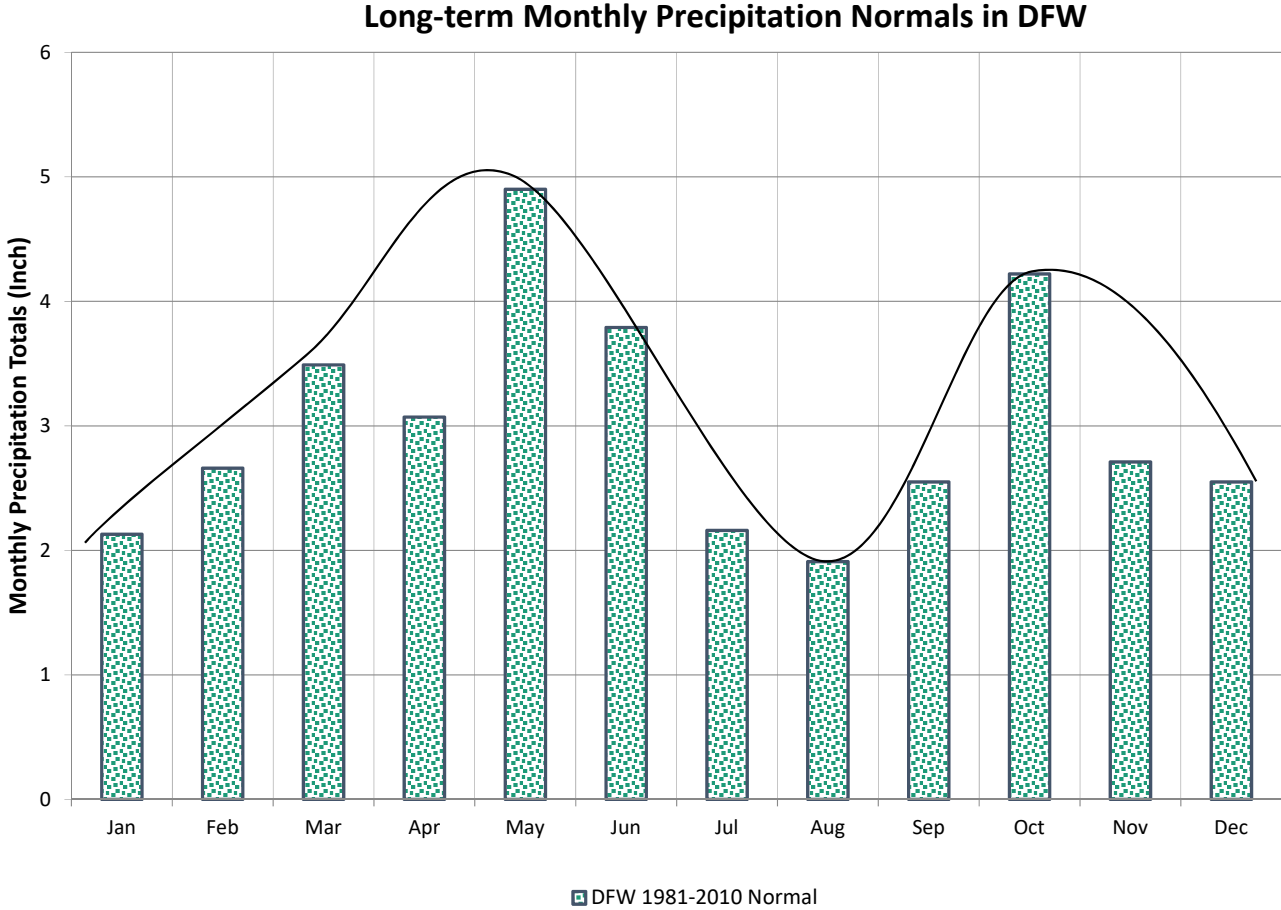




# Precipitation in North Texas

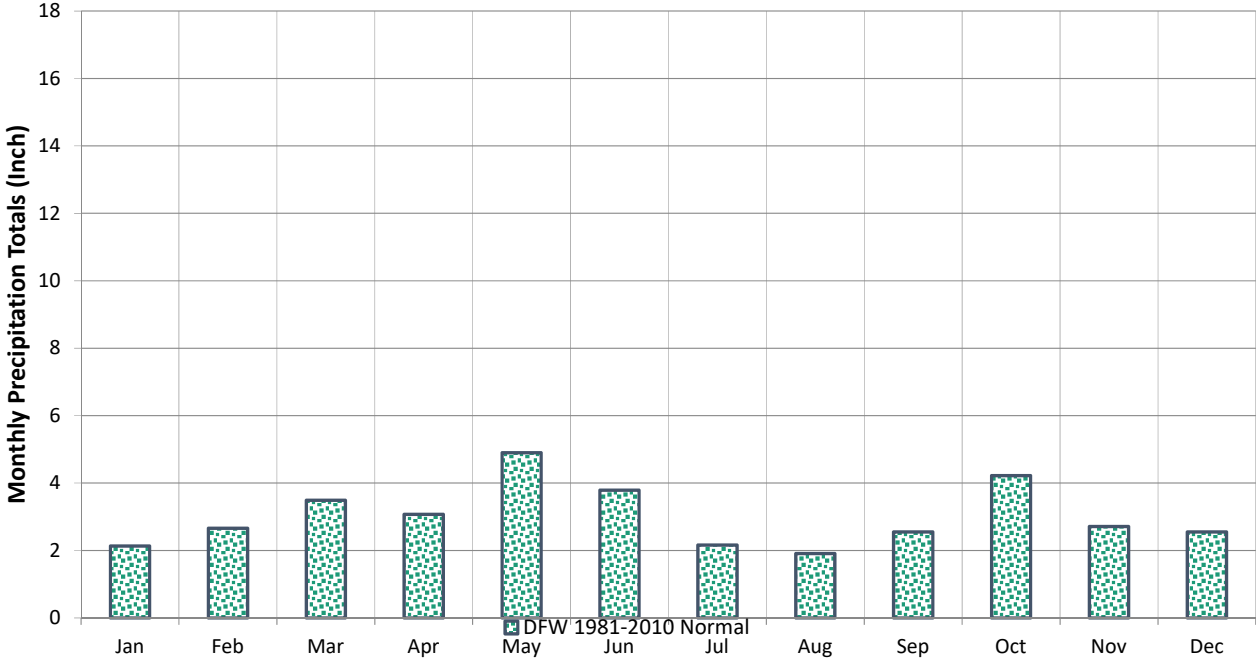


# Precipitation Patterns

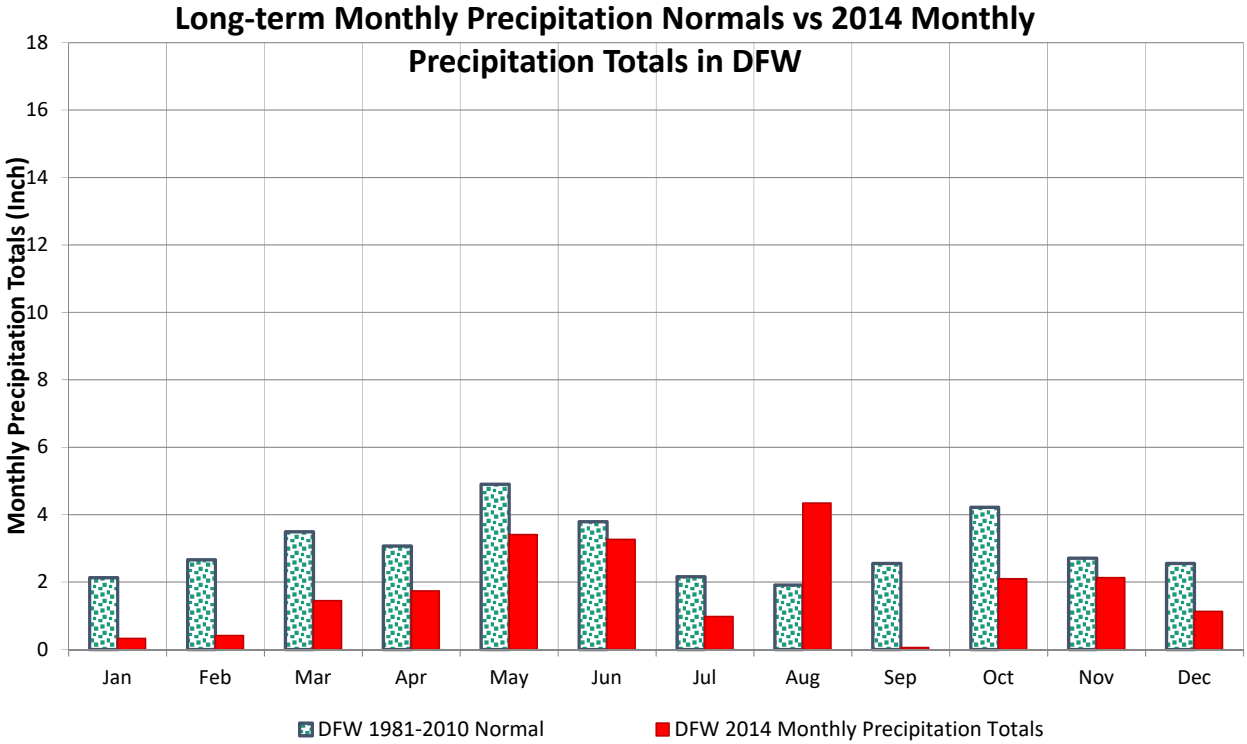


# Precipitation Patterns

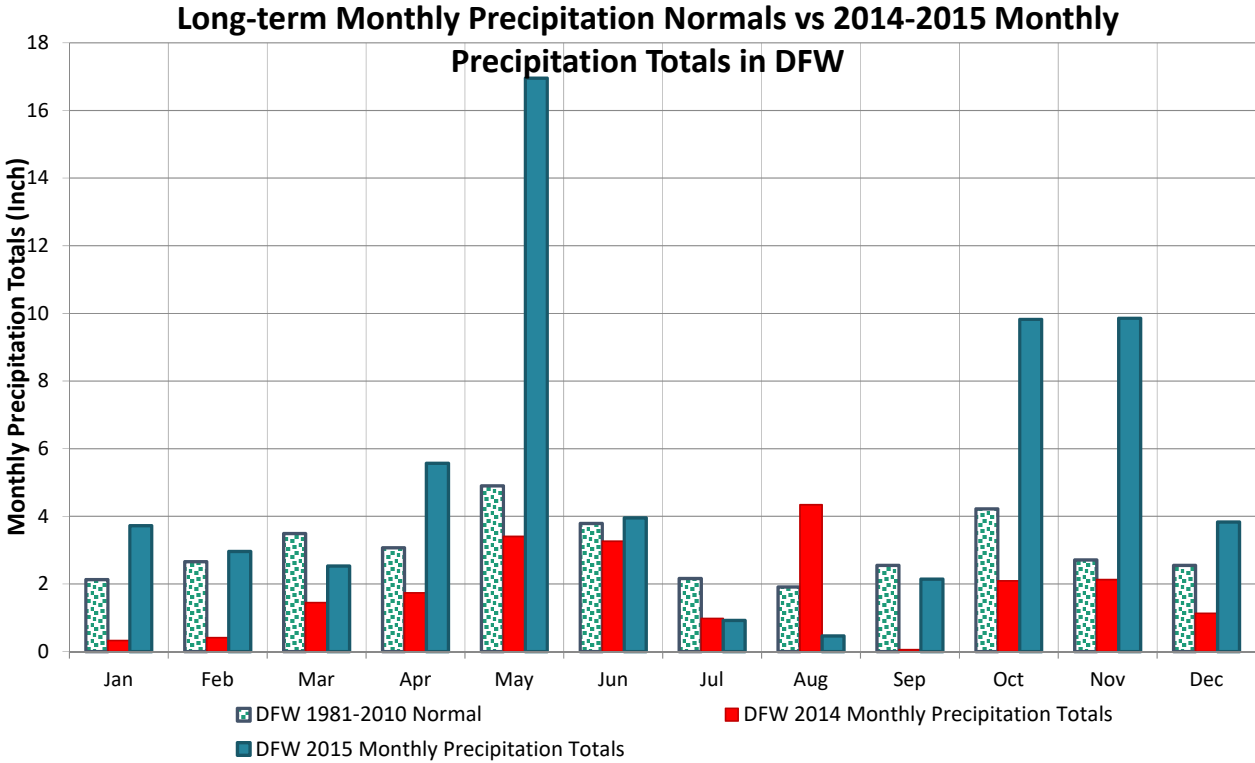
Long-term Monthly Precipitation Normals in DFW



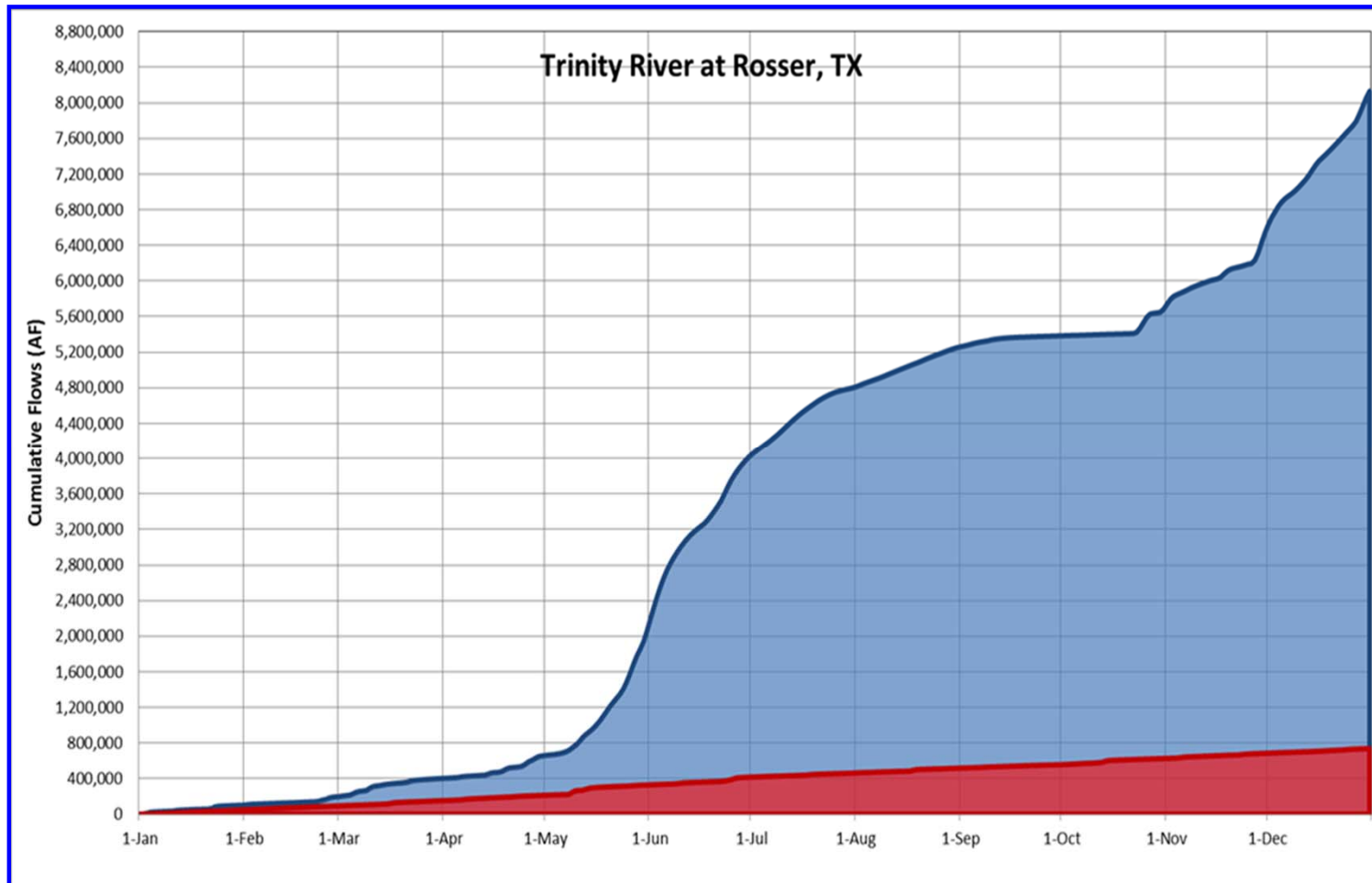
# Precipitation Patterns



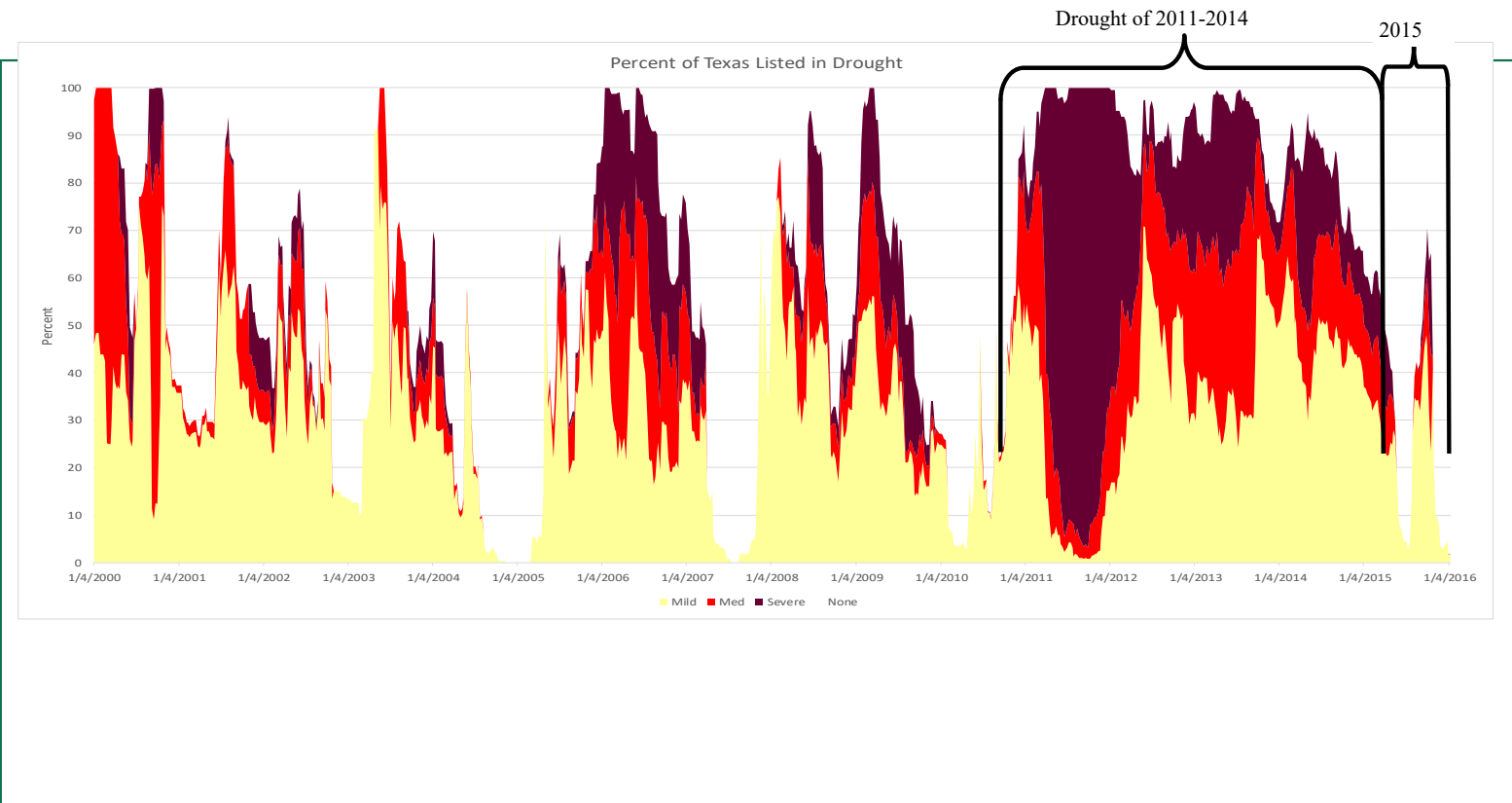
# Precipitation Patterns



# Total Cumulative Flow in Trinity, 2014 v. 2015



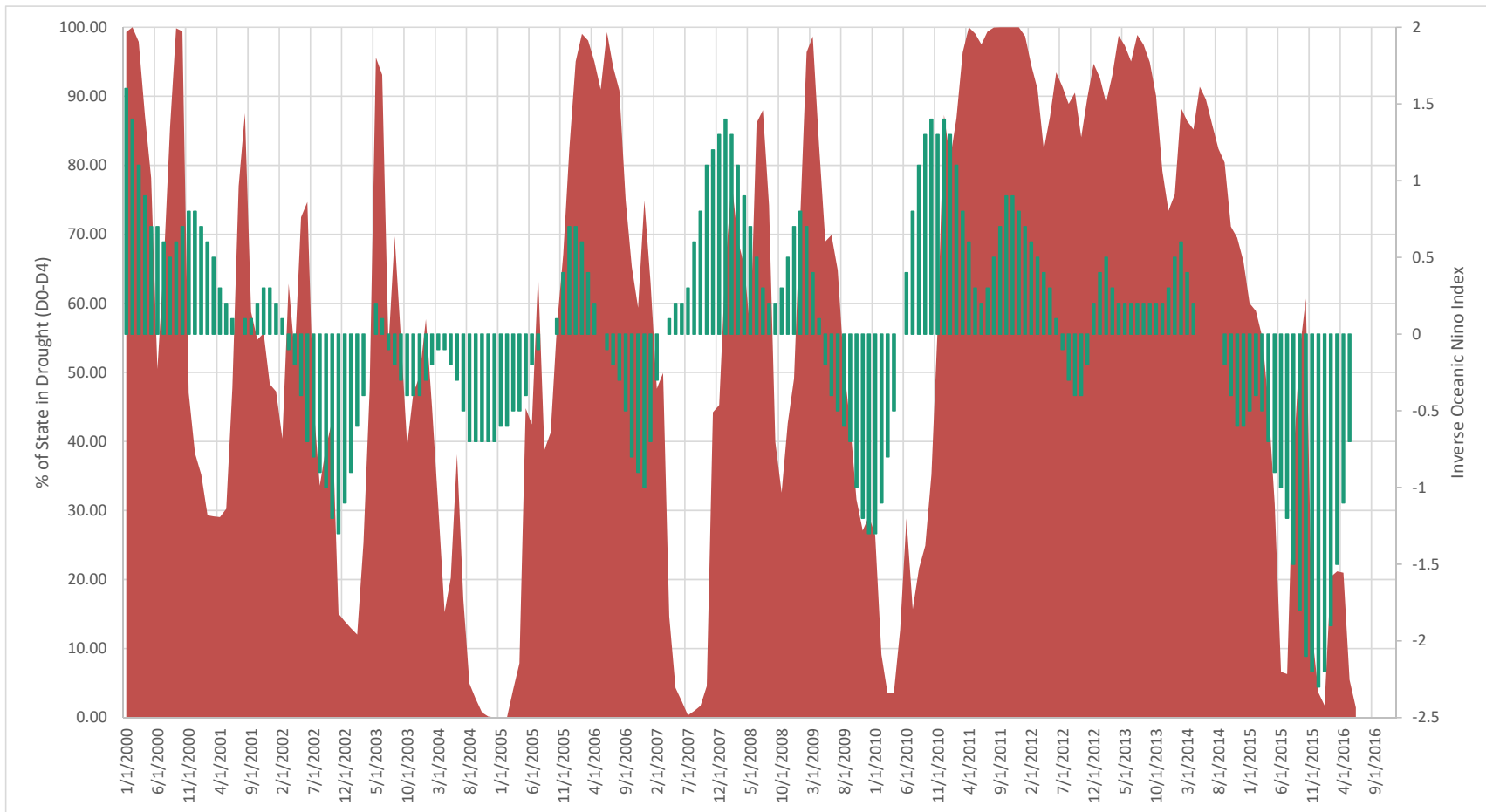
# The Drought and Flooding in Texas is Cyclical

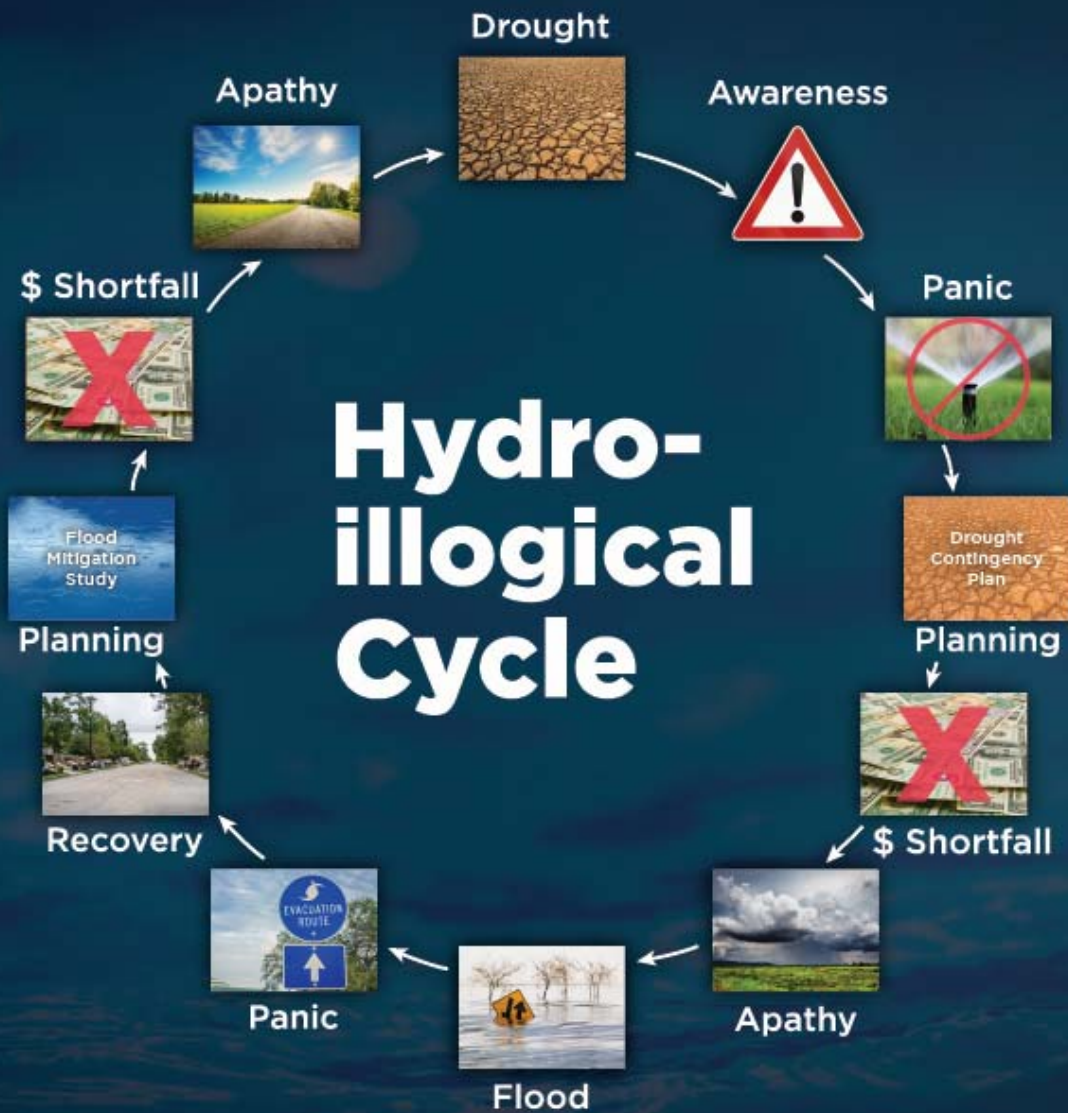


**“Texan’s have seen drought alternate with flood in a disheartening pattern of extremes. In many cases the same areas suffering from acute water shortages are later ravaged by floods...”**  
***1961 State Water Plan***



# Role of ENSO Cycle in Texas' Climate





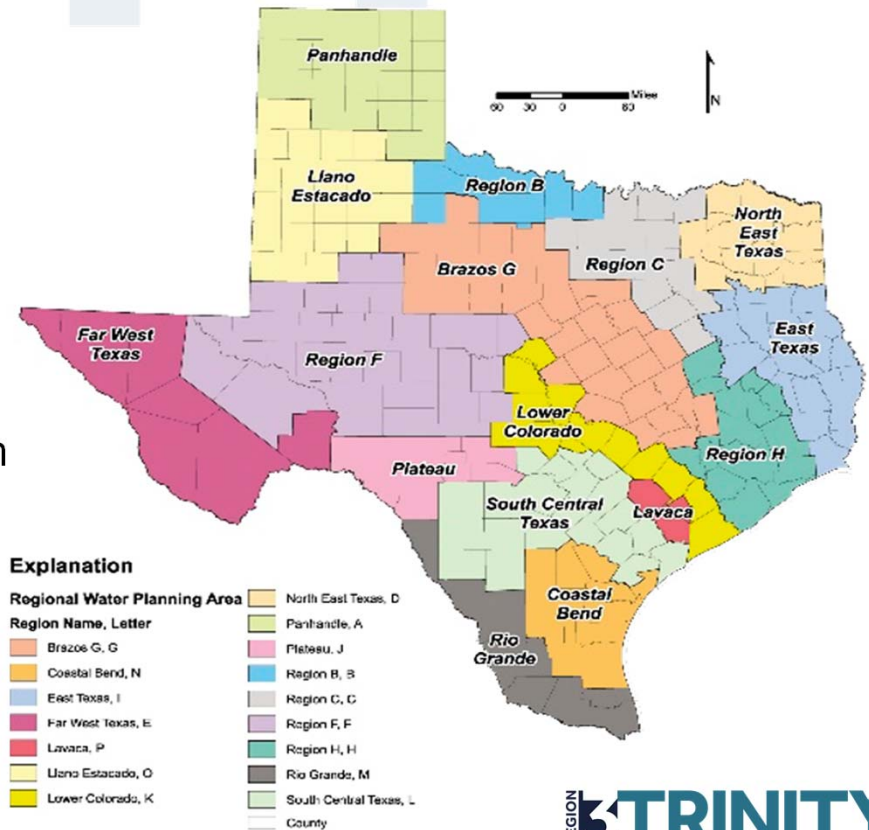
# A brief history of water planning in Texas

- 1961 – first state water plan
  - Top down, 20-yr plan
- In 1997, Legislature passed SB1 overhauled statewide water planning
  - Bottom up, 50-yr plan
- Texas Water Development Board (TWDB) was charged with implementing SB1
- The plans are updated every five years



# TWDB's 16 Regional Water Planning areas

- Each group is tasked with developing regional water plans for their areas
  - Current Demand v. Supply
  - Projected Demand v. Supply
  - Develop strategies to overcome deficits
- The plans cover a rolling 50-year planning horizon



# Regional Water Planning Groups and the Texas Water Development Board

## **RWPG**

- Represent 11 interest categories
- Establish bylaws
- Hold Public Meetings
- Prepare Regional Water Plans every five years

## **TWDB**

- Provide guidance documents
- Develop plan requirements
- Approve Regional Water Plans and incorporate them into a State Water Plan
- Allocate funding

# TRINITY

## State Flood Planning Coordination

- After repeated record-breaking floods, the Texas Legislature established a process to develop the first-ever State Flood Plan in the 2019 Legislative session
- SB 8 charged the TWDB with implementation
- The regional flood planning process is similar in many ways to the regional water planning process



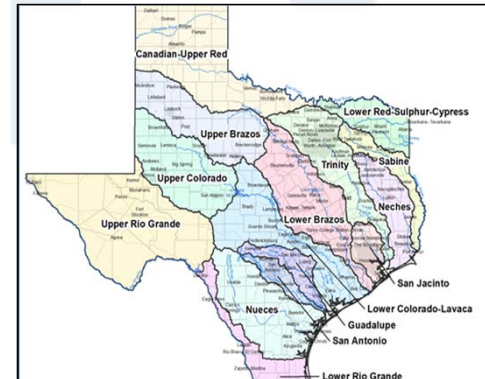
# TRINITY

## First-ever Regional Flood Plan for Texas' Trinity River Basin underway

- The Trinity RFPG is among 15 regional flood planning groups designated in April 2020 to undertake a new regional flood planning process in Texas
- This group's plan will then become part of Texas' first-ever State Flood Plan



## Difference Between RWPG and RFPG:



### Water Planning

- Water supply in 16 regions
  - 50-year planning period
- Restrictive – *must be consistent with the plan to obtain water rights*
- Water projects generate revenue stream

### Flood Planning

- Flood risk in 15 regions
  - 30-year planning period
- Permissive – *being in plan provides access to resources and funding*
- Flood control avoids costs but does not generate revenue



# Regional Flood Planning Groups

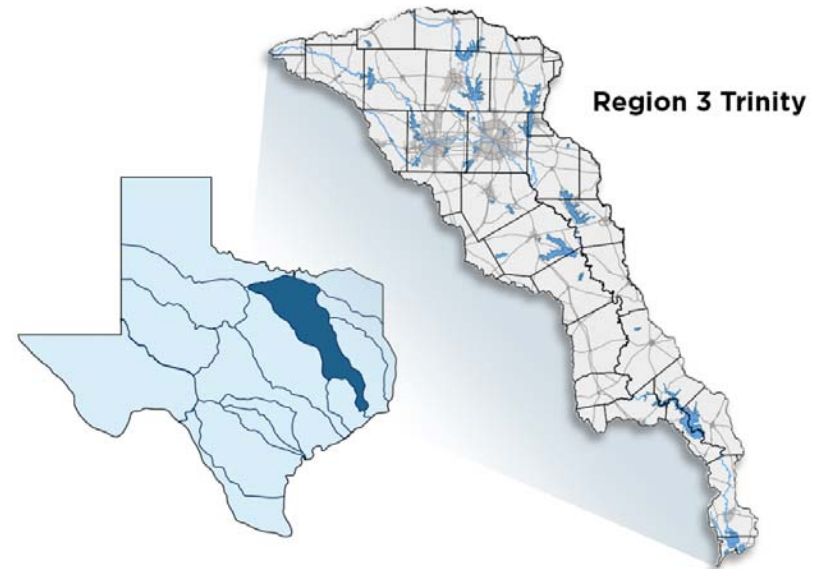
- 15 regions
- 12 interest groups for each region
  - Variety of interest categories
  - Appointments considered geographic representation
- The group selects contract administrators & consultants
- Prepare and submit Regional Flood Plans



# TRINITY

## Region Three, the Trinity River Basin

- The region spans from Cooke County in the north to Chambers County on the Gulf Coast
- 38 counties in the region (some counties are also represented by at least one other RFPG)
- Area covers 17,919 square miles and approximately 15,855 stream miles
- More than 30 major lakes & reservoirs



# The Trinity Regional Flood Planning Group

## Voting members:

- Chad Ballard
- Sano Blocker
- Melissa Bookhout
- Glenn Clingenpeel
- Scott Harris
- Rachel Ickert
- Andrew Isbell
- Jordan Macha
- Mike Rickman
- Matt Robinson
- Lissa Shepard
- Sarah Standifer

## Interest group represented:

- Small business
- Electric generating utilities
- Agricultural interests
- River authorities
- Water utilities
- Flood districts
- Public
- Environmental interests
- Water districts
- Industries
- Counties
- Municipalities



# The Trinity Regional Flood Planning Group



## Non-voting members:

- Brooke Bacuetes
- Richard Bagans
- Rob Barthen
- Steve Bednarz
- Justin Bower
- Ellen Buchanan
- Todd Burrer
- Jerry Cotter
- Diane Howe
- Lonnie Hunt
- Brian Hurtuk
- Edith Marvin
- Kevin McCalla
- Lisa McCracken
- Greg Waller
- Adam Whisenant

## Organization represented:

- General Land Office
- Texas Water Development Board
- Texas Department of Agriculture
- Texas State Soil and Water Conservation Board
- Houston-Galveston Area Council
- Neches Flood Planning Group (liaison)
- Region 6 San Jacinto Flood Planning Group (liaison)
- U.S. Army Corps of Engineers, Fort Worth Rep.
- Federal Emergency Management Agency
- Deep East Texas Council of Governments
- Texas Division of Emergency Management
- North Central Texas Council of Governments
- Texas Commission on Environmental Quality
- U.S. Army Corps of Engineers, Galveston Rep.
- Natl Weather Service / West Gulf River Forecast Center
- Texas Parks and Wildlife Department

## Major Components – Flood Plan

- Current and future flood risks
- Current and future flood infrastructure
- Flood mitigation needs analyses
- Development and selection of flood management evaluations, flood management strategies and flood mitigation projects



## Major Components – Flood Plan

- Contributions to water supply and impacts on State Water Plan
- Funding recommendations for projects
- Public participation and plan approval



# TRINITY

## Data Collection

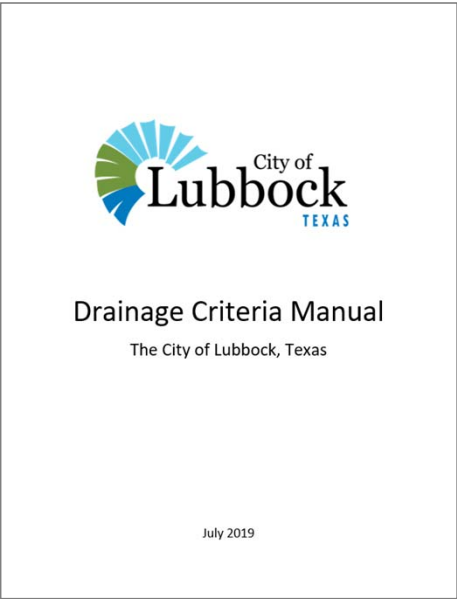
Reported Flooding Incidents



Physical Infrastructure



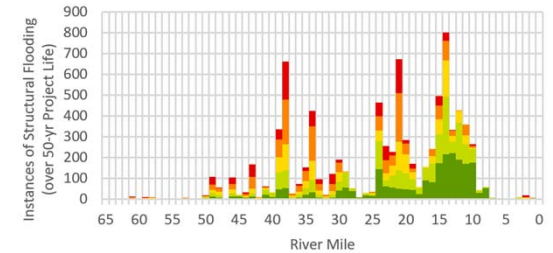
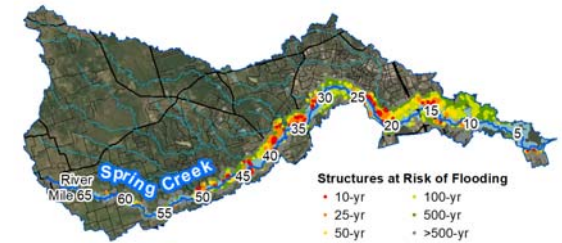
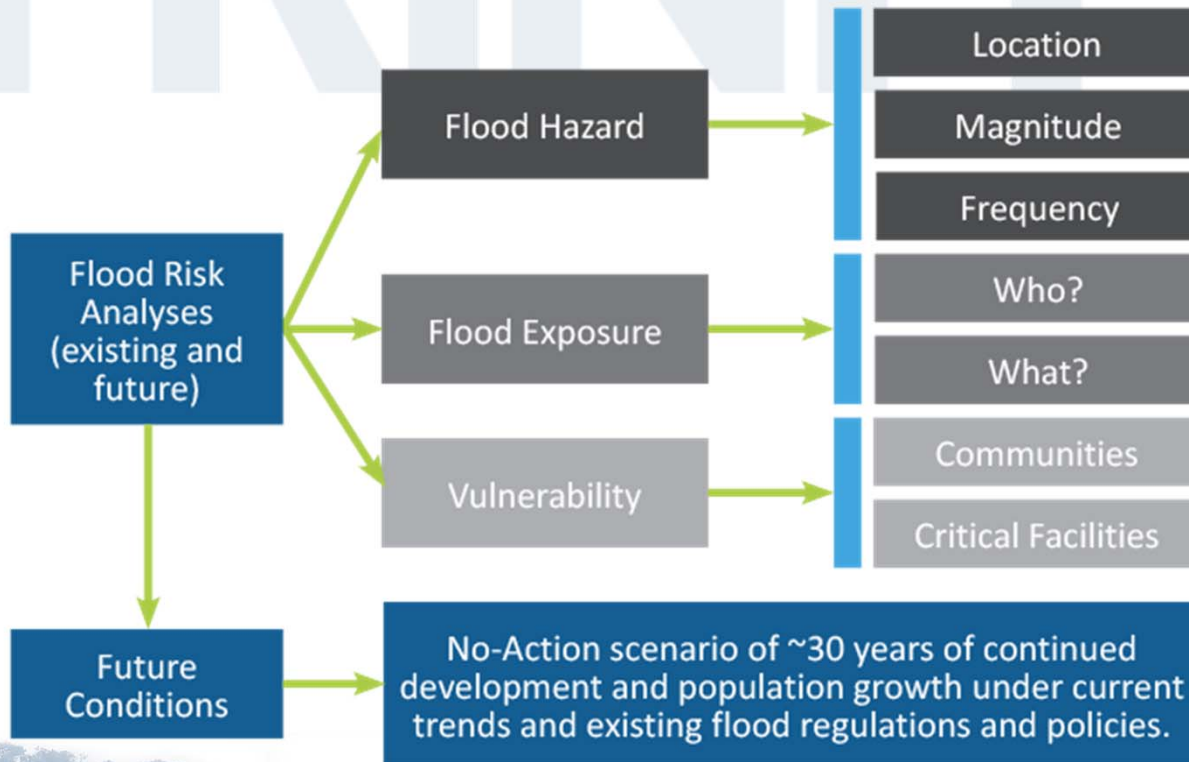
Policy



H&H Models



# Flood Risk Analysis





# TRINITY

## Floodplain Management Practices

- Are current practices increasing flooding risks?
- Recommend region specific floodplain and land use management strategies



# Flood Mitigation and Management Goals

Identify specific goals addressing risk to life and property

Short-term goals  
(10-years)

Long-term goals  
(30-years)

Determine levels of residual risk



# Identification, Assessment and Recommendation of FMEs, FMSs, and FMPs,

## Flood Management Evaluation (FME)

- A proposed flood study of a specific, flood-prone area that is needed in order to assess flood risk and/or determine whether there are potentially feasible FMSs or FMPs.



## Flood Management Strategy (FMS)

- A proposed plan to reduce flood risk or mitigate flood hazards to life or property (may or may not require associated FMPs to be implemented).



## Flood Mitigation Project (FMP)

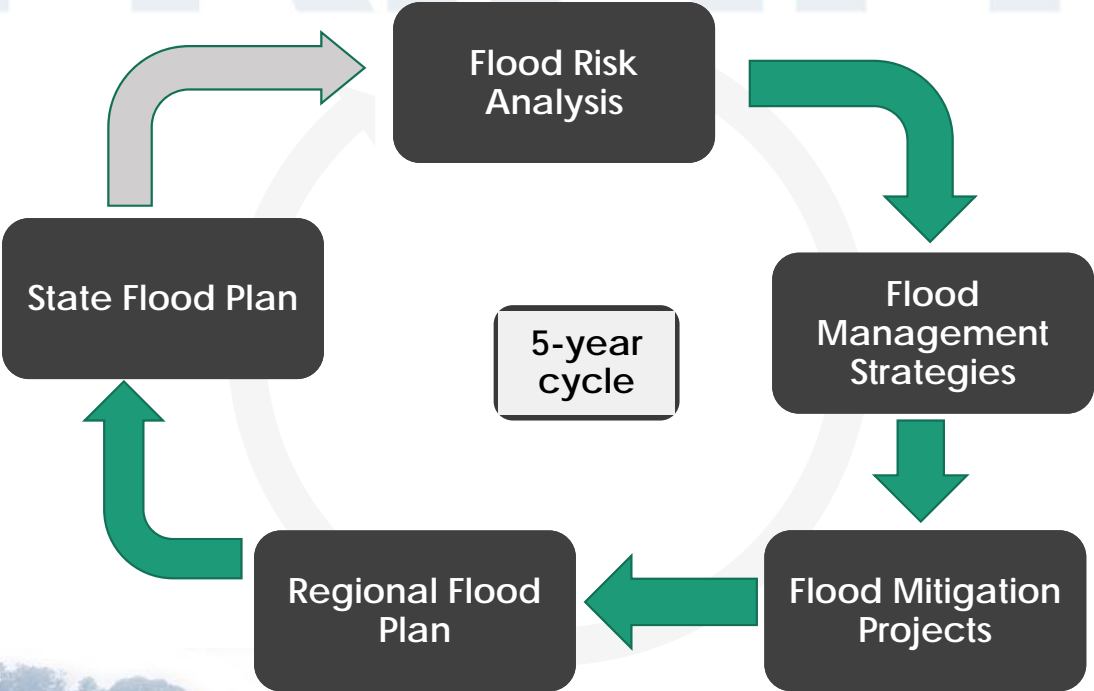
- A proposed project (structural and non-structural) that when implemented will reduce flood risk, mitigate flood hazards to life or property.



Costs Benefit Analyses and Project Prioritization  
Funding Analysis



# Regional Flood Plan Adoption and Approval Process



The initial RFPs shall be delivered on or before January 10, 2023

The initial SFP shall be delivered on or before September 1, 2024



# Next steps and planning milestones

- Aug. 19, 2021, 2 p.m. TRFPG Meeting, Arlington, North Central Texas Council of Governments office, Transportation Room
  - Regular meetings throughout the process
- Jan. 2022, Technical Memo submitted to the TWDB
- Aug. 2022, draft Regional Flood Plan(s) due
  - Includes public and TWDB review/comment
- January 2023, final Regional Flood Plan(s) due to TWDB
- September 2024, final State Flood Plan due to Legislature

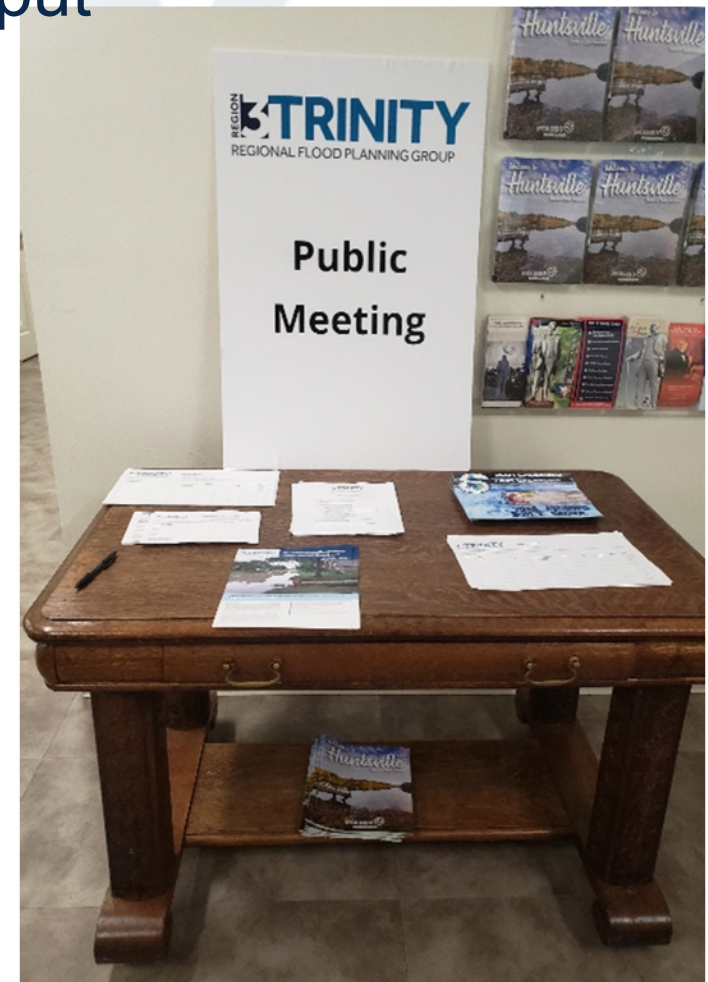


# The plan will only be as good as the input provided

## TRFPG public engagement

Public participation opportunities include:

- Submission of public comments via the Trinity RFPG website, [www.trinityrfpg.org](http://www.trinityrfpg.org)
- Comments or questions can also be sent to the Trinity RFPG email address, [info@trinityrfpg.org](mailto:info@trinityrfpg.org)
- Subscription to the Planning Group's future e-updates through the "Subscribe" form on the website
- Participation in Planning Group Public Meetings, info on the website
- Identify flood-prone areas on the interactive map available via the button at the top of the website's Public Comment page



# TRINITY

## What Flood Planning Can Learn from Water Planning

Cooperation  
is Crucial



# TRINITY

## What Flood Planning Can Learn from Water Planning

Embrace  
Adaptive  
Management



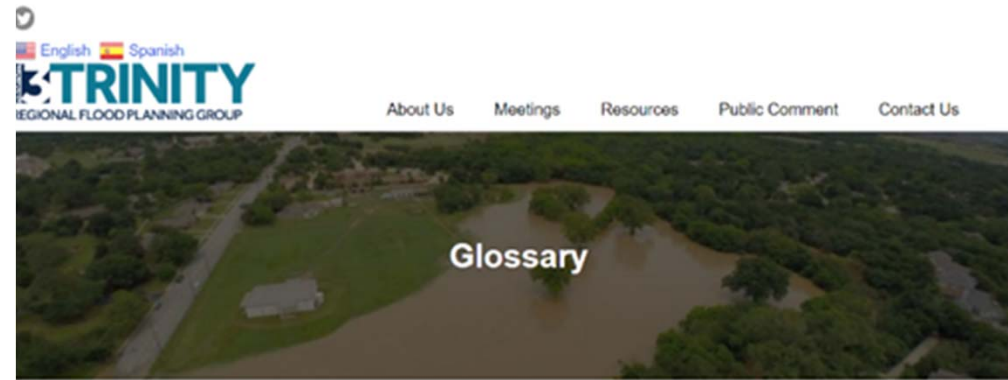


# TRINITY

trinityrfpg.org

The website has valuable resources, including:

- Meeting notifications, agendas, agenda packets/presentations and minutes
- Glossary and acronym decoder
- Planning documents such as the group's bylaws and, when available, draft and final chapters (and ultimately the draft and final plan)
- Spanish translation
- A link to the group's Twitter handle: @TrinityTRFPG
- Other resources



Glossary of Regional Flood Planning Terms and Acronyms

Home | About Us | Meetings | Resources | Public Comment | Contact Us



# Questions?

John Doe (name)

Director of Marketing (title)

*johndoe@greatcompany.com (contact info)*



**RESILIENCE AT RISK**



## 2021 Texas Infrastructure Report Card

- ✓ Report Card overview
- ✓ Focus on Flood Risk Mitigation
- ✓ In 25 minutes or less.

North Central Texas CRS Users & Elected Officials Flood Plain Seminar

Wed. June 30, 2021 9:20AM | Virtual. "One night only" 😊

Presented by: Mark K. Boyd PhD, PE, D.WRE, CAPM  
Principal Engineer, LCA Environmental, Inc.



Mark K. Boyd PhD, PE, D.WRE, CAPM  
Principal Engineer, LCA Environmental, Inc.



ASCE Texas Section 2021 IRC Committee Chair  
VP Technical Elect, ASCE Texas Section

Adjunct Associate Professor  
Southern Methodist University



*20+ years teaching  
graduate  
hydrology and  
environmental  
courses*





## ASCE Texas Section | [www.texasce.org](http://www.texasce.org)

- Represents more than 10,000 civil engineers
- Supports year-round technical work of state agencies & policymakers
- Hosts a Legislative Drive-In (normally, this year “zoom-in”)
- Has an obligation to educate the public & policy makers about the condition of our state’s infrastructure

10,000 Civil Engineers!  
SCARY THOUGHT.

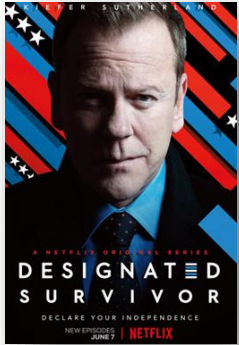
A cartoon orange character with a wide, open-mouthed smile, large eyes, and raised hands, appearing to be shouting or expressing surprise. The character is positioned below the text "SCARY THOUGHT."



# GAINING TRACTION!

since 1998 (national), Texas 2004

- ASCE Texas recommendations on flood risk mitigation were adopted & funded through actions of the 86<sup>th</sup> Texas Legislature, in the aftermath of Hurricane Harvey
- ASCE urges Congress to consider key priorities including: Sustainability, Resilience, and Prioritizing Asset Management and Operation & Maintenance needs
- On popular media! Script in Netflix Series “Designated Survivor”. Fictional President Tom Kirkman (played by Kiefer Sutherland...that’s Donald’s son to us old guys).



The report card in the Oval office?



# 2021 Texas Report Card – A Labor of Volunteer Dedication

## Flood Risk Mitigation Subcommittee

Melvin Spinks, PE, CFM (Chair) | CivilTech

Chris Van Heerde, PE (co-Chair) | MHT Engineering

Jessica Sprague, PE, CFM | CivilTech

Stephanie Zertuche, PE, CFM | GeoSolutions, LLC

## Levees Subcommittee

Curtis Beitel, PE CFM, ENV SP (Chair) | HDR

Andrew Wilson, PE, CFM | Peloton Land Solutions

Umesh K. Bachu, PE | ECS

*The late* Russell “Rusty” Gibson, PE\* | E TTL Engineers & Consultants

\*report card dedicated to Rusty

55 Committee Members  
12 Categories  
92 pages  
Developed during pandemic  
lockdown

<https://www.texasce.org/our-programs/infrastructure-report-card/>



# 10 things not to say to the public

1. Hit by a flood? Great! Now you're safe for another 100 years!

2. Explain 100 year event. 1/100, 1% chance any given year., could happen twice in a year... Huh??

3. Lecture them on the hydrologic cycle.

4. Don't worry, we have a stochastic model and a unit hydrograph for that.

5. Anything Evapo-transportation rates.

6. Anything about antecedent moisture conditions

7. Anything about conditional probability distribution, sequential heavy rainfall events

8. The record fits the Type I Gumbel extreme probability distribution.

9. Wanna know more? It's all in NOAA Atlas 14. Read it!

10. Play LED ZEPHELLIN – When the Levee Breaks, tell them it couldn't get worse than the Great Mississippi flood of 1927.



“when the levee breaks, we'll have no place to stay”.

**How to best summarize infrastructure issues?  
Why not school letter grade?**



# TEXAS INFRASTRUCTURE REPORT CARD GRADE BASIS

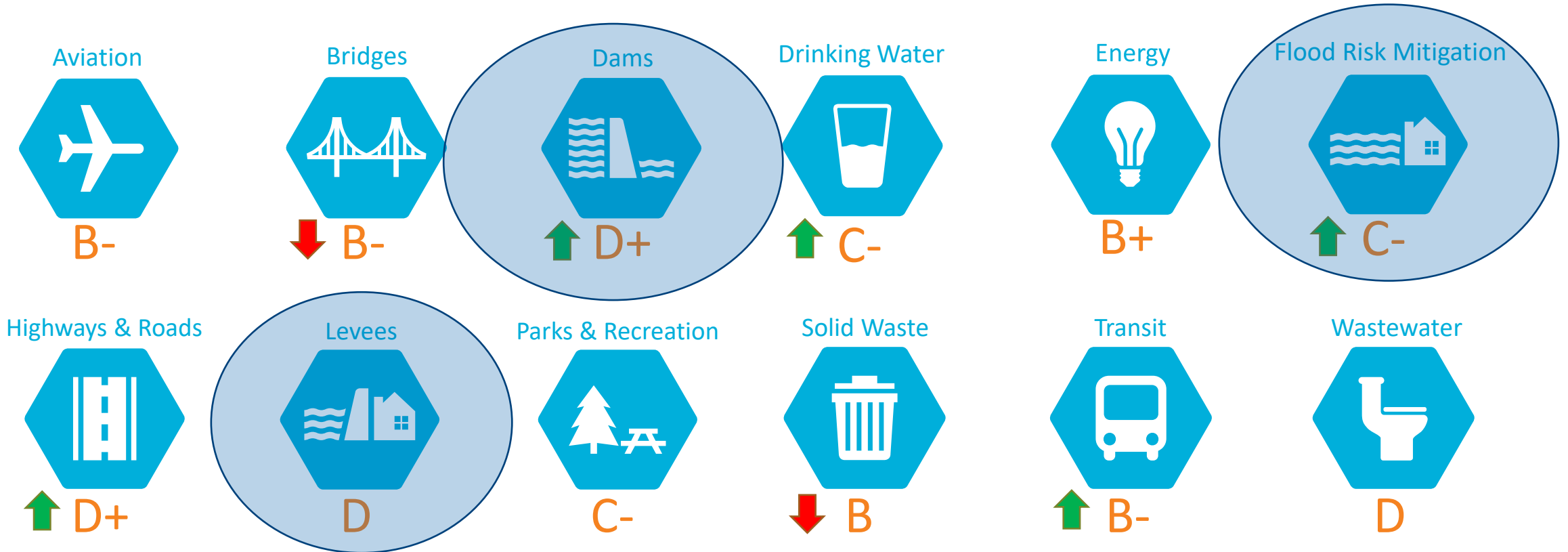
- ✚ Methodology
  - ✚ CAPACITY
  - ✚ CONDITION
  - ✚ FUNDING
  - ✚ FUTURE NEED (Texas Population Growth!)
  - ✚ OPERATION & MAINTENANCE
  - ✚ PUBLIC SAFETY
  - ✚ RESILIENCE
  - ✚ INNOVATION

NOT JUST NUTS & BOLTS





# Texas Category Grades and Texas GPA on the rise:



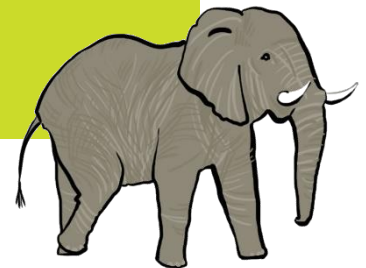
<https://www.texasce.org/wp-content/uploads/2021/02/2021-Texas-Infrastructure-Report-Card.pdf>



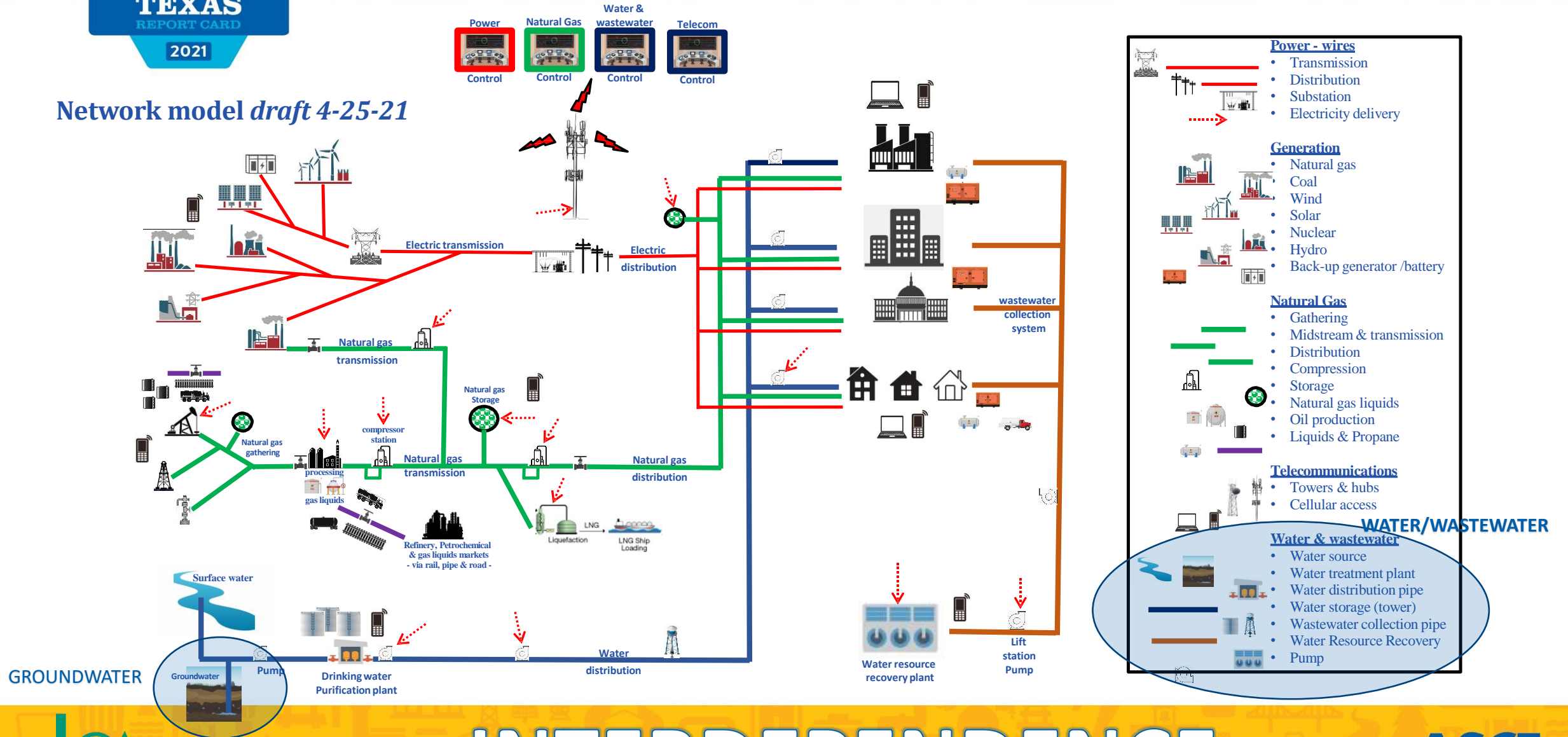
# The Big Elephant, Feb 2021 winter storm.

## Energy

- Two Energy categories: oil & gas and electricity
- Texas leads the U.S. in oil & gas production
- Texas is the energy innovation capitol of the world
- Oil production increased from 1 million barrels per day in 2011 to over 5.4 million barrels per day in 2019
- Texas needs to continue its leadership by example
- Big elephant in the room. What about the winter storms of 2021?
- Texas ASCE “Beyond the Storms” Committee producing a report similar to Hurricane Harvey report of aftermath that helped prompt the first Texas Flood Plan



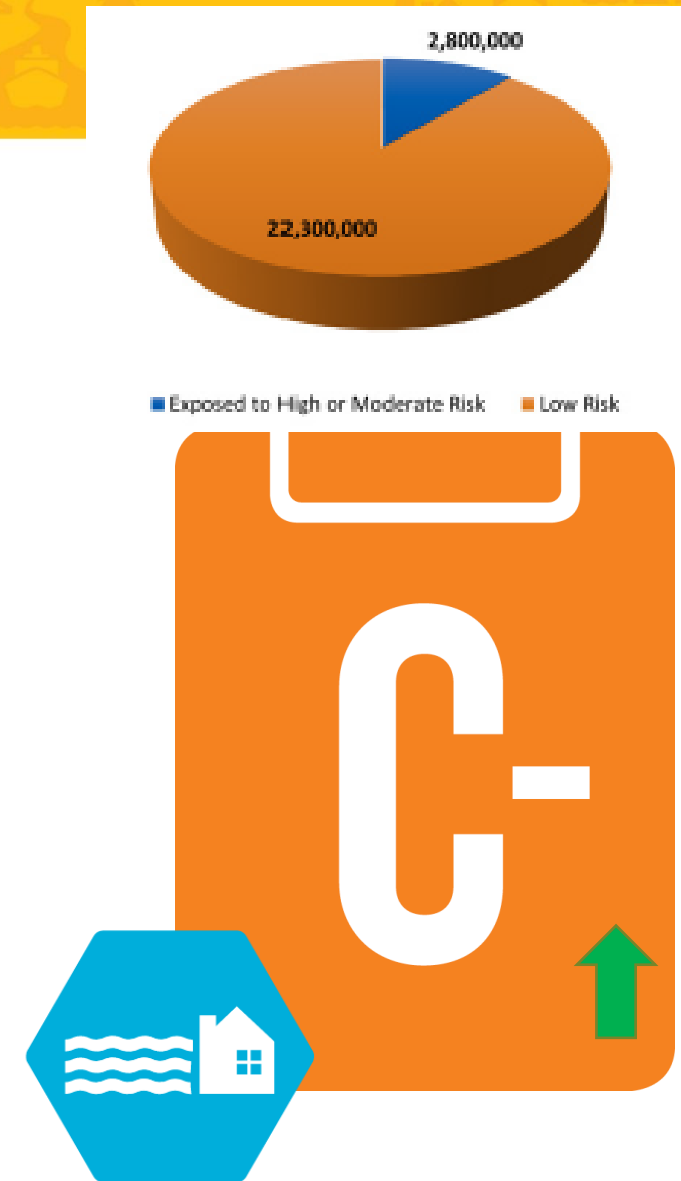
## Network model draft 4-25-21



# INTERDEPENDENCE

## Flood Risk Mitigation

- Roughly 1 in 10 Texans is exposed to moderate or high annual riverine flood risks.
- Initiatives are underway to reduce risks through better planning, improved asset management, & new funding sources to support flood risk mitigation infrastructure.
- 2019 Texas State Flood Assessment report: More than \$31.5 billion needed over the next decade.
- TWDB Estimate: local communities need 18 to \$27 Billion in financial assistance.



- Major metropolitan areas passed flood control bond referendums
  - Harris County \$2.5 Billion
  - Fort Bend County - \$83 million
  - Dallas \$1.05 Billion (\$139 million to drainage and flood control projects)
  - San Antonio \$550 million
- Senate Bill 500 (86<sup>th</sup> legislature, 2019)
  - TWDB new responsibilities creating Texas Flood Infrastructure fund (FIF) and Texas Infrastructure resilience Fund (TIRF).
- 2019 State Flood Assessment report 31 of 40 Texas Cities (pop. 100,000+) have stormwater utilities.

D to C  
↑

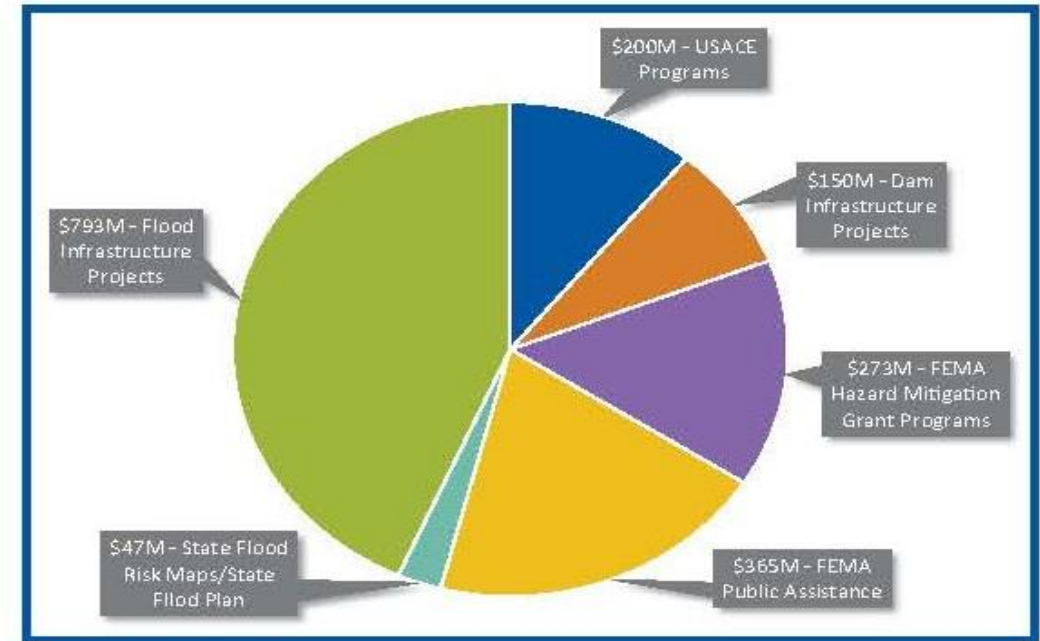


FIGURE 15. Senate Bill 500 Funding Allocation.

- 180 flood related deaths, 2015-2019, highest in US.
- Hurricane Harvey – 68 deaths (highest from hurricane since 1919)
- What’s ahead? Uncertain.
- NOAA Atlas 14, Volume 11, planning/design has not yet adjusted.
- Not enough there, there to address growing, accelerating Texas population.
- More building standards improvements
- More protective policies
- More/better smart growth
- New/better urban planning.

WHY C-?

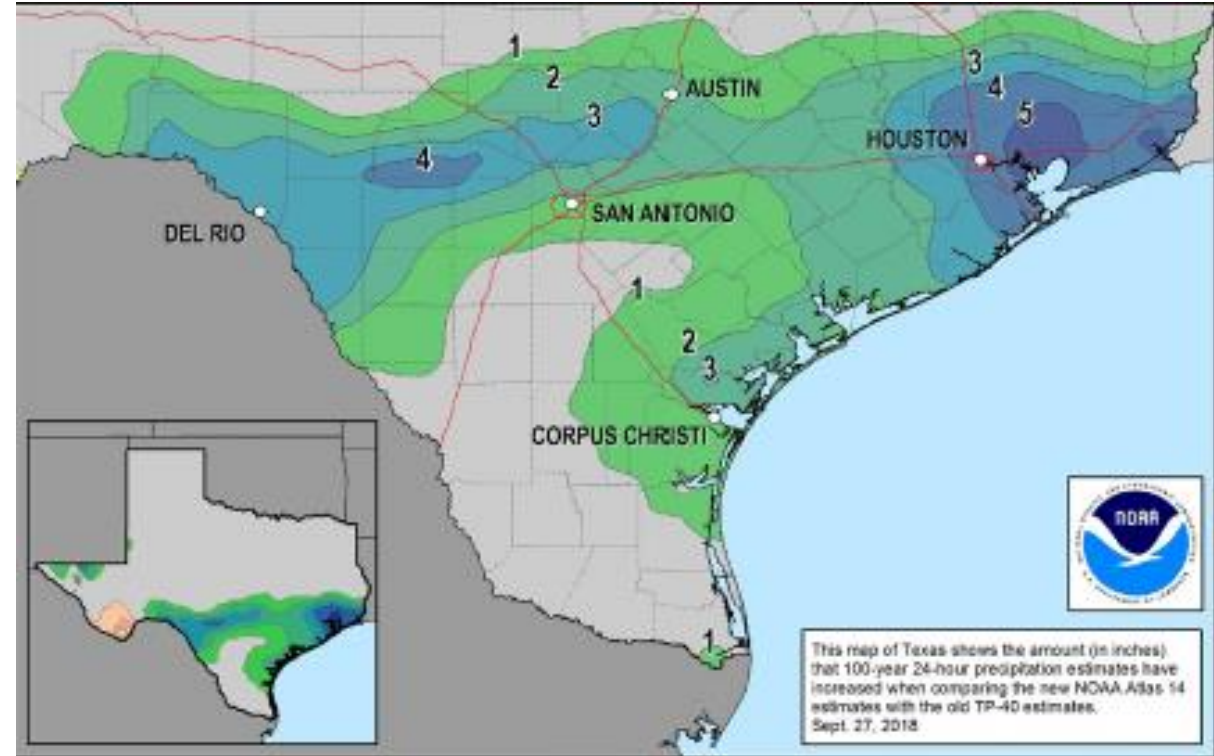


FIGURE 16. The 100-year rainfall estimates increased anywhere from 1 to 5 inches for a 24-hour storm. Source: NOAA.



## SELECTED FLOOD RISK RECOMMENDATIONS

- Planning leads to “analysis by paralysis”. Committee recommended, a mix of shovel ready and planning projects to make sure public sees public dollars at work.
- Work with local communities to minimize development in identified flood hazard and at-risk areas.
- Encourage development standards and alternatives to design practices based on the latest data from NOAA Atlas 14. This relates to a separate recommendation to incorporate design and planning to consider environmental and data impacts.
- Continue to do what’s working, as this has resulted in improving the grade and path toward greater resilience and preparedness.

*Note: Similar recommendations pages are available in the report card for all categories.*



### RECOMMENDATIONS TO RAISE THE GRADE

Texas has a singular opportunity to make a noteworthy impact on the flood risk reduction and stormwater drainage infrastructure improvements within the state, and significantly reduce future problems with development. Specific recommendations are listed below:

- The State’s current plan needs to emphasize the implementation of infrastructure projects as a result of the ongoing planning effort by TWDB and GLO.
- Increase coordination across local, municipal, and state authorities to facilitate watershed-based flood risk reduction planning and to provide technical assistance to communities.
- Flood mitigation planning leads to a perception of “analysis paralysis” by the public. Therefore, a blend of shovel ready and planning projects is recommended to show public dollars at work.
- Revenue sources need to be identified and have dedicated Operations and Maintenance Funds. Facilities need to be maintained or failures can occur; therefore, robust vetting of the O&M Funds should be undertaken to prevent maintenance shortfalls in the future.
- Flood mitigation designs need to consider environmental and climate impacts, sea level rise, subsidence, future population growth, and other factors.
- Continue to update FEMA FIRM maps using the most recent scientific data, updated models, and updated rainfall rates for all watersheds in the state.
- Continue to educate localities and the public on the benefits of the FEMA National Flood Insurance Program (NFIP).
- Work with communities to minimize development in identified flood hazard zones and at-risk areas.
- Encourage localities to explore the broader use of stormwater retention and detention strategies, including green infrastructure, regional systems, and public/private partnerships.
- Encourage localities to revisit, create and/or enforce development standards which consider alternative design practices and current rainfall values as presented in NOAA Atlas 14.
- Continue to ensure financial assistance is available for implementation of flood mitigation and stormwater drainage projects.



## Dams

- About 1/3 of the state's dams are for flood risk mitigation and 1 in 7 dams are for irrigation or water supply.
- Dams have great value and great consequence. The consequences of a dam failure far exceed the loss of a water supply or your favorite fishing hole
- \$5 Billion 2019 Association of State Dam Safety Officials estimated cost to rehabilitate all non-federal dams in Texas.
- \$2.1 billion repair/rehab estimate, Texas State Soil and Water Conservation Board dams in the Small Watershed Programs.



What about levees? We don't really know.

## Levees

- More than 1 million Texans and \$127 billion dollars' worth of property are protected by levees.
- There is no state levee program.
- Texas has 327 levee systems total, extending a combined 567 miles.
- More than 75% of Texas levee systems are without screened risk classification.
- 5 levee systems (about 100 miles of levees) are classified as high to very high risk.





# TEXAS INFRASTRUCTURE REPORT CARD

## BIG PICTURE | BOTTOM LINE

Three of the major Texas infrastructure identified funding shortfalls are related to flood risk:

- Flood Risk Mitigation - \$31.5 Billion (next 10 years)
- Levees - \$Billions (truly unknown)
- Dams - \$5 Billion (rehab/repair)
- Wastewater - \$250 million / year
- Drinking Water capital costs – \$ 26.8 Billion (50 year, to be funded by utility bills)
- Highways & Roads - \$15 Billion thru 2040



# The American Jobs Plan

- **\$50 Billion toward infrastructure resilience (none toward flood risk).**
- **\$17 Billion for inland waterways, related to freight capability (nothing toward flood mitigation).**
- **\$621 Billion toward transportation (which if planned improperly, could make flooding worse).**



# BRIEFING TO 87<sup>TH</sup> STATE LEGISLATURE

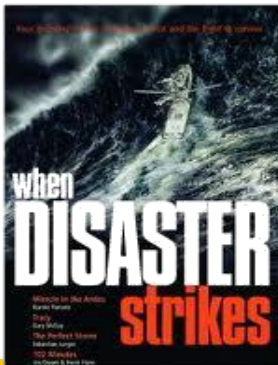
- ✓ Policy makers should collaborate with civil engineers to craft infrastructure legislation with resilience at the forefront, to maximize the return on investment and build a stronger Texas.
- ✓ Resilience refers to the capability to mitigate against significant all-hazards risks and incidents and to expeditiously recover with minimal impacts to public, the economy, & national security.
- ✓ Texas needs to understand the impact of the loss of infrastructure, as well as the timeline and cost to restore its function.
- ✓ **An all-hazard, comprehensive risk assessment that considers both event likelihood and consequences is necessary to prepare systems for the impacts of extreme events.**
- ✓ Texas needs to develop performance criteria and uniform statewide standards that address interdependencies and establish minimum performance goals for resilient infrastructure



Failure to Act! <https://www.asce.org/failuretoact/>  
Consequence of status quo investments

## Infrastructure is Critical to Texas' Economy

- Every additional \$1.00 invested in infrastructure delivers a return of roughly \$3.70 in additional economic growth over 20 years, according to the Business Roundtable.
- Neglecting infrastructure will leave us mired in static 20th Century status quo, or worse.
- The report card is an important advocacy tool
- ASCE commends governmental agencies for their work & dedication to serving the citizens of Texas
- Texas is the largest continental state, the 2nd most populous state, & an economic powerhouse, leading the Nation in wind power energy production
- Too often, we take infrastructure for granted & simply expect it to work
- Until....





## Legislator Support

“The *ASCE Texas Infrastructure Report Card* is a critical tool as we assess our needs and measure progress in actively building Texas into a better place to live, work, and raise a family. We must continue to work together with all levels of government, community leaders, industry partners, and universities, using this invaluable resource to help keep us better informed about the issues facing Texas.”

- Representative Dennis Paul PE, Texas House of Representatives, District 129



# State of the State

“... if Texas was its own country,  
we would have the **9th largest economy** in the entire world.”

- Texas Governor Greg Abbott, February 1, 2021



“To sustain a higher quality of life for all, and to support its massive economy, growing population, and increasingly complex interconnected systems, Texas deserves and can afford **the best, most resilient and sustainable infrastructure in the world.**”

Mark K. Boyd, PhD, PE | Chair Texas ASCE 2021 Infrastructure Report Card Committee





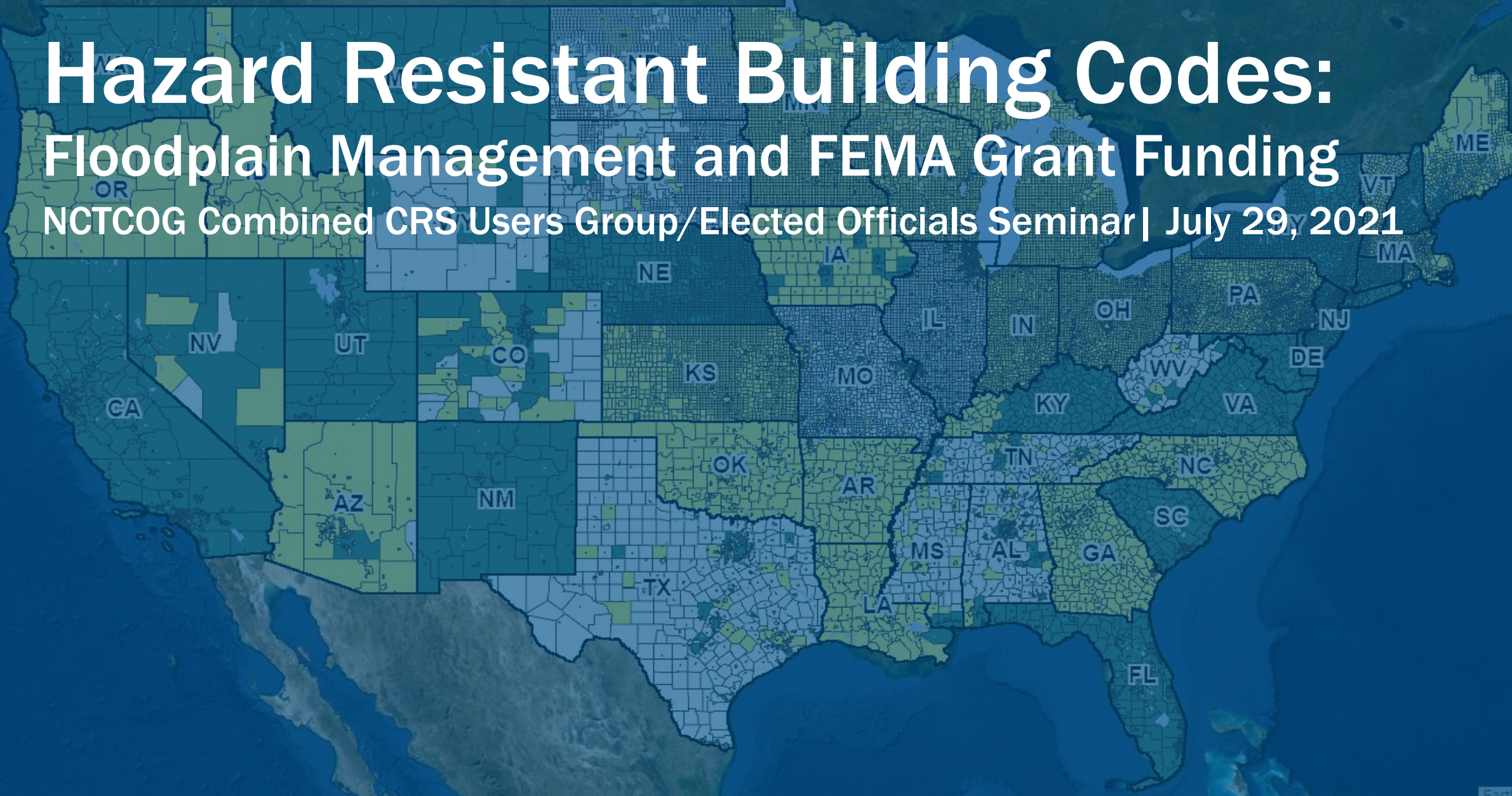
WANT TO KNOW MORE? READ ENTIRE 92 PAGE REPORT CARD  
<https://www.texasce.org/our-programs/infrastructure-report-card/>

THANK YOU!

OPEN Q&A

# Hazard Resistant Building Codes: Floodplain Management and FEMA Grant Funding

NCTCOG Combined CRS Users Group/Elected Officials Seminar | July 29, 2021



# Building Science Branch Presenters and HQ Support

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## Region VI Civil Engineer, Risk Analysis

Donald Leifheit, Jr., CFM

FEMA Region VI

[Donald.LeifheitJr@fema.dhs.gov](mailto:Donald.LeifheitJr@fema.dhs.gov)



## Headquarters Support

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# FEMA

# Overview and Goals

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- Provide a basic understanding of hazard-resistant building codes, focusing on flood provisions and grant opportunities
- Encourage communities to:
  - **Adopt the latest published editions of hazard-resistant building codes**
    - Currently deemed 2015 and later International Codes
  - **Review and update adopted building codes on a regular schedule**
    - Soon we will be rating the States code adoption using the 2018 and later editions of the I-Codes
  - **Identify and utilize resources to achieve hazard-resistant code adoption and enforcement**
  - **Identify grant opportunities from multiple sources related to hazard-resistant codes**



# Hazard Resistance in Building Codes



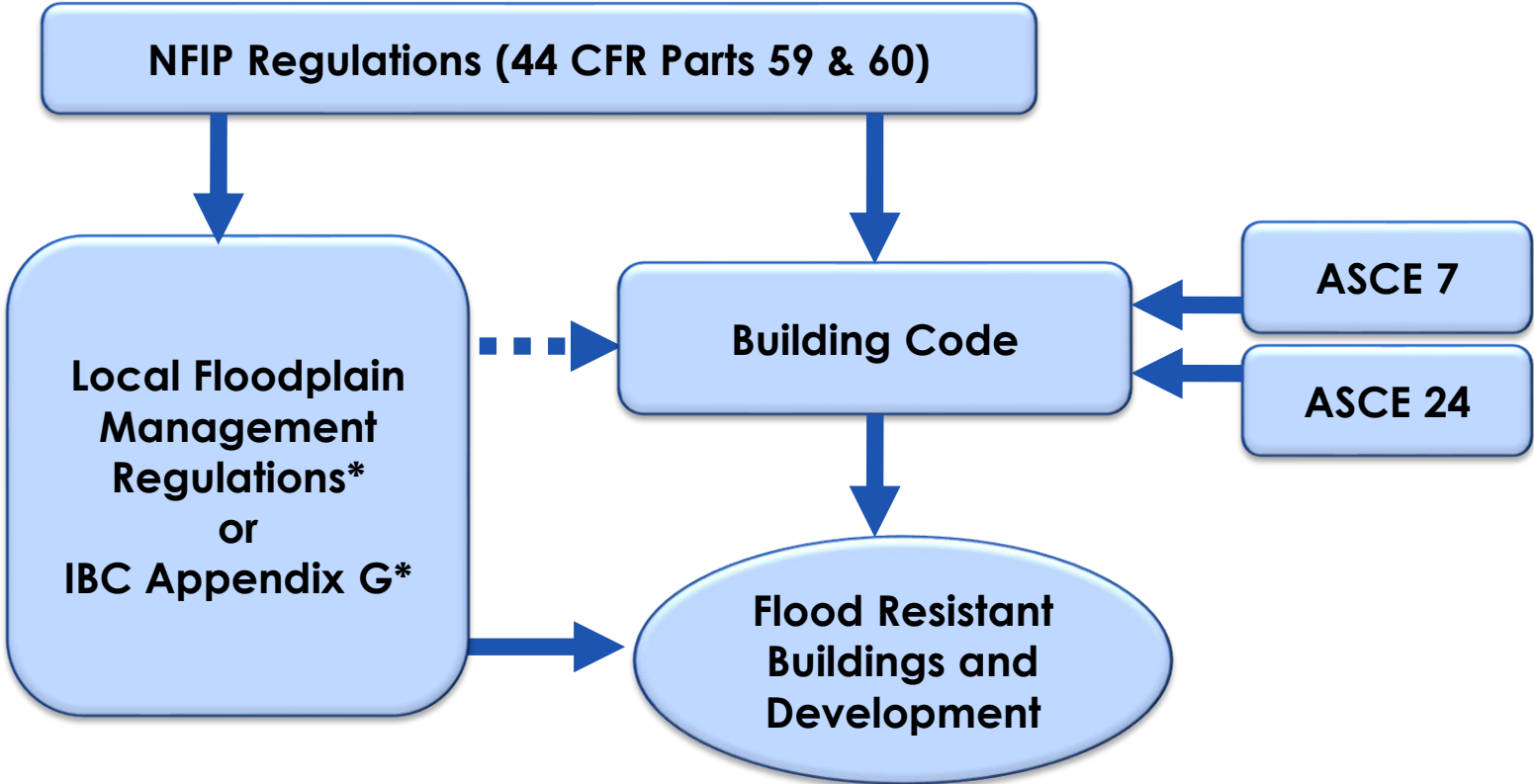
**FEMA**

## Rockport, Texas after Hurricane Harvey

Photo courtesy of the 2017 FEMA Hurricane Harvey Mitigation Assessment Team (MAT)

Federal Emergency Management Agency

# Relationship Between I-Codes and NFIP



\* NFIP-consistent administrative provisions, community-specific adoption of FIS and maps, and technical requirements for development outside the scope of the building code (and higher standards, in some communities).



# Hazard Resistance in Building Codes in Texas

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Hazard-resistant code: 2015 or later IBC and IRC without weakening hazard provisions

**Now: 2003  
IBC/2000  
IRC**

- References ASCE 24-98
- No freeboard

**Jan. 2022:  
2012  
IBC/IRC**

- References ASCE 24-05
- Limited freeboard
- Explicit flood damage-resistant materials requirement
- Final elevation inspection
- Floodway analysis

**Goal:  
2021  
IBC/IRC**

- References ASCE 24-14
- Consistent freeboard 1 ft +
- Emergency power for critical facilities
- More specific SI/SD administration



**FEMA**

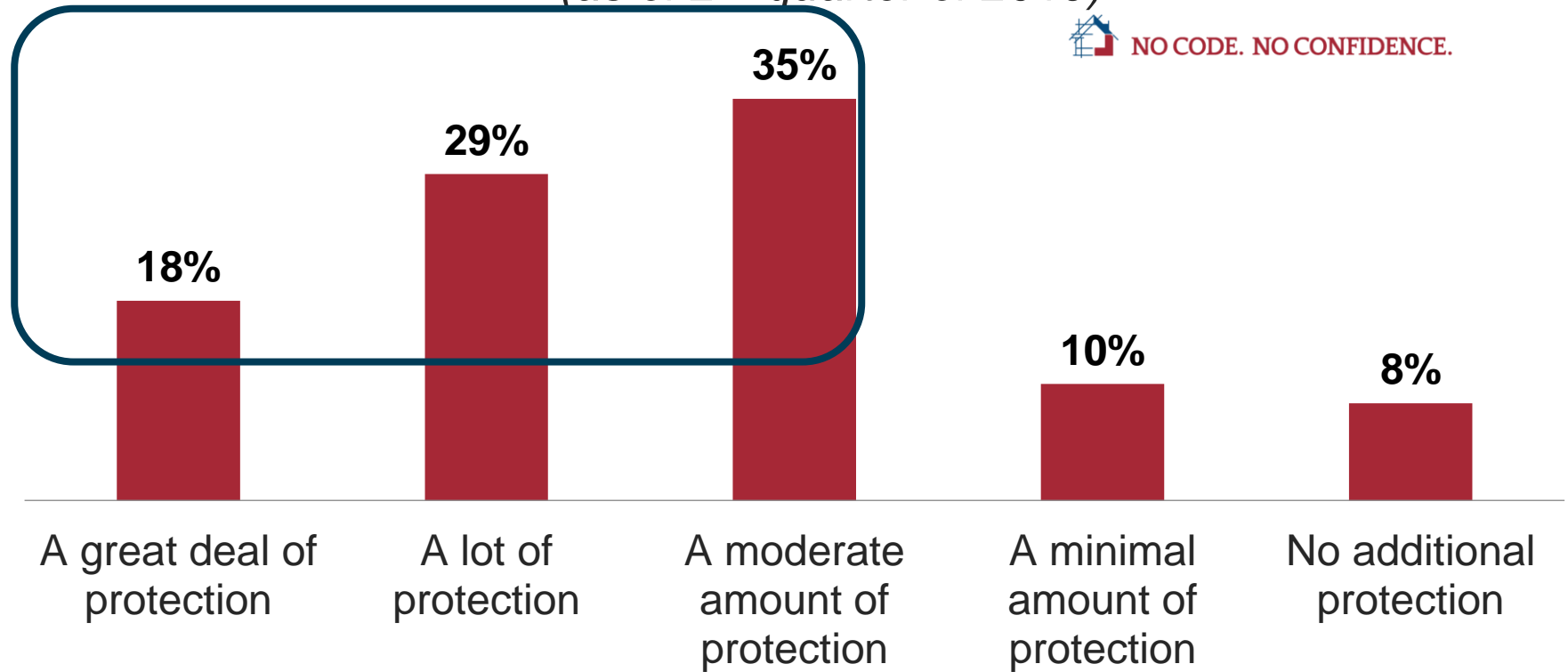
# People's Assumptions of Protection

**8 out of 10**

Americans assume they are at least moderately protected.

<http://newsroom.flash.org/commentary/why-americans-arent-concerned-about-building-codes-even-though-they-should-be.htm>

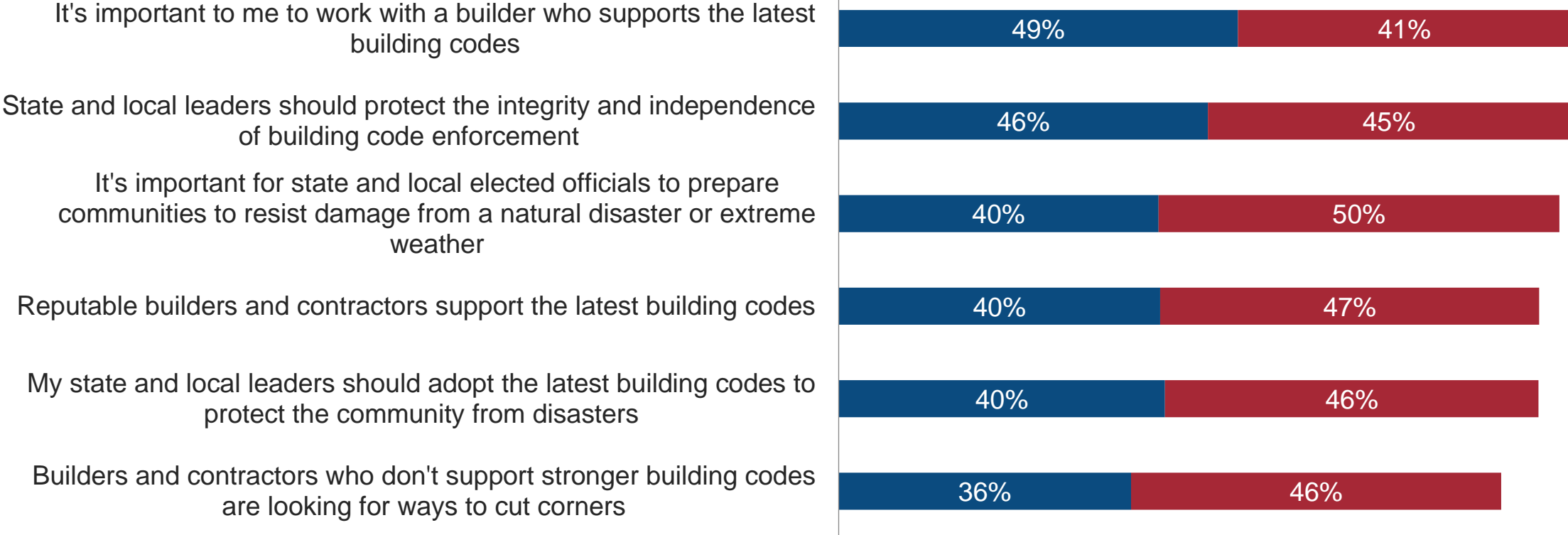
*Assumed Protection with Building Codes  
(as of 2<sup>nd</sup> quarter of 2019)*



**FEMA**



# People Have High Expectations



■ Strongly Agree ■ Somewhat Agree

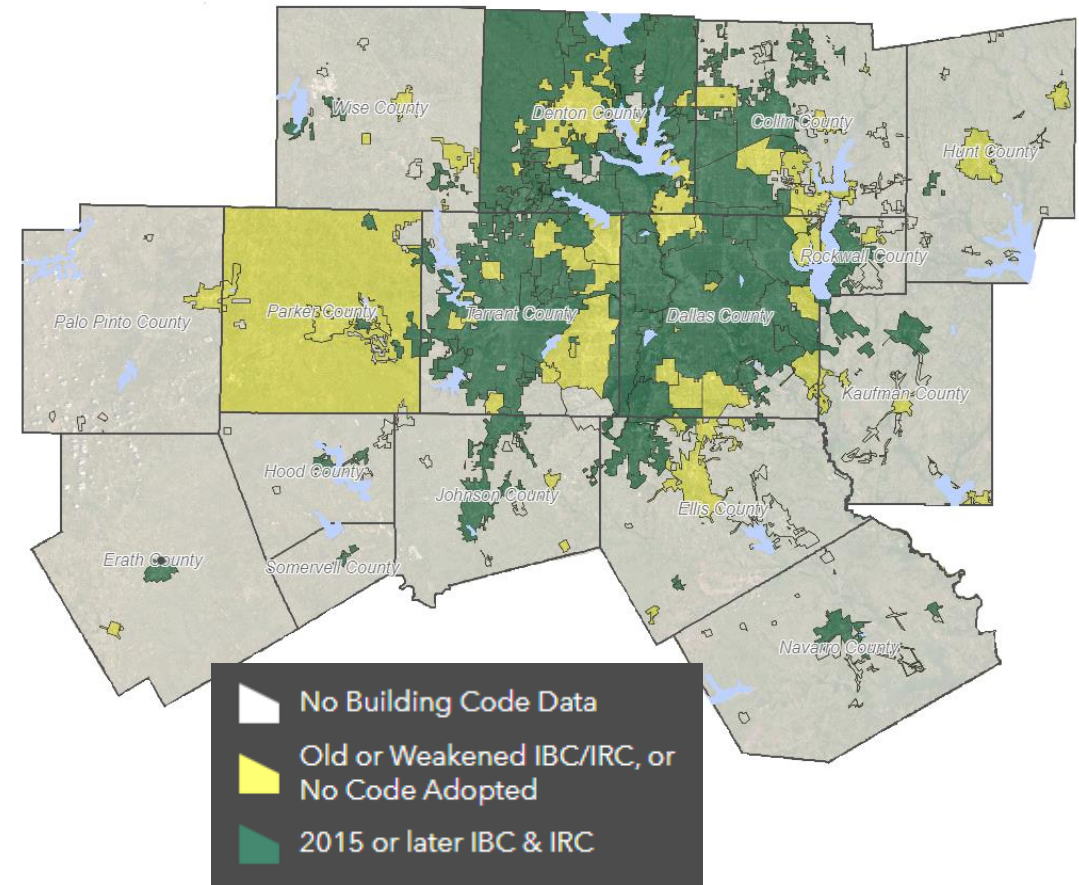
 NO CODE. NO CONFIDENCE.



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# Building Code Adoption Status: NCTCOG Jurisdictions

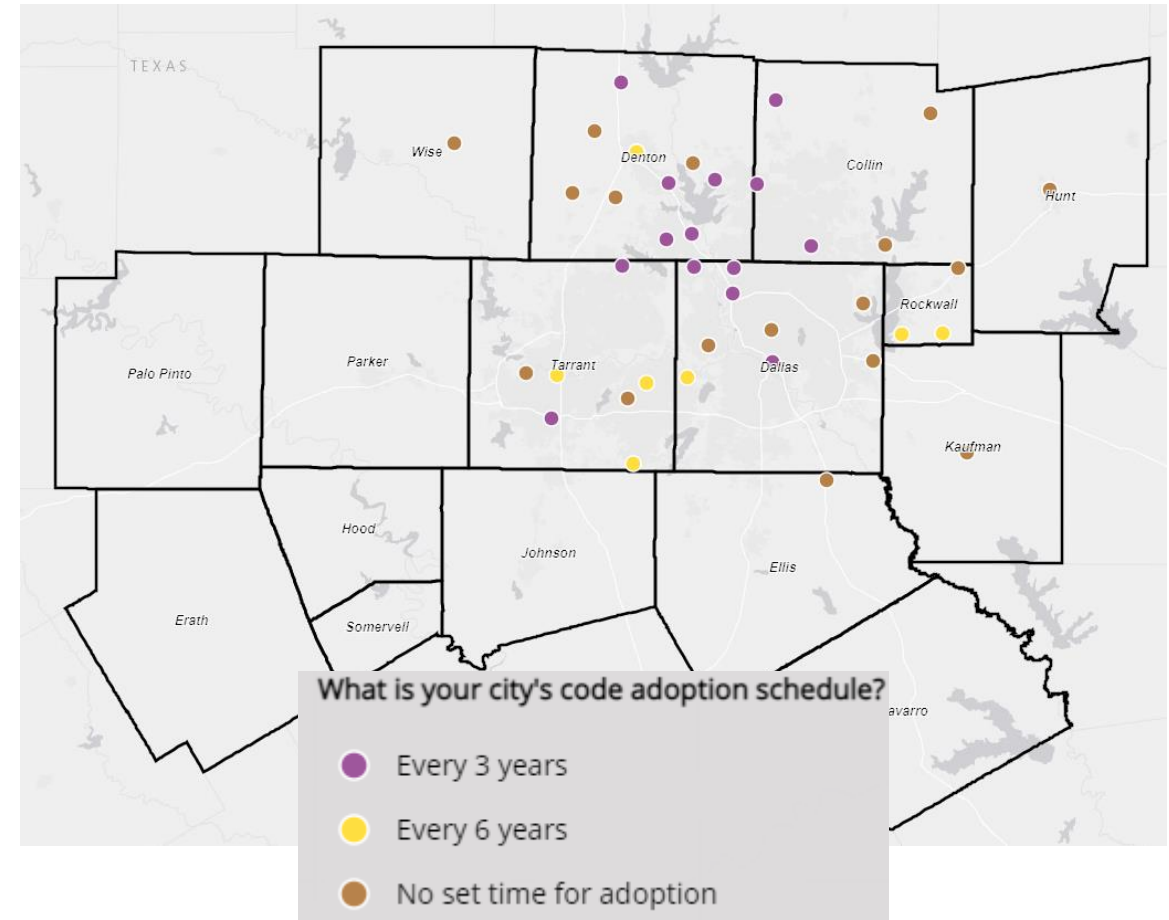
- 60% of NCTCOG jurisdictions are hazard-resistant
- FEMA BCAT Portal:  
<https://www.fema.gov/emergency-managers/risk-management/building-science/bcat>
  - Help us fill the map! Email [FEMA-BuildingScienceHelp@fema.dhs.gov](mailto:FEMA-BuildingScienceHelp@fema.dhs.gov) with code status if missing



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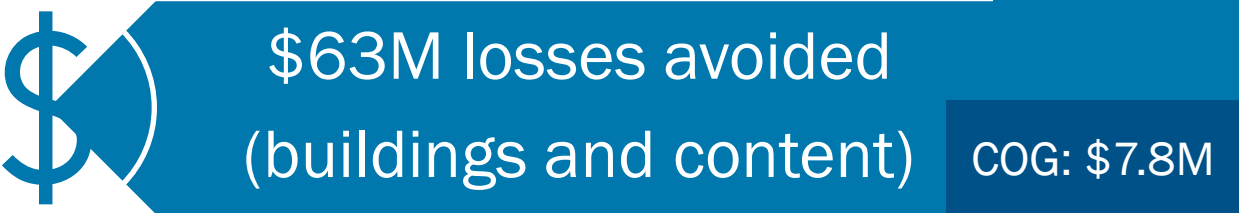
# Building Code Adoption Status: NCTCOG Jurisdictions

- NCTCOG Code Adoption Surveys:  
<https://www.nctcog.org/envir/regional-building-codes/code-adoption-surveys>
  - Adopted code editions?
  - Code adoption schedule?
  - Plans for adopting 2018 codes?
  - Use of NCTCOG amendments?



# Freeboard: Losses Avoided in TX

*Building Codes Save: A Nationwide Study (FEMA, 2020)*



**FEMA**



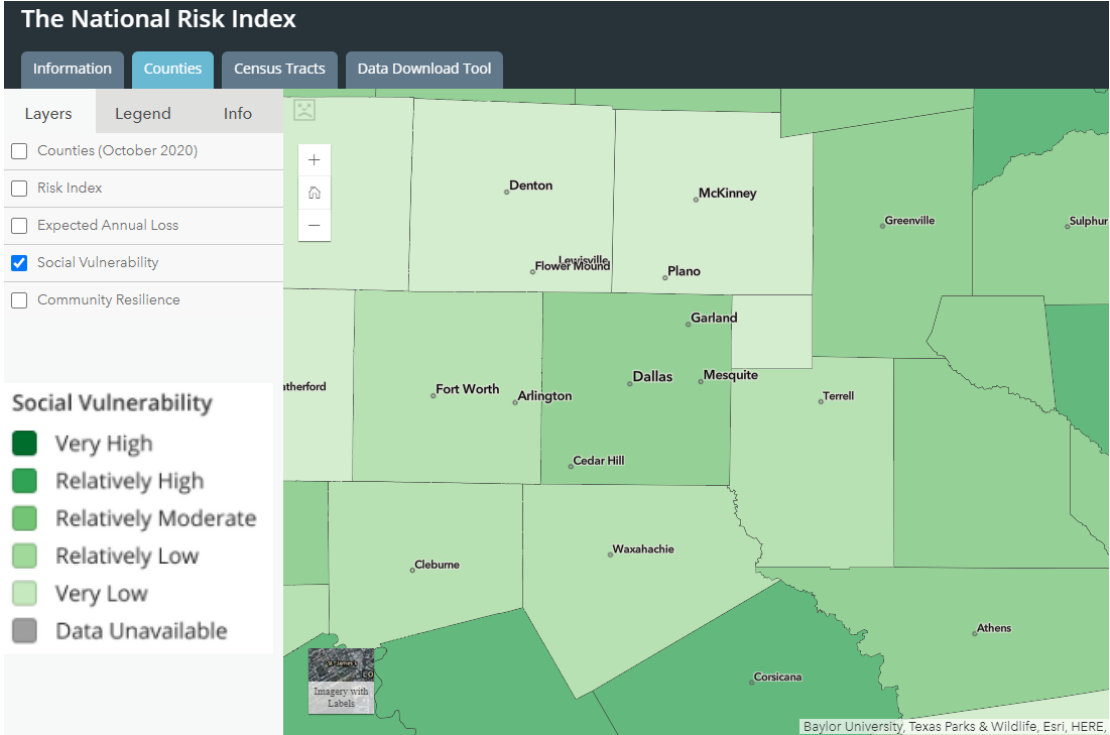
Source: FEMA *Building Codes Save*  
<https://www.fema.gov/emergency-managers/risk-management/building-science/building-codes-save-study>

# National Risk Index: NCTCOG Counties

NCTCOG Exposure to Riverine Flooding		
	Pop. at Risk Without Recent Codes*	Expected Annual Loss to Buildings (EALB)
All Communities	181,827 (67%)	\$7,429,636
Socially Vulnerable Communities**	64,584 (28%)	\$4,298,834

\*2015 IBC and IRC or later editions

\*\*Includes Relatively Moderate, Relatively High, Very High Vulnerability



<https://hazards.geoplatform.gov/portal/apps/MapSeries/index.html?appid=ddf915a24fb24dc8863eed96bc3345f8>



# Savings Outweigh the Costs

- **Opportunities for More Savings:** *Building Codes Save* identified Priority High Hazard, Higher Growth Counties with Limited I-Code Use

County		Wise	Hunt	Parker	Rockwall	Hood	Johnson	Ellis	Kaufman
New post-2000 bldgs.	Total	10,591	10,013	20,075	17,747	8,245	19,027	24,136	20,138
	In SFHA	140	103	290	219	130	269	327	166

- 1 foot of freeboard only adds ~1.5% to construction costs\*
- Adopting the latest building codes saves \$11 per \$1 invested\*
- Indirect losses slow recovery: business interruptions, lost personal income, outsized debt, homelessness, lost municipal tax receipts
- Communities can work together to share costs and resources for code enforcement

\* <https://www.nibs.org/projects/natural-hazard-mitigation-saves-2019-report>



**FEMA**

# Building Code Effectiveness Grading Schedule (BCEGS®)

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- BCEGS score 1 (best) to 10 based on code administration, plan review, and field inspection
- **Stronger codes = more hazard resilience = better score = lower rates/premiums**
- Competitive BRIC: 15 Technical Points awarded to subapplicants with BCEGS score of 1 to 5 (out of 10)
- CRS class prerequisites based on BCEGS score
- 138 jurisdictions within NCTCOG participate in BCEGS (and have a BCEGS score), does not include the 16 counties
- **No BCEGS score?:** Contact ISO to begin the scoring process, typically a 2-4 month process at no cost to the community (other than personnel time)
- Visit: <https://www.isomitigation.com/bcegs/>

# Advantages of Building Codes

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- Administration and enforcement
- Consistent permitting and inspections
- Flood provisions that are more specific or more resilient than NFIP go into effect automatically (such as Substantial Improvement/Substantial Damage administration; freeboard)
- Competitive edge in FEMA grant funding
- Community Rating System (CRS):
  - Class 8 prerequisite: 1 foot of freeboard for residential buildings
  - Class 6 prerequisite: BCEGS score of 5/5 or better
  - Class 4 prerequisite: BCEGS score of 4/4 or better
  - Credits for Activity 430 “higher regulatory standards” meaning stronger standards and more resilient



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# More Specific and Resilient Standards in Codes

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- Specific design requirements for foundations, geotechnical characteristics, flood loads
- High risk flood hazard areas (alluvial fans, flash flooding, mudslides, ice jams, high velocity flow, high velocity wave action, Coastal A Zone, erosion)
- Freeboard as function of Flood Design Class
- Dry floodproofing specifications
- Flood opening specifications
- Elevators, pools, parking structures, accessory structures
- Two elevation inspections (after foundation prior to further vertical construction; final inspection)
- Substantial Improvement/Substantial Damage determinations
- <https://www.fema.gov/emergency-managers/risk-management/building-science/building-codes/flood>



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# What's Next: Building Codes Strategy

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FEMA is developing an Agency Strategy to advance disaster-resistant building codes at the State and local level as a starting point for a coordinated effort involving Other Federal Agencies to achieve a resilient Nation with superior building performance in disasters.



**FEMA**

# FY2020 BRIC Grants Award Summary

- Building Code Activities
  - 15 selected
  - \$2.2 million federal share
  - 2 in Texas
- All 400+ projects (\$500 million federal share) selected under **national competition** came from states with statewide code mandate of either the 2015 or 2018 IBC and IRC
- Want to apply for BRIC? contact Josh Davies (TDEM) at (512) 462-6142 or [TDEM-Mitigation@tdem.texas.gov](mailto:TDEM-Mitigation@tdem.texas.gov)



<https://tdem.texas.gov/building-resilient-infrastructure-and-communities-2021/>



FEMA

# BRIC Building Code Activities

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**Evaluate** adoption and/or implementation of codes that reduce risk that are best suited to the community



**Enhance** existing adopted codes to incorporate more current requirements or higher standards that increase resilience



**Develop** professional workforce capabilities through technical assistance and training

Learn more: [https://www.fema.gov/sites/default/files/2020-08/fema\\_bric-and-building-codes\\_support\\_document\\_August\\_2020.pdf](https://www.fema.gov/sites/default/files/2020-08/fema_bric-and-building-codes_support_document_August_2020.pdf)



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# FEMA Grants Require Latest Codes

- DRRA 1235b requires incorporation of latest published hazard-resistant codes, standards, and specifications into Public Assistance project design and construction
- HMA guidance requires the latest hazard-resistant codes in flood projects
- HMA guidance requires FEMA P-361 for safe rooms, based on ICC 500, the standard for storm shelter design and construction
- Regardless of community code adoption status



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# DRRA 1206 Post-Disaster Resources

*FEMA Policy FP 204-079-01 Building Code and Floodplain Management Administration and Enforcement*



**Building Code Administration** (review and process building applications; collect fees; hire, train, supervise staff; etc.)



**Code Enforcement** (inspect structures; review elevation certificates; conduct and process condemnation determinations; etc.)



**Floodplain Management Regulation, Administration, and Enforcement** (hire, train, supervise extra staff; provide training; process permits; etc.)



**Substantial Damage Operations** (conduct field surveys; prepare cost information; perform inspections; etc.)



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## FEMA Policy Requirements:

- Designated area of the major disaster declaration
- Performed within **180 days after the disaster**
- Relate to the **repair, replacement or retrofit of disaster-damaged structures**
- Funded at the **permanent work cost share** applicable to the event

<https://www.fema.gov/media-collection/section-1206-building-code-and-floodplain-management-administration-and>

# Mutual Aid Response

- Mutual Aid teams can be funded through DRRRA 1206 to assist with post-disaster building tasks
- Texas Statewide Mutual Aid System allows political subdivisions to provide mutual aid
- Texas DEM can employ and pay disaster reservists with specialized skills
- Build relationships with community Public Assistance (PA) personnel who work directly with FEMA
- Mutual Aid for Building Department Fact Sheets and Mutual Aid Legislation Portal (<https://www.fema.gov/emergency-managers/risk-management/building-science/bcat>)



Mutual Aid agreements enable jurisdictions to share personnel and resources during emergencies. Code-related activities include building safety evaluations, post-disaster code enforcement and administration, as well as floodplain administration.



Building  
Officials  
Association  
of TX



**AIA**

- Houston
- Dallas
- Austin



TX Floodplain  
Management  
Association



**FEMA**

# HUD Community Development Block Grants

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The Texas General Land Office (GLO) works to rebuild Texas communities by putting Texans back in their homes, restoring critical infrastructure and mitigating future damage through resilient community planning.

- GLO is the lead agency for administering over \$14 billion in HUD Community Development Block Grant Disaster Recovery (CDBG-DR) funds
- Eligible activities include: acquisition, relocation, rehabilitation, construction of public facilities, public services, energy conservation/renewables, economic development
- Activities primarily benefit low- and moderate-income persons
- <https://recovery.texas.gov/>
- [https://www.hud.gov/program\\_offices/comm\\_planning/cdbg](https://www.hud.gov/program_offices/comm_planning/cdbg)



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# What's Next for NFIP

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- Upcoming Risk Rating 2.0: Equity in Action
  - Deliver actuarially sound rates & new pricing methodology using multiple flood variables
  - <https://www.fema.gov/flood-insurance/risk-rating>
- Issued FEMA RFI on FEMA Programs to further advance equity, climate change resilience, and environmental justice
  - <https://www.federalregister.gov/documents/2021/04/22/2021-08444/request-for-information-on-fema-programs-regulations-and-policies>
- Upcoming RFI in response to ASFPM/NRDC petition to reform NFIP building performance requirements
  - expected in September



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# How Do We Adopt a Code?

<https://youtu.be/fZRmdKYDFJU>

Add the code adoption item to City Council (workshop) agenda for discussion

Place an item on the City Council regular agenda for adoption of each code or as a group of codes

Prepare packets for the City Council meeting

Present your codes or code amendment items to the City Council, answer any questions they may have and get your code or code amendment items passed

Congratulations! You have now adopted new building codes or building codes amendments for your city!

NCTCOG Regional Codes Coordinating Committee Resources:  
<https://www.nctcog.org/envir/regional-building-codes>



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# Key Takeaways; Remember to Advocate Adoption of Updated Codes

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- Adopt the latest published editions of hazard-resistant building codes that provide the greatest level of hazard resilience for your community (October 2021; FEMA BCAT will move to 2018 and later editions of the I-Codes)
- Maintaining the latest codes is an ongoing process as codes continue to improve hazard resilience. Review and update codes on a regular basis, and the closer we update to the two most recent code editions (Approx. every 6 years) will increase your grant opportunities both in preferred status, i.e., BCEGS rating, including CRS rating (or lower insurance dollars)
- Adopting the latest published editions of the 2021 codes:
  - Protects people, property, and communities from natural hazards
  - Reduces disaster losses and saves money
  - Gives a competitive advantage in grant funding



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## Key Takeaways; What are your resources?

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- Continue to monitor FEMA's BCAT Portal, Partner code tracking websites; including the NTC-cog Portals and surveys to demonstrate to your community and neighboring communities to consider adopting the 2018 I-Codes as a minimum standard
- Work on improving your communities BCEGS rating which in turn improves your communities CRS rating, which in turn saves your residents with lower insurance premiums
- Contact Region VI, Texas Department of Emergency Management, or the Texas General Land Office and apply for Building Code funding through the Disaster Recovery Reform Act of 2018, specifically "Building Resilient Infrastructure and Communities" BRIC, both in Disaster related or Non-Disaster related building code funding opportunities



# Available Tools and Emerging Policies

Nationwide Building Code Adoption Tracking (<https://www.fema.gov/emergency-managers/risk-management/building-science/bcat>)

[www.Inspect2Protect.org](http://www.Inspect2Protect.org)

DRRA 1206 authorizes FEMA to provide SLTTs with resources to administer and enforce adopted building codes and floodplain ordinances

DRRA 1234 authorizes capability and capacity building activities as allocation/set-aside

- BRIC competitive program rewards states with statewide code mandate of either the 2015 or 2018 IBC and IRC, soon to be 2018 to 2021 I-Codes
- HMA and PA Grants (DRRA 1235b) require adherence to latest codes for flood projects



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# Additional Resources

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- <https://www.nctcog.org/home>
- <https://www.fema.gov/about/organization/region-6>
- <https://www.fema.gov/emergency-managers/risk-management/building-science>
- <https://www.fema.gov/emergency-managers/risk-management/building-science/building-codes-save-study>
- <https://www.fema.gov/grants>
- <https://www.iccsafe.org/texas/>
- <https://agriflife.org/resilienttexas/>
  
- Sign up for FEMA email updates: <https://public.govdelivery.com/accounts/USDHSFEMA/subscriber/new>



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# Questions?



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Helping people before, during, and after disasters.