

Trinity River COMMON VISION Steering Committee

September 20, 2023



Welcome and Introductions

Thanks for attending!

- ▶ Please introduce yourself in the chat box.
- ▶ **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. Welcome and Introductions
2. Trinity River COMMON VISION Work Program Overview and Activities Update.
3. Action Items
4. Related Activities
5. Roundtable Topics/Other Business
6. Adjournment

Presentation on the Trinity River **COMMON VISION** Program



Trinity River COMMON VISION

Timeline and Background

\$11B

1980s Regional Environmental Impact Statement

US Army Corps of Engineers determined impacts of flooding based on different levels of floodplain development
1989 NCTCOG adopted a Regional Policy Position on flooding

1991 Corridor Development Certificate (CDC) Manual

The CDC process includes USACE review and comment from participating local governments along the corridor

2023 NFIP-CDC Consolidated Model Completed

Effort to combine the NFIP H&H model with the CDC model offering communities along the mainstem most accurate data

1990 Upper Trinity River Feasibility Study (UTRFS)

Six-year, \$8 million effort to identify projects that address flood damage reduction and water quality

Creation of the COMMON VISION Program

1993 – 2006 UTRFS Phase II

\$12 million to reduce flood risks
Arlington Johnson Creek Buyouts
Dallas Floodway/Elm Fork Project
Clear Fork/West Fork Project
Big Fossil Creek Watershed Project
Lake Worth Project

Trinity River COMMON VISION

Participating Members



TEN CITIES

Arlington
Carrollton
Coppell
Dallas
Farmers Branch
Fort Worth
Grand Prairie
Irving
Lewisville
Seagoville

FOUR COUNTIES

Dallas County
Denton County
Kaufman County
Tarrant County

TWO SPECIAL DISTRICTS

Tarrant Regional Water District
Trinity River Authority

PROGRAMMATIC PARTNERS

NCTCOG Environment & Development
U.S. Army Corps of Engineers
Federal Emergency Management Agency
Texas Water Development Board







Population: Growth in U.S. highlighting TX

3 of the 15 fastest growing largest cities in the US are in the Trinity River Watershed.

Rank	Area Name	State	Numeric Increase	2022 Total Population
1	Fort Worth	TX	19,170	956,709
2	Phoenix	AZ	19,053	1,644,409
3	San Antonio	TX	18,889	1,472,909
4	Seattle	WA	17,749	749,256
5	Charlotte	NC	15,217	897,720
6	Jacksonville	FL	14,408	971,319
7	Port St. Lucie	FL	13,887	231,790
8	Cape Coral	FL	13,017	216,992
9	Houston	TX	11,223	2,302,878
10	Georgetown	TX	10,887	86,507
11	North Las Vegas	NV	9,419	280,543
12	Henderson	NV	8,994	331,415
13	Dallas	TX	8,833	1,299,544
14	Irvine	CA	8,589	313,685
15	Frisco	TX	8,506	219,587

















Imperviousness: Projected Development

Legend

-  Texas County Boundary
-  TSI Study Area
-  Trinity CWMS Junctions
-  Trinity CWMS Flow Reaches
-  Trinity CWMS Subbasins
-  Waterbodies

Imperviousness Change (2020 to 2045)

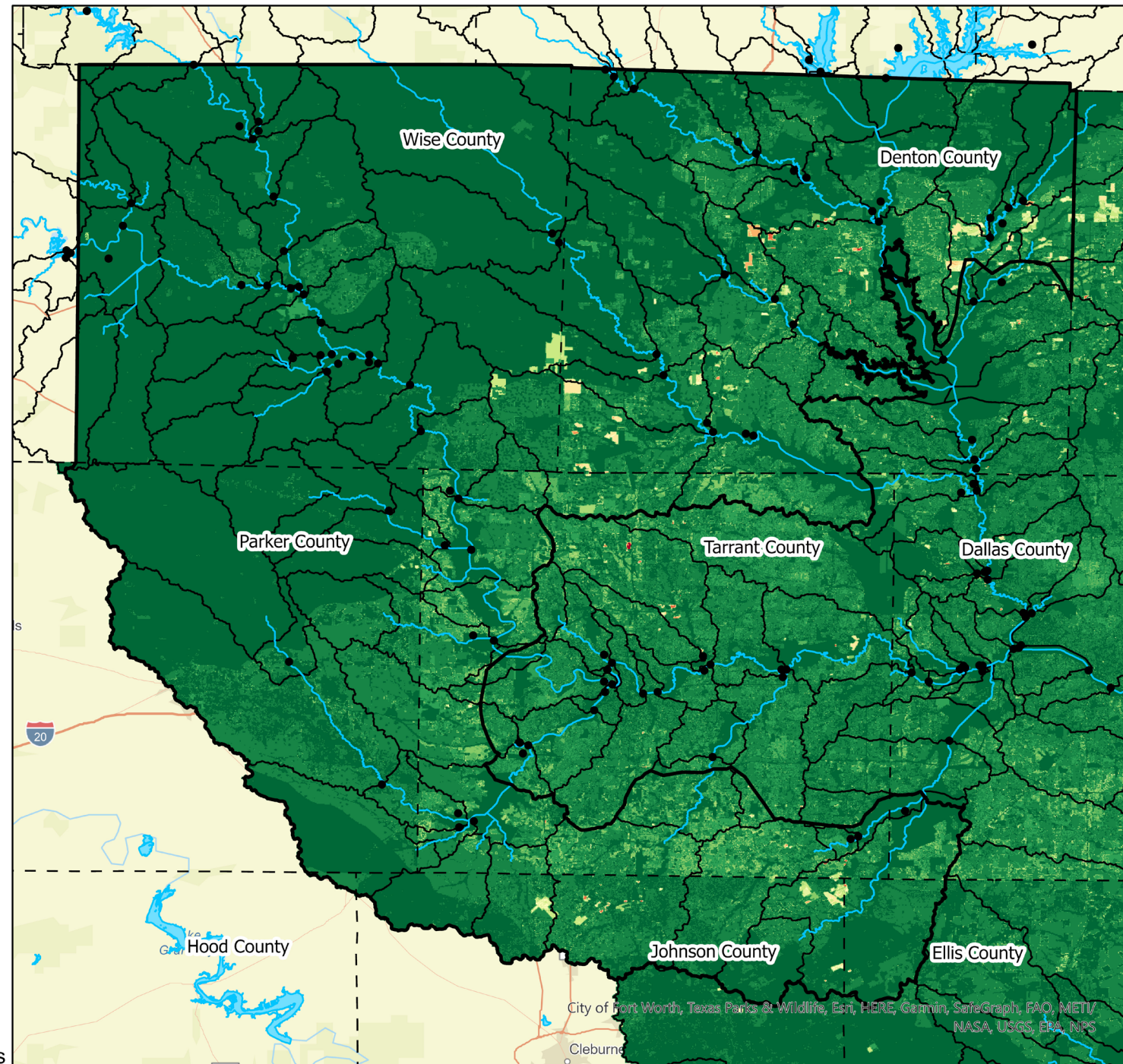
Percentage (%)

-  0
-  0 - 5
-  5 - 10
-  10 - 15
-  15 - 20
-  20 - 25
-  25 - 30
-  30 - 35
-  35 - 40
-  40 - 45
-  45 - 50
-  50 - 55
-  55 - 60
-  60 - 65
-  65 - 70
-  70 - 75

TSI H&H
Land Use
Investigation

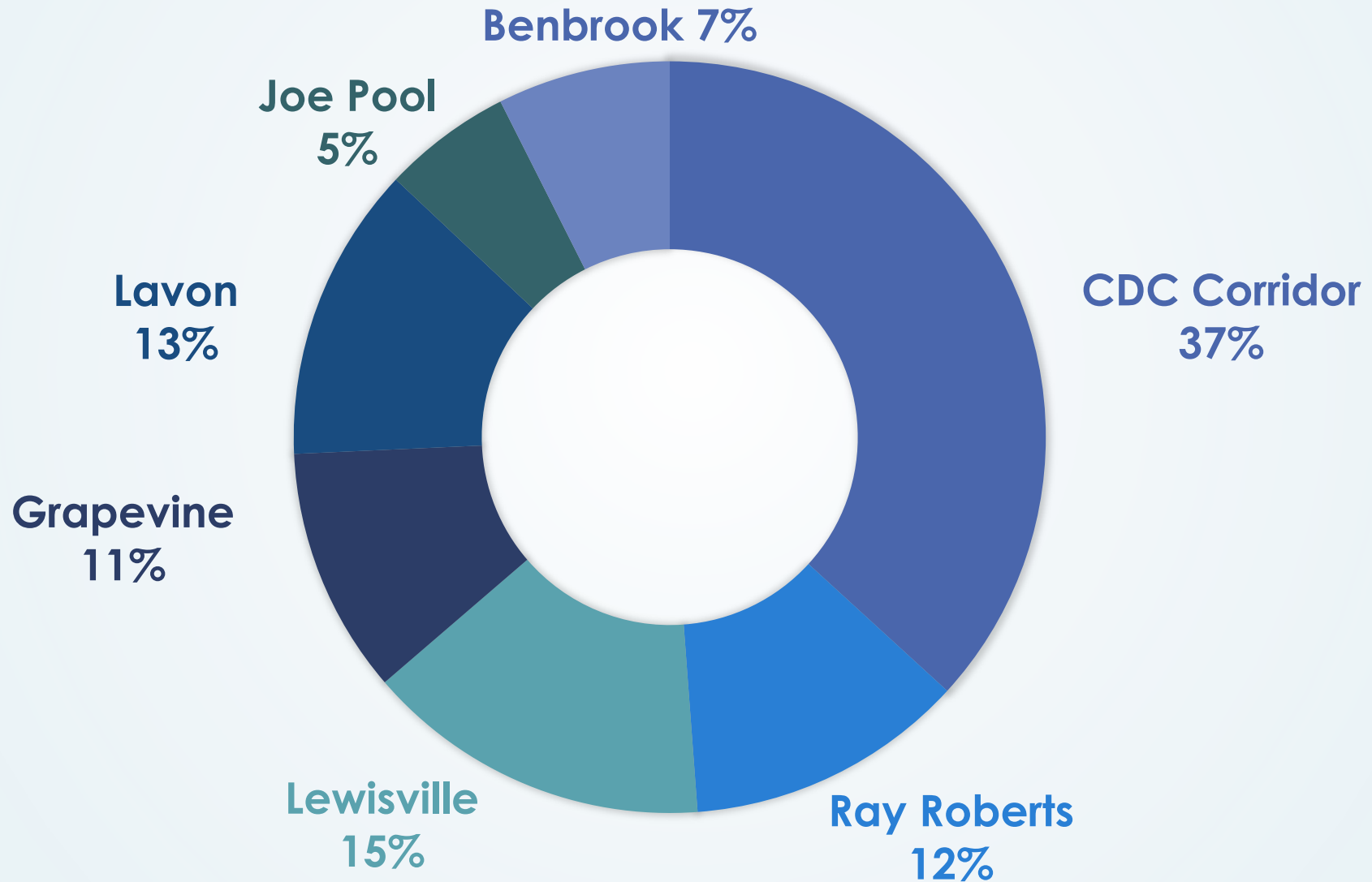


0 3.75 7.5 15
Miles



*Data from: NCTCOG Transportation
Group Demographic Team & UTA Fang
Research Group

Active Flood Storage



2015 Floods



D. Carrier Parkway at I-20, Grand Prairie, Texas, May 17, 2015



B. Loop 12 at I-30 flooding in Dallas, Texas, May 29, 2015

2015 Floods



The 111th Engineer Battalion of the Texas Army National Guard rescue three people from a small vehicle stuck in a low water crossing near Granbury, Texas, May 26, 2015.



H. Grapevine Lake Spillway, June 19, 2015

CDC Program Goals

Corridor Development Certificate Program



Provides Oversight

Provides oversight for projects constructed in the 1% annual chance floodplain



Review Process

Establishes a consistent regional criteria and review process



Limits Impact

Limits (but does not eliminate) the impact of floodplain encroachments for regulated streams on downstream areas



Trinity River CDC Process

Step 0: Pre-CDC Application Conference

Step 1: Submission of Application to City

Step 2: Submission of CDC Application and Fee

Step 3: Comment Period

Step 4: Application is sent to USACE for Review

Step 5: Technical Review Results/Model Update

step
00

Pre-CDC Application Conference

Communication is key in the CDC process. NCTCOG highly recommends that developers and potential CDC applicants hold a pre-CDC conference with the floodplain administrator of the CDC Permitting Entity in which the project is located.



step
01

Developer Submits Application to City

If a developer wants to develop in the floodplain, they first download the model and insert their project. The developer then meets with the CDC Permitting Entity to get their application in order. This step may vary by jurisdiction.



step
02

City Submits CDC Application

The CDC Permitting Entity submits the CDC Application and fees to the Trinity COMMON VISION program through this website.



step
03

Municipalities Offer Comments

Starting the day the application is submitted, CDC communities are notified and have 30 days to review and provide comments on the application.



step
04

Application Sent to USACE for Review

The application and all documentation is sent to the U.S. Army Corps of Engineers (USACE) for review. The USACE will coordinate review with the Applicant's engineer representative during the review process.



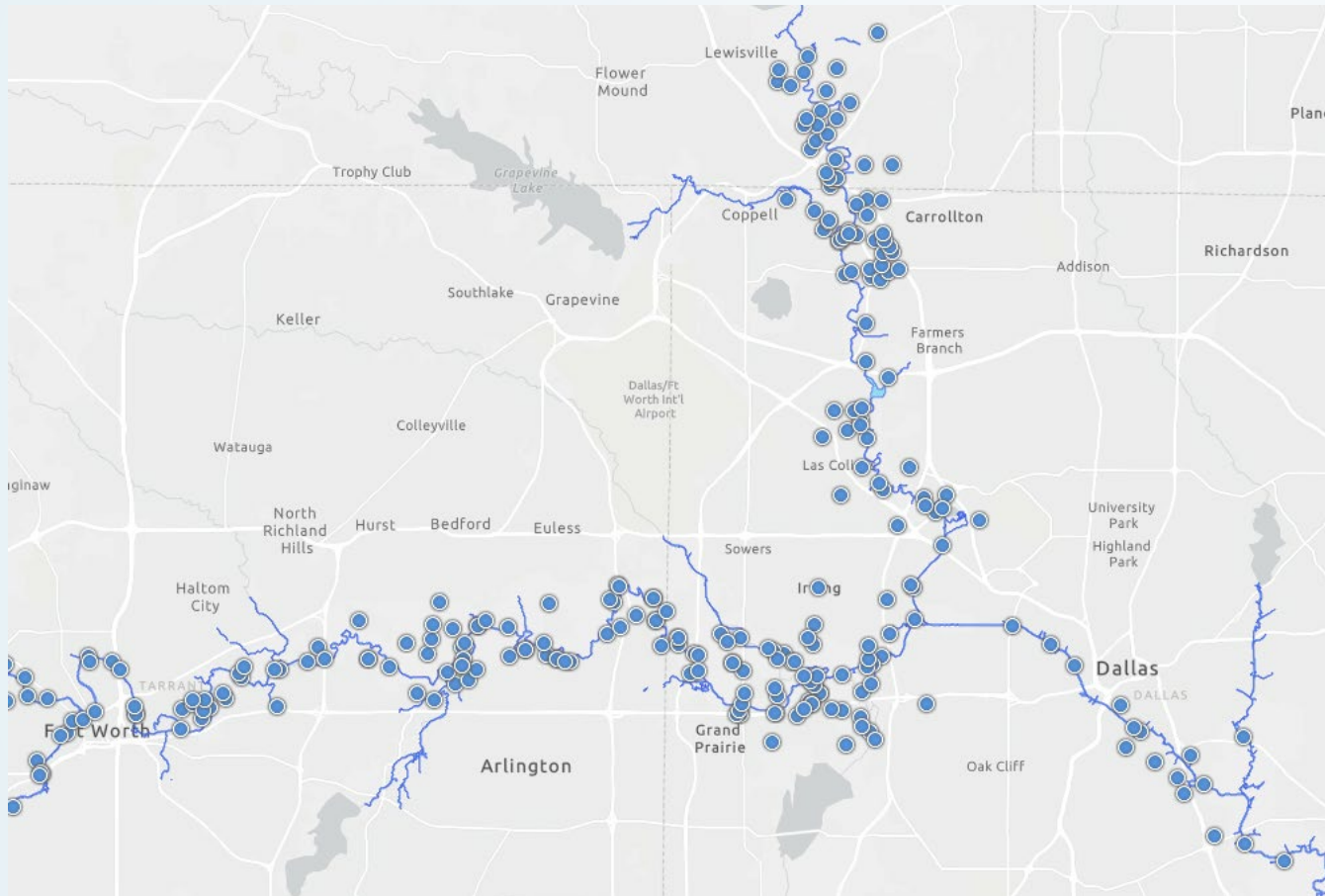
step
05

Project Added to CDC Model

The project is added to the CDC Model by USACE after the CDC permit is granted by the submitting CDC Permitting Entity.



CDC Permits in Fiscal Year 2023



- 13 Applications Received This Fiscal Year
- 262 Total Permits Issued Since CDC Inception

Other Programmatic Activities

- ▶ Administrative Coordination for the procurement of a Regional Flood Warning Software Program Contract through the NCTCOG TXShare Program
- ▶ Sponsorship of FEMA's NFIP training course and partnership with TFMA to host annual CFM exam
- ▶ Maintaining and hosting the Consolidated Model for the Trinity River and assist in expansion efforts of the model
- ▶ Updating the Corridor Development Certificate (CDC) Manual
- ▶ Engage with communities along the East Fork and Denton Creek Communities to join the COMMON VISION Program

Questions?



Trinity River COMMON VISION Work Program & Activities Update



Update of the CDC Manual to the 5th Edition



FY2023 Trinity River Common Vision Work Program

CDC Manual Update to the 5th Edition

- ▶ NFIP-CDC Model Consolidation Team tasked with updating CDC Manual in late 2020
- ▶ Following last years efforts, the NFIP-CDC Model Consolidation Team continued to meet to finalize the revisions for the 5th Edition to the CDC Manual.
 - ▶ Team Members
 - ▶ Lisa Biggs, Team Chair – City of Fort Worth
 - ▶ Amy Cannon – City of Arlington
 - ▶ Olivia Whittaker – City of Dallas
 - ▶ Mike Danella, Matt Lepinski – USACE
 - ▶ Cameron Cornett – FEMA
 - ▶ Craig Ottman -TRWD
 - ▶ Stephanie Griffin – Halff Associates
 - ▶ Jake Lesue – Dewberry
 - ▶ Chris Johnson – FNI
 - ▶ Edith Marvin, Jai-W Hayes-Jackson - NCTCOG

FY2023 Trinity River Common Vision Work Program

CDC Manual Update to the 5th Edition

- ▶ Main Updates and Revisions included in the new manual
 - ▶ Updating the CDC Process to include the NFIP-CDC Consolidated Model.
 - ▶ Inclusion of new Trinity River CDC website
 - ▶ CDC will be valid for two years instead of current five years and one year extensions given instead of three years with a maximum of three extensions allowed
 - ▶ Addition of Model Maintenance Fee following completion of project during LOMR process
 - ▶ Revised format of chapters to clarify requirements and process
 - ▶ Developed FAQs for community and public audiences



FY2023 Trinity River Common Vision Work Program

CDC Manual Update to the 5th Edition

Current Manual

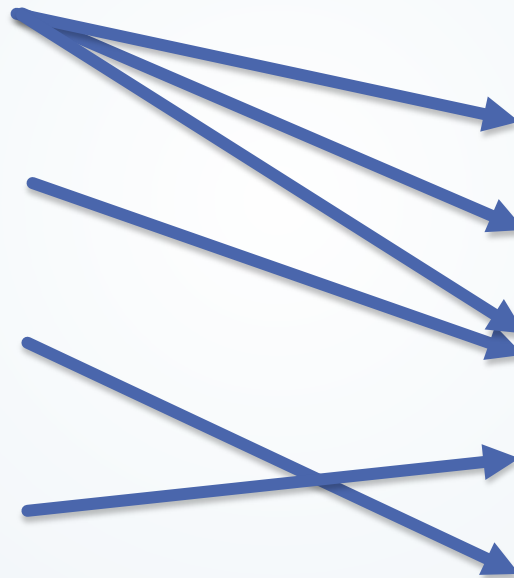
Chapter 1 General Information

Chapter 2 CDC Common Permit
Criteria

Chapter 3 CDC Application
Requirements

Chapter 4 The CDC Process

Appendices



Revised Manual

Summary of Changes

Glossary

Section 1 Introduction

Section 2 CDC Regulation and
Criteria

Section 3 The CDC Process

Section 4 CDC Application

Appendices



FY2023 Trinity River Common Vision Work Program

CDC Manual Update to the 5th Edition

- ▶ Other Revisions:
 - ▶ **CDC Cost Recovery Fee** renamed to **CDC Application Fee**
 - ▶ **100-year flood** will now be called **CDC 1% annual chance exceedance flood** and **FEMA 1% annual chance flood**
 - ▶ **Grandfathered projects** will now be called **Specific Prior Development Projects** or **Legacy Projects**
 - ▶ **CDC Model** will become the **Consolidated NFIP-CDC Model** or just **NFIP-CDC Model**
 - ▶ **CDC Application Form** will consist of four parts: Submittal Checklist, Part 1- General Project Information, Part 2 – Hydrologic and Hydraulic Information, and Application Certification



FY2023 Trinity River Common Vision Work Program

CDC Manual Update to the 5th Edition

➤ Next Steps

- Prepare final draft of compiled manual document
- Provide the final draft manual to FMTF for their review
- Address any comments and publish the updated manual

➤ New task for Team

- Determine how to provide guidance for new communities without CDC Models currently
- Provide training and support for new CDC Manual



USACE Updates on NFIP-CDC Model Improvement Efforts

September 2023

Trinity River Common Vision Steering Committee

Matthew T. Lepinski, P.E.

Lead Hydraulic Engineer, Water Resources

U.S. Army Corps of Engineers

Fort Worth District



North Central Texas
Council of Governments
Environment & Development

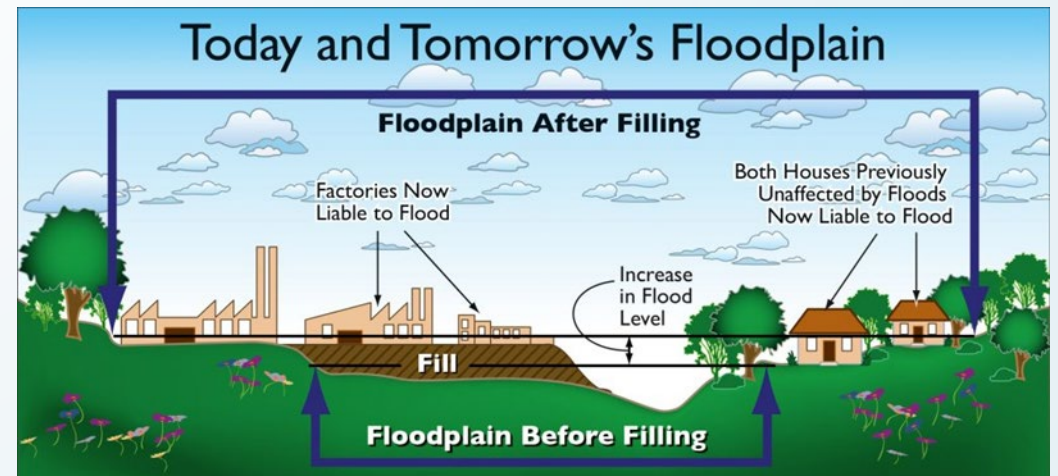
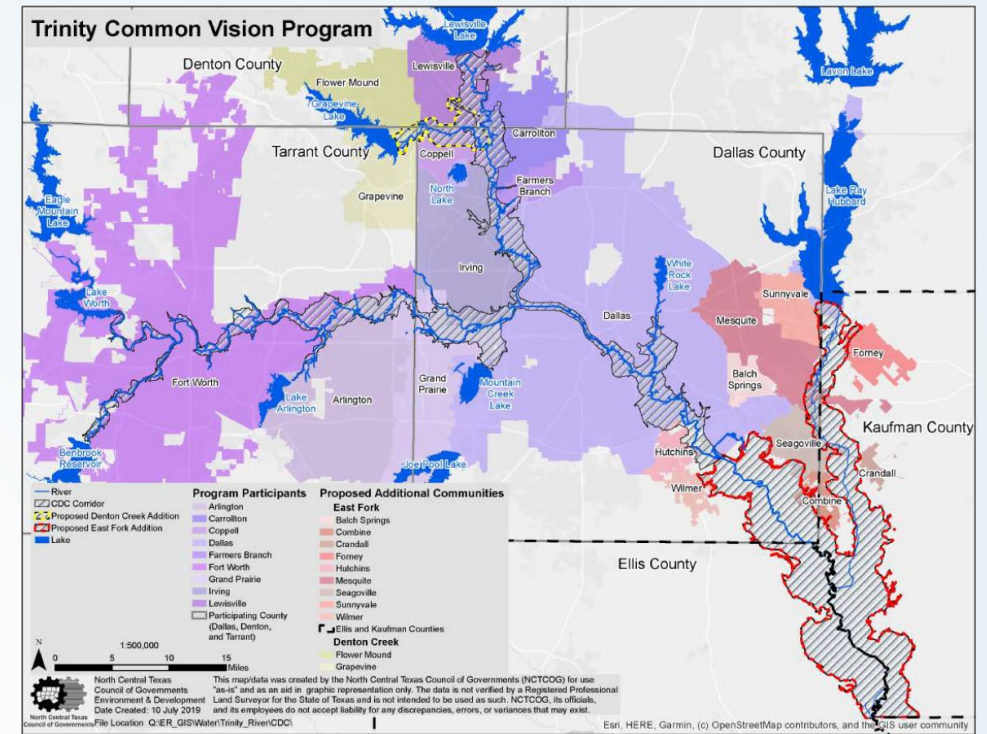
What Is Model Consolidation

2 Models, 2 Purposes (Goals, Objectives, Criteria)

- **FEMA NFIP model(s)**
 - Used for the National Flood Insurance program
 - Existing conditions
 - Projects must be constructed
- **FMTF/NCTCOG CDC model(s)/tool(s)**
 - Used to manage growth and development
 - Loss of storage and WS elevations
 - Has prevented billions in damages
 - Future conditions
 - Constructed and planned (permitted) projects

One Model (Consolidated) – Many Purposes

- Managed by the NCTCOG w/ technology
- Captures watershed/floodplain changes
- Transparency in both processes
- Consolidated review process
- Satisfies and supports NFIP and CDC
- Manages storage, WS elevations and...
- Simplified and streamlined
- Promotes flood risk awareness and resiliency
- Incorporates new technologies, tools and data (decreased uncertainty)
- Other purposes



FY2023 Trinity River Common Vision Work Program

NFIP/CDC Model Consolidation Highlights

Common actions

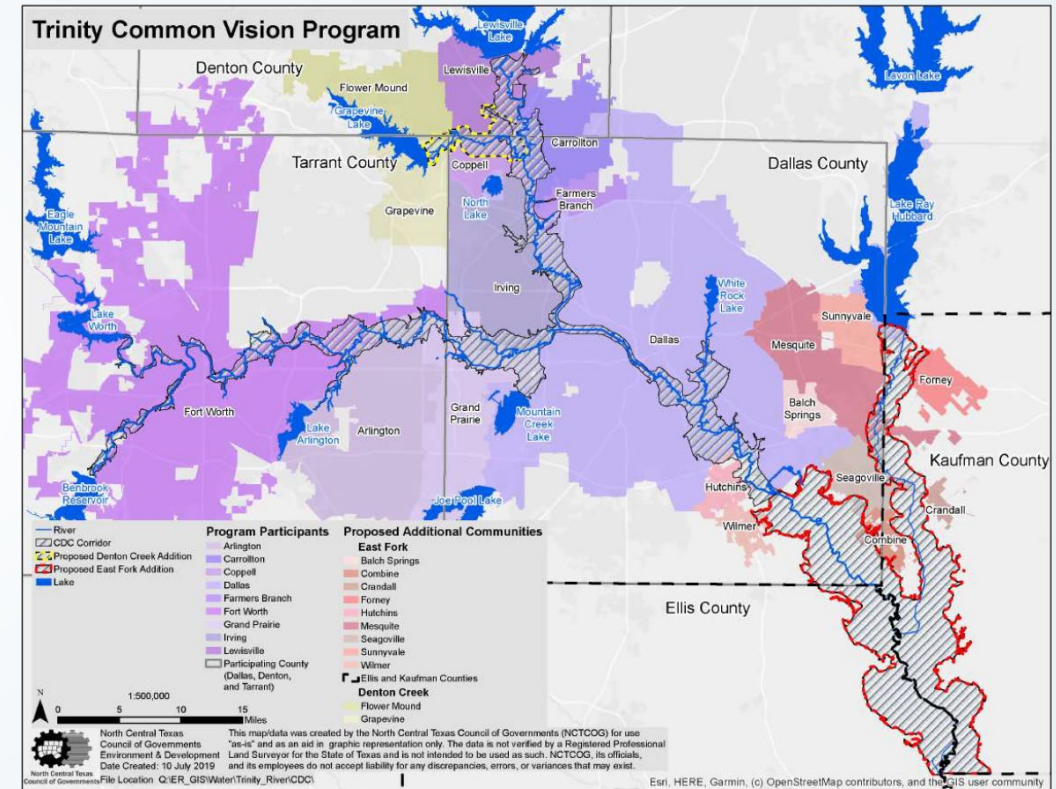
- Incorporate new georeferencing technologies (FEMA funded \$2 M)
- Restructured for multi-purpose and future conditions
- Leverages Trinity River WHA meteorological and hydrologic models (FEMA & USACE funded \$1 M)
- Collaboration with member communities

NFIP-CDC Model Consolidation

- Integration of floodplain actions (FEMA)
- Integration of CDC projects since last update
- Schedule & cost – Compete (May 2023) \$0.25 M

NFIP-CDC Main Stem/East Fork Trinity River Model Extension

- NFIP model completed, all floodplain actions incorporated (FEMA funded \$1.5 M)
- CDC H&H models under development
- Collaboration with member communities
- Discussed strategy with NCTCOG and FEMA Region 6.
- Schedule and Cost – 2024, \$0.25 M +(working to secure additional funds)



FY2023 Trinity River Common Vision Work Program

NFIP-CDC Model Consolidation

- Updating the newly georeferenced CDC model with future flows and approved but not yet constructed CDC project geometries from 2017 onward.
 - USACE and FEMA worked to update their respective models and posted consolidated NFIP-CDC model to the Trinity River CDC website.
 - Culmination of a collaborative effort to generate a first-ever consolidated NFIP/CDC model.
 - Aligns with NFIP/CDC manual updates and incorporates FMTF review & feedback.
- Consolidated NFIP-CDC model was approved at May FMTF meeting and posted to www.TrinityRiverCDC.com.
 - **Thank you to our partners for this collaborative effort to generate a first-ever consolidated NFIP/CDC model**



FY2023 Trinity River Common Vision Work Program

NFIP-CDC Model Extension

Study extents:

East Fork Trinity - 30 miles

Lake Ray Hubbard to Trinity River

Trinity Main Stem - 38 miles

South of IH 20 to Henderson County

3 Impacted Counties:

- Dallas
- Ellis
- Kaufman



FY2023 Trinity River Common Vision Work Program

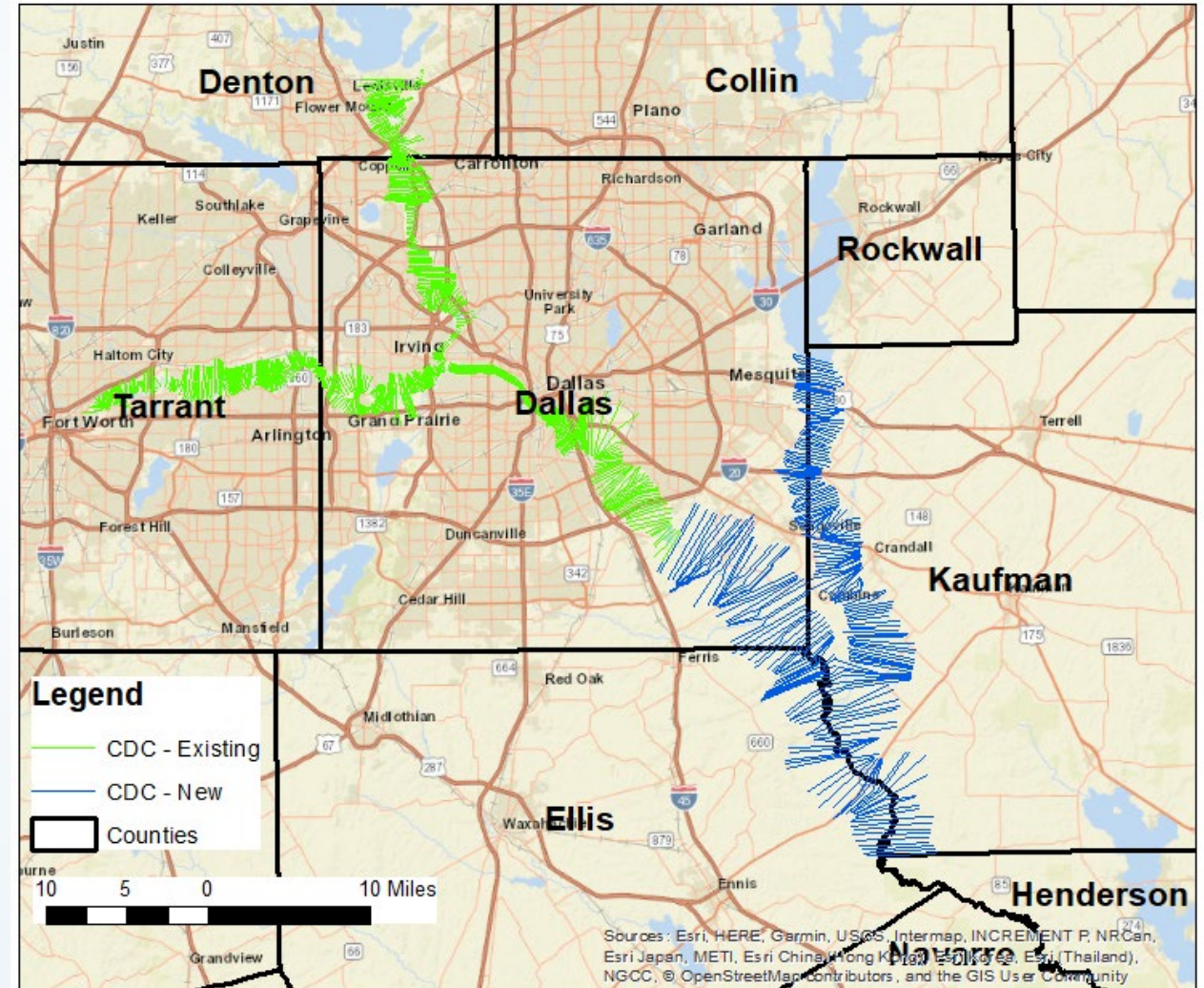
NFIP-CDC Model Extension: Trinity Main Stem and East Fork Trinity

Deliverables

- ▶ Future land use HEC-HMS Model (Trinity Main Stem extension and East Fork)
- ▶ Extended consolidated NFIP/CDC model
- ▶ Inundation area shapefiles for future flood events
- ▶ Project study report

Benefits

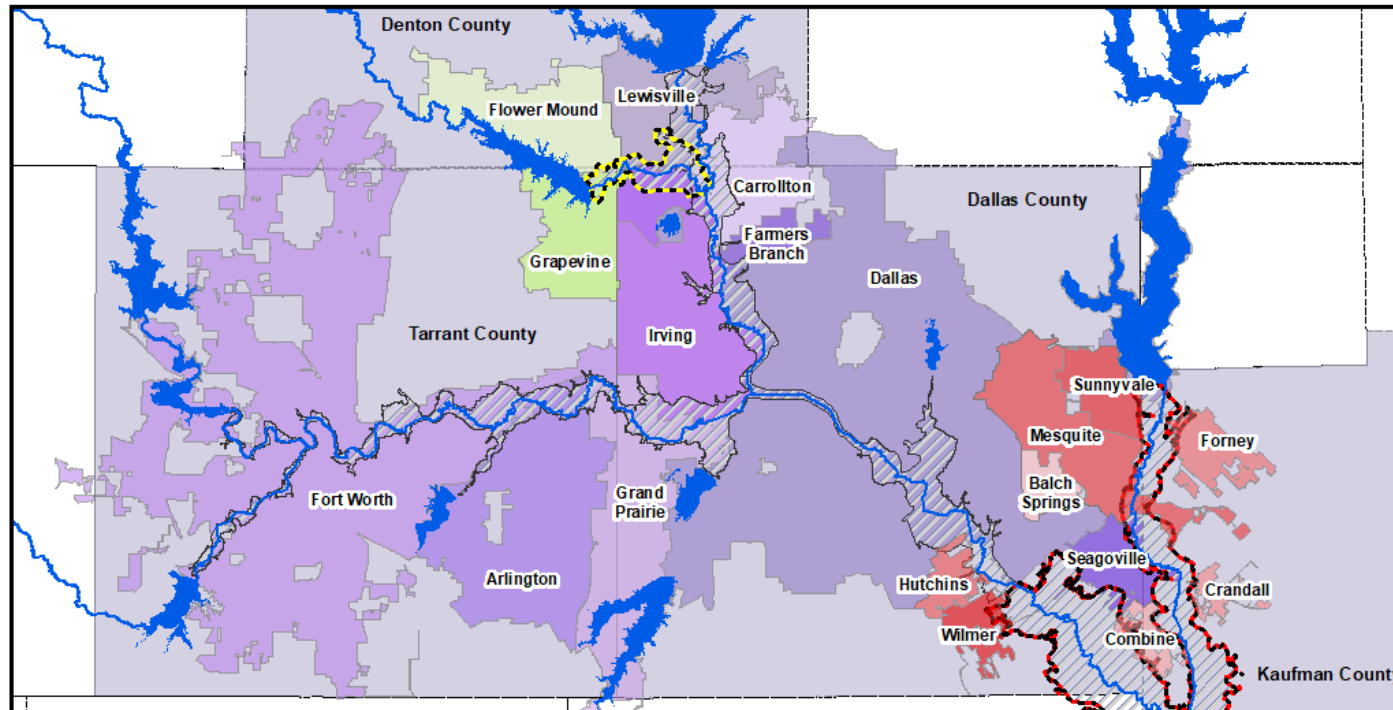
- ▶ Stabilization of flood risk along East Fork and Main Stem to Henderson County
- ▶ Opens the door for new opportunities and new member communities



East Fork Trinity and Denton Creek Community Integration



East Fork Trinity and Denton Creek Community Integration



Trinity River Common Vision Program

Map may not accurately reflect the latest regulatory flood map extents.

<ul style="list-style-type: none"> River Lakes Corridor Development Certificate Program Boundary Proposed Denton Creek Addition Proposed East Fork Addition North Central Texas Council of Governments 	<p>Program Participants</p> <ul style="list-style-type: none"> Arlington Carrollton Coppell Dallas Farmers Branch Fort Worth Grand Prairie Irving Lewisville Seagoville Dallas, Denton, Tarrant, and Kaufman counties 	<p>Proposed Participants</p> <ul style="list-style-type: none"> Flower Mound Grapevine Balch Springs Combine Crandall Forney Hutchins Mesquite Sunnyvale Wilmer
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0 2.5 5 10 Miles

This map was created by the North Central Texas Council of Governments (NCTCOG) for use "as-is" and as an aid in graphic representation only. The data is not verified by a Registered Professional Land Surveyor for the State of Texas and is not intended to be used as such. NCTCOG, its officials, and its employees do not accept liability for any discrepancies, errors, or variances that may exist.

June 19, 2023

Current Members

- 10 cities
- 4 counties

Prospective Members – Expressed Interest

- **East Fork Communities**
- **Denton Creek Communities**
- City of Mesquite
- Ellis County
- City of Weatherford

Community Rating System (CRS)



Community Rating System (CRS)

What is CRS?

- ▶ Voluntary incentive program
- ▶ Recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP
- ▶ CRS grants credits for 19 different activities
- ▶ Classes are rated from 10 to 1 depending on credits earned
- ▶ Property owners can receive discounts on flood insurance premiums based on the community's class

Rate Class	Discount for SFHA*	Discount for Non-SFHA**	Credit Points Required
1	45%	10%	4,500 +
2	40%	10%	4,000–4,499
3	35%	10%	3,500–3,999
4	30%	10%	3,500–3,499
5	25%	10%	3,000–2,999
6	20%	10%	2,500–2,499
7	15%	5%	1,500–1,999
8	10%	5%	1,000–1,499
9	5%	5%	500–999
10	0	0	0–499

* Special Flood Hazard Area

** Preferred Risk Policies are available only in B, C, and X Zones for properties that are shown to have a minimal risk of flood damage. The Preferred Risk Policy does not receive premium rate credits under the CRS because it already has a lower premium than other policies. Although they are in SFHAs, Zones AR and A99 are limited to a 5% discount. Premium reductions are subject to change.

Community Rating System (CRS) Users Group

What is the North Central Texas CRS Users Group?

- Formed by CRS communities in North Central Texas
- Collaborate to meet local floodplain mitigation goals and support each other in qualifying for CRS credit
- One of two CRS users groups in Texas – many others across the nation
- Meets about two times per year



Community Rating System (CRS) Users Group

Next Meeting

- ▶ Floodplain seminar for elected officials and municipal staff
 - ▶ Thursday, October 19, 9:30 – 11:30 a.m., NCTCOG Offices
 - ▶ Information and registration: <https://www.nctcog.org/envir/watershed-management/crs-user-group>
- ▶ Topics:
 - ▶ Trinity River Corridor Development Certificate – Model & Manual Updates
 - ▶ Dallas County Inland Port Flood Planning Study
 - ▶ Fort Worth's Open Space Conservation Program
 - ▶ FEMA's 2-D Modeling
- ▶ Contact: Erin Blackman at eblackman@nctcog.org or 817-608-2360



Action Items



Summary of September 2022 COMMON VISION Steering Committee Meeting



2022 Trinity COMMON VISION Steering Committee Meeting Summary

- NCTCOG staff are seeking approval of the 2022 Trinity COMMON VISION Steering Committee Meeting Summary.
- A [link to the 2022 summary](#) is available in the chat.
- Vote to approve

Approval of FY24 Trinity River COMMON VISION Work Program and Budget



FY2024 Trinity River COMMON VISION Work Program

FY24 Work Program Overview

A link to the Draft FY24 Work Program is [here](#).

Continuation of existing Ongoing Support Activities and Technical Activities

- ▶ Ongoing Trinity River COMMON VISION Information and Task Force Committee Support
- ▶ Ongoing CDC Process and mapping support
- ▶ Continued FEMA's NFIP training courses
- ▶ Ongoing effort to explore partnership and outreach opportunities
- ▶ Continued exploration of regional cooperative detention/retention strategies
- ▶ **Administrative Coordination for Regional Flood Warning Software Program Contract**
- ▶ Maintenance of the CDC Application and Tracking Website
- ▶ Participation in the Trinity Regional Flood Planning Group

FY2024 Trinity River COMMON VISION Work Program

FY24 Work Program Overview

A link to the Draft FY24 Work Program is [here](#).

Additional technical activities

- ▶ Participation in the Model Consolidation Committee will continue into FY24
- ▶ Updating the CDC Manual to the 5th Edition will continue into FY24
- ▶ Continuing East Fork Trinity and Denton Creek integration
- ▶ **Updating communities' acreage in floodplain (FIRM)**

No change anticipated in cost shares

COST SHARES FOR CURRENT COMMON VISION PARTICIPANTS

Participant	Acres in Floodplain (FIRM)	Cost Share
Arlington	3,351	\$5,802.78
Carrollton	5,941	\$10,287.77
Coppell	1,490	\$2,580.17
Dallas	25,787	\$44,654.18
Farmers Branch	1,472	\$2,549.00
Fort Worth	16,261	\$28,158.44
Grand Prairie	8,498	\$14,715.60
Irving	7,757	\$13,432.44
Lewisville	3,072	\$5,319.65
Seagoville	2,776	\$3,192.00
Dallas County		\$10,000.00
Denton County		\$5,000.00
Kaufman County		\$10,000.00
Tarrant County		\$7,500.00
TRWD		\$7,500.00
TRA		N/A
Subtotal Current Program		\$170,692.03



FY2024 Trinity River COMMON VISION

Draft Work Program Vote

- ➔ NCTCOG is seeking the Steering Committee's approval of the FY24 Work Program, recommended by the Flood Management Task Force on August 18, 2023.
- ➔ A link to the [FY24 Work Program](#) is available in the chat.
- ➔ Vote to approve.

Related Activities Update



Trinity River National Water Trail

Master Plan



History and Background

In 2018, Trinity Coalition and NCTCOG met with cities and counties with a proposal to integrate 21 existing canoe launch sites into a single paddling trail. In October 2020, the Trinity River Paddling Trail was designated as a National Water Trail by the National Park Service.

The Trinity River National Water Trail Task Force and master plan is a coordinated effort between:

- The Trinity Coalition
- The North Central Texas Council of Governments
- and the communities and organizations along the Trinity River

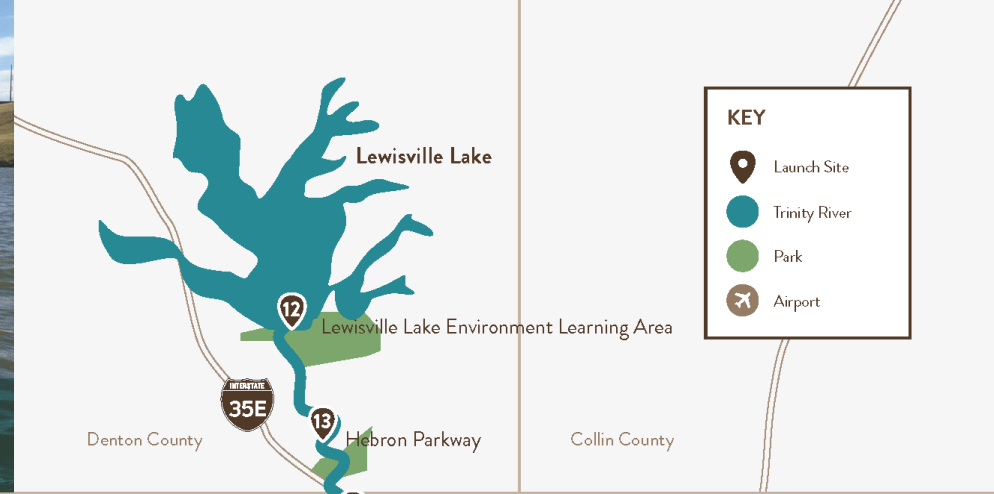
The Task Force was created to advance recreation, tourism, and economic development along the Water Trail. The goal of the Task Force is to:

- Support the designation by maintaining the trail
- Promote the use of the trail as a recreational attraction
- Create a regional master plan

Trinity River Trail Map



Rivers are a natural environment and constantly changing. Please check the local river gauges for current flow conditions. If you have questions, corrections, or updates to this map, email Teresa at teresa@trinitycoalition.org.



Vision for the Trail

- ▶ To assemble the various segments of the Upper Trinity River in North Texas into a fully integrated paddling trail.
- ▶ The Trinity River Water Trail covers 130 river miles, over nine cities and three counties. 21 launch sites along its length with access to 3 river tributaries and the main branch
 - ▶ Clear Fork
 - ▶ West Fork
 - ▶ Elm Fork

Goals for the Trail

- ▶ Develop new launch sites to shorten distances between sites
- ▶ Promote National Water Trail to cities and communities
- ▶ Make the trail more accessible
- ▶ Maintain condition of the existing and future launch sites
- ▶ Promote stewardship along the Trinity River
- ▶ Connect the Trinity River National Water Trail to the DFW Discovery Trail
- ▶ Extend the National Water Trail further south
- ▶ Promote the economic benefits of the trail

Mapping Needs

Current Ideas

- ▶ Incorporating existing land trails and parks
 - ▶ Bike Paths
 - ▶ Hiking Trails
 - ▶ Nature Preserves
 - ▶ Nature Centers
- ▶ Map points of interest and services along the water trail

Questions

- ▶ **What points of interest does your community want to highlight on the map or in the Master Plan?**

Maintenance & Infrastructure Needs

Infrastructure Needs

- ▶ New Launch Sites
 - ▶ Grand Prairie – Beltline Canoe Launch
 - ▶ Arlington – Viridian Canoe Launch
 - ▶ Irving – Trinity View Park Launch
 - ▶ Fort Worth – Riverside Park Launch
 - ▶ Lewisville – Lewisville Lake Paddling Loop
- ▶ Trail Signage

Maintenance Needs

- ▶ Repair and Restoration of Launch Sites
- ▶ Standard Operations and Procedures

Questions

- ▶ **Who should be contacted regarding issues with launch sites and/or the trail?**
- ▶ **What design standards for launch sites does your community use? (state and local standards or NPS standards)**
- ▶ **Does your community form Adopt-a-Trail agreements or partnerships?**

Branding, Communication and Signage Needs

Communication

What safety plans are in place as of right now for emergencies?

Are regulations and conduct on using the trail clear?

Signage

What kind of signage does your community have right now?

Does your community have clearly visible signage for current hazards on your portion of the trail?

Promotion and Branding

Is your community currently promoting the water trail? If so, how?

What does your community see as the economic benefits for the trail?



Trinity River Paddling Trail
Lewisville Lake Environmental Learning Area



Current location:
LLELA
Lewisville Lake
Environmental
Learning Area
DD: 33.067109° -
96.964697°

Next Take-out:
Hebron
Parkway Rd
~6 miles /
~ 2.5 hrs
DD: 33.012600° -
96.950689°

This section has Cell coverage. In case of emergency call 911. River section LLELA to Huffines Park at Hebron Parkway, Lewisville

River conditions: this section of the river starts out with shallow fast moving current. Downstream the river widens and slows. **Hazards:** please watch for fallen trees that can go completely across the river.
<http://www.playlewisville.com/>



For more information: <https://trinitycoalition.org/>

Contact

Erin Blackman

Environment & Development Planner
North Central Texas Council of Governments

EBlackman@nctcog.org

817.608.2360

Jai-W Hayes-Jackson

Environment & Development Planner
North Central Texas Council of Governments

JHayes-Jackson@nctcog.org

817.695.9212

Task Force Website:

<https://nctcog.org/envir/committees/trinity-river-national-water-trail-task-force>

Connect



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nctcogenv



youtube.com/user/nctcoged



EandD@nctcog.org



nctcog.org/envir



North Central Texas
Council of Governments

Integrating Planning for Transportation and Stormwater Infrastructure

Trinity River COMMON VISION Steering Committee | September 20, 2023

Kate Zielke

Project Overview

WHY THE REGION NEEDS A STUDY ON INTEGRATING
TRANSPORTATION AND STORMWATER INFRASTRUCTURE

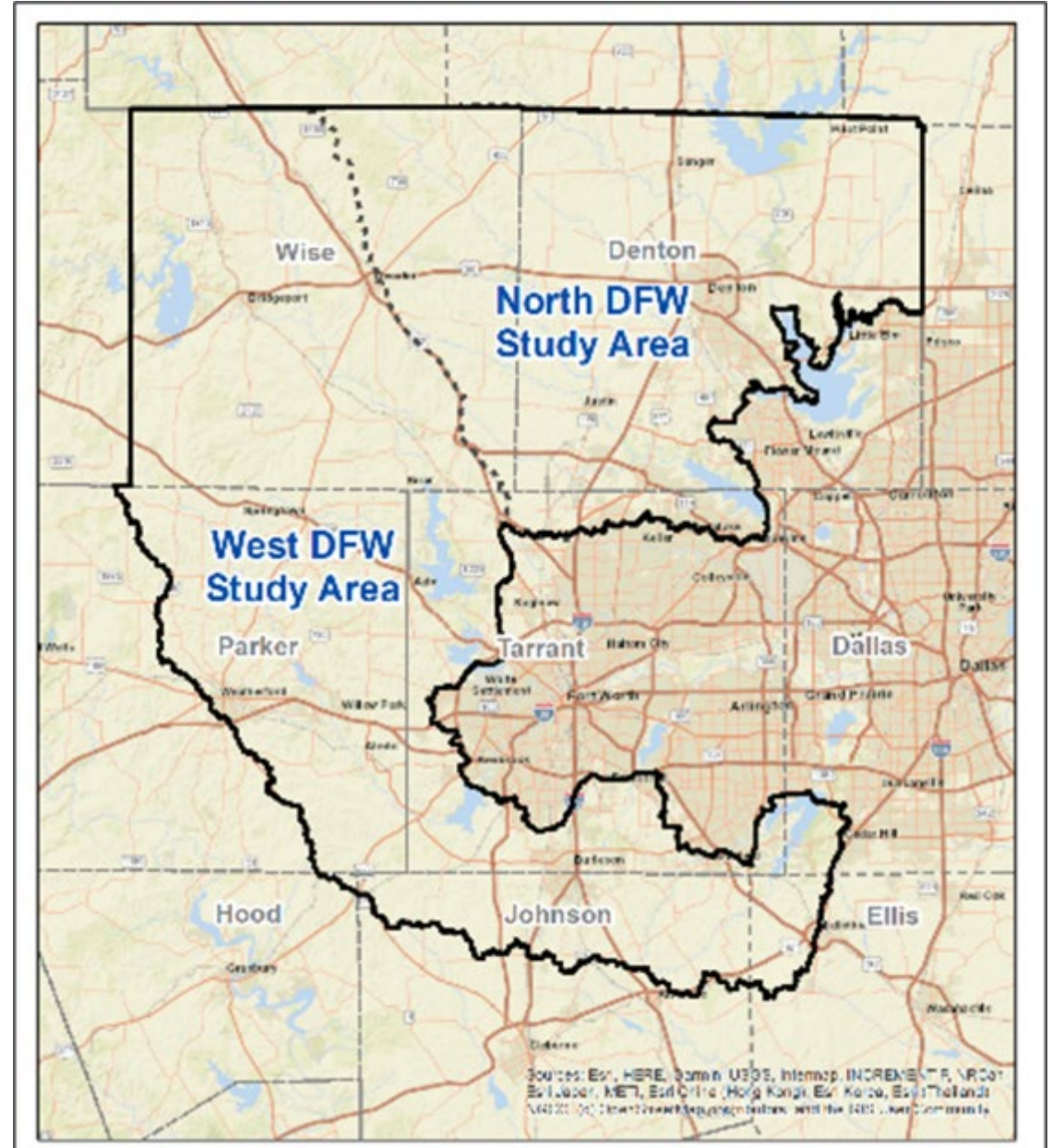
Project Details

Purpose

- Prevention vs. response
- Integrate stormwater management, urban development, transportation, and environmental planning
- Develop plan for risk awareness and resiliency
- Identify impacts and alleviate risks from flooding

Timeline & Budget:

- Official kickoff March 2023
- Completion date for first phase: June 2025
- Funding for first phase: \$6 million



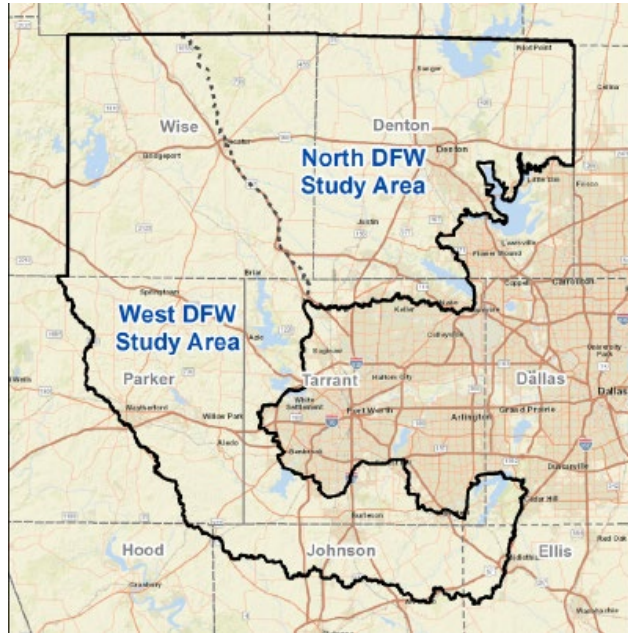
Project Team Members



North Central Texas
Council of Governments



US Army Corps
of Engineers®



UNIVERSITY OF
TEXAS
ARLINGTON



trwd Tarrant
Regional
Water
District



TEXAS A&M
AGRILIFE



integrating Transportation
& Stormwater Infrastructure

Funding Partners

Texas Water Development
Board

Texas Department of
Transportation/Federal Highway
Administration

Federal Emergency
Management Agency

Why TSI?

Fatalities by State for 2012 – 2017

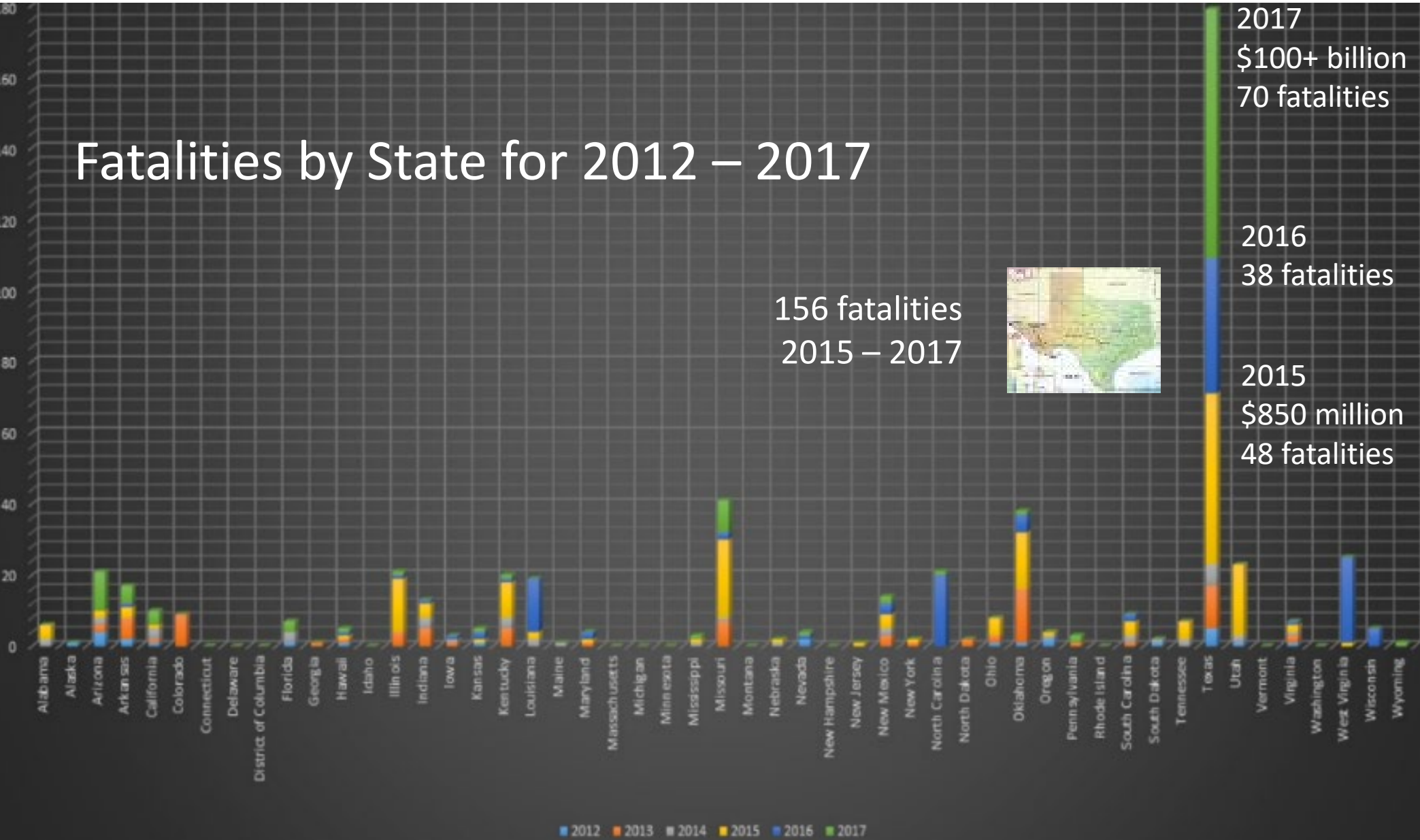
156 fatalities
2015 – 2017



2017
\$100+ billion
70 fatalities

2016
38 fatalities

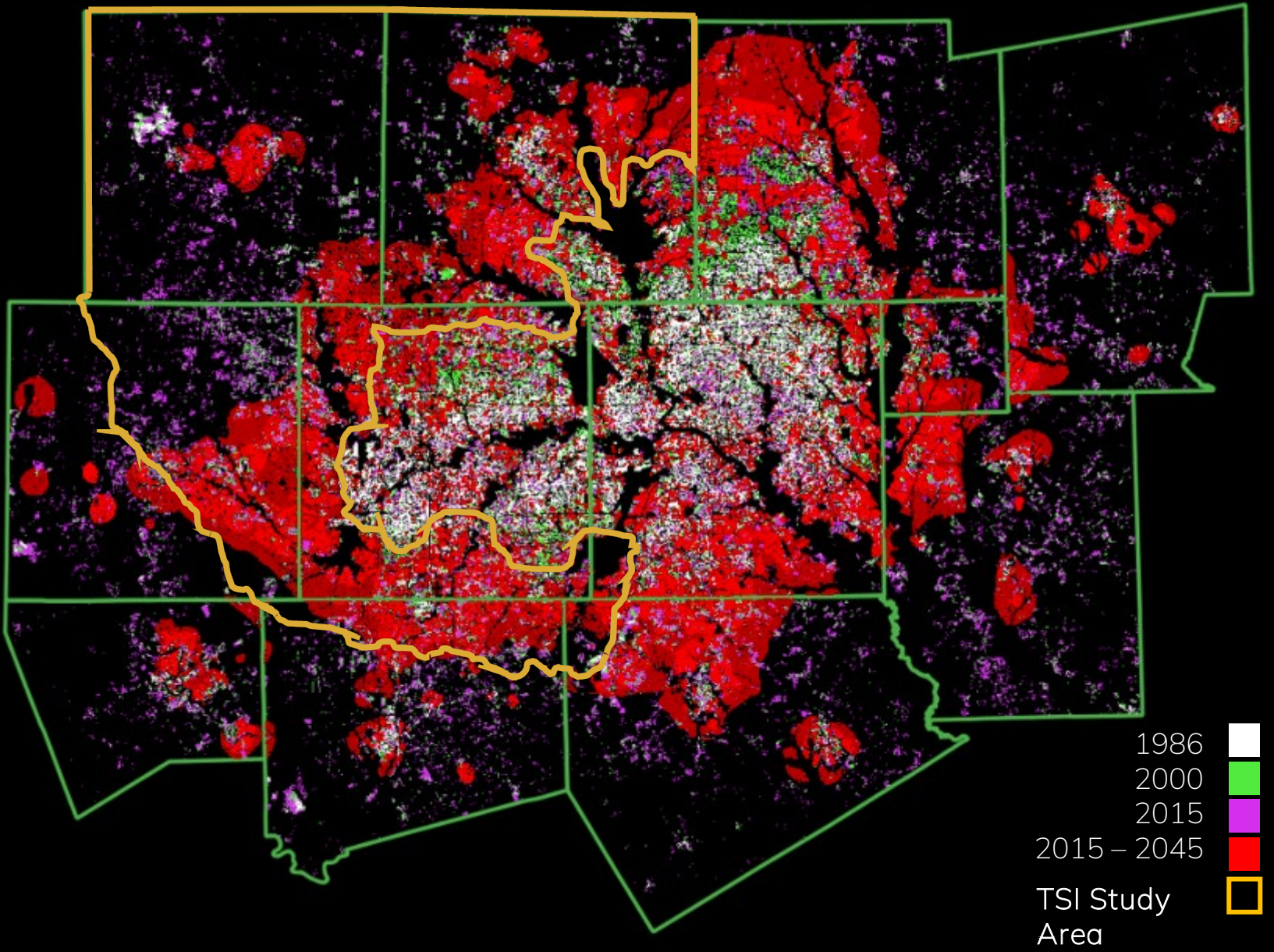
2015
\$850 million
48 fatalities



Source: Gregory Waller, Service Coordination Hydrologist, NWS – West Gulf River Forecast Center, <http://www.nws.noaa.gov/om/hazstats.shtml>

Why TSI?

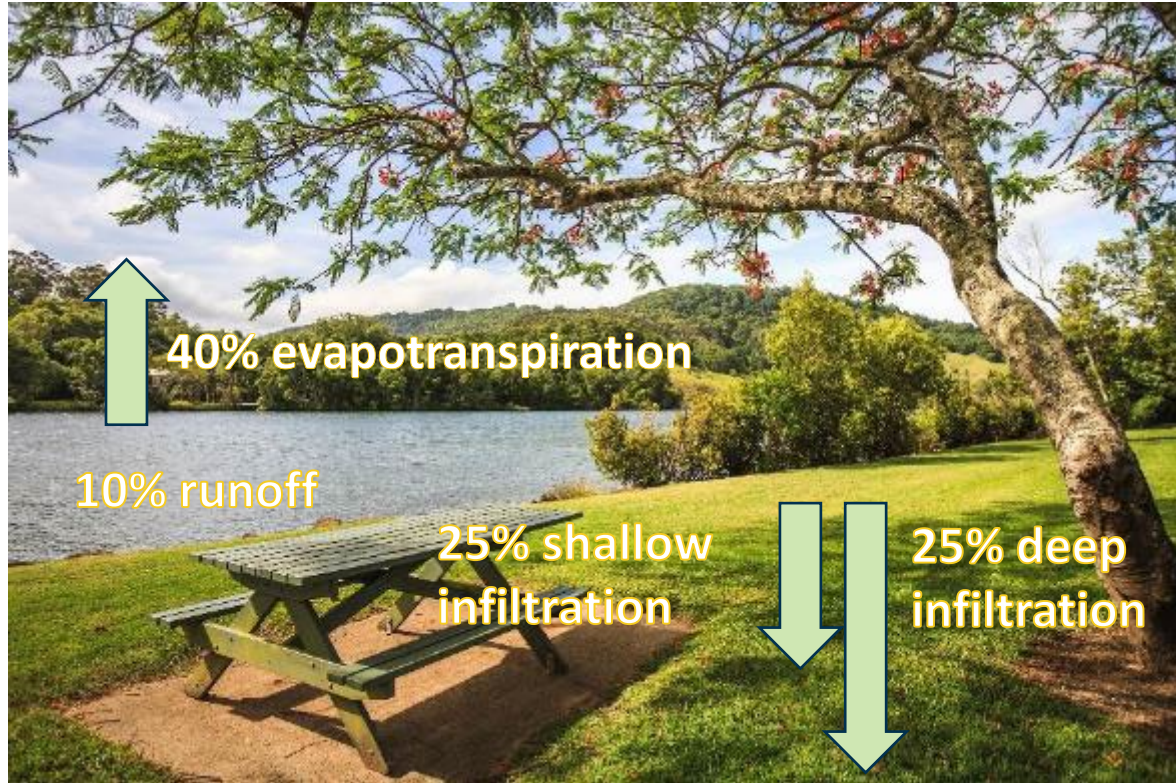
- 60% undeveloped (2015)
- 19% growth in impervious surface (2006 – 2016)
- 126% increase in population (2020 – 2045)
- >7,000 miles of streams
>274,000 acres of 100-year floodplain



Challenges

URBANIZATION, WATER QUANTITY, STORMWATER, AND TRANSPORTATION

Urbanization Challenges



BEFORE (Natural Ground Cover)



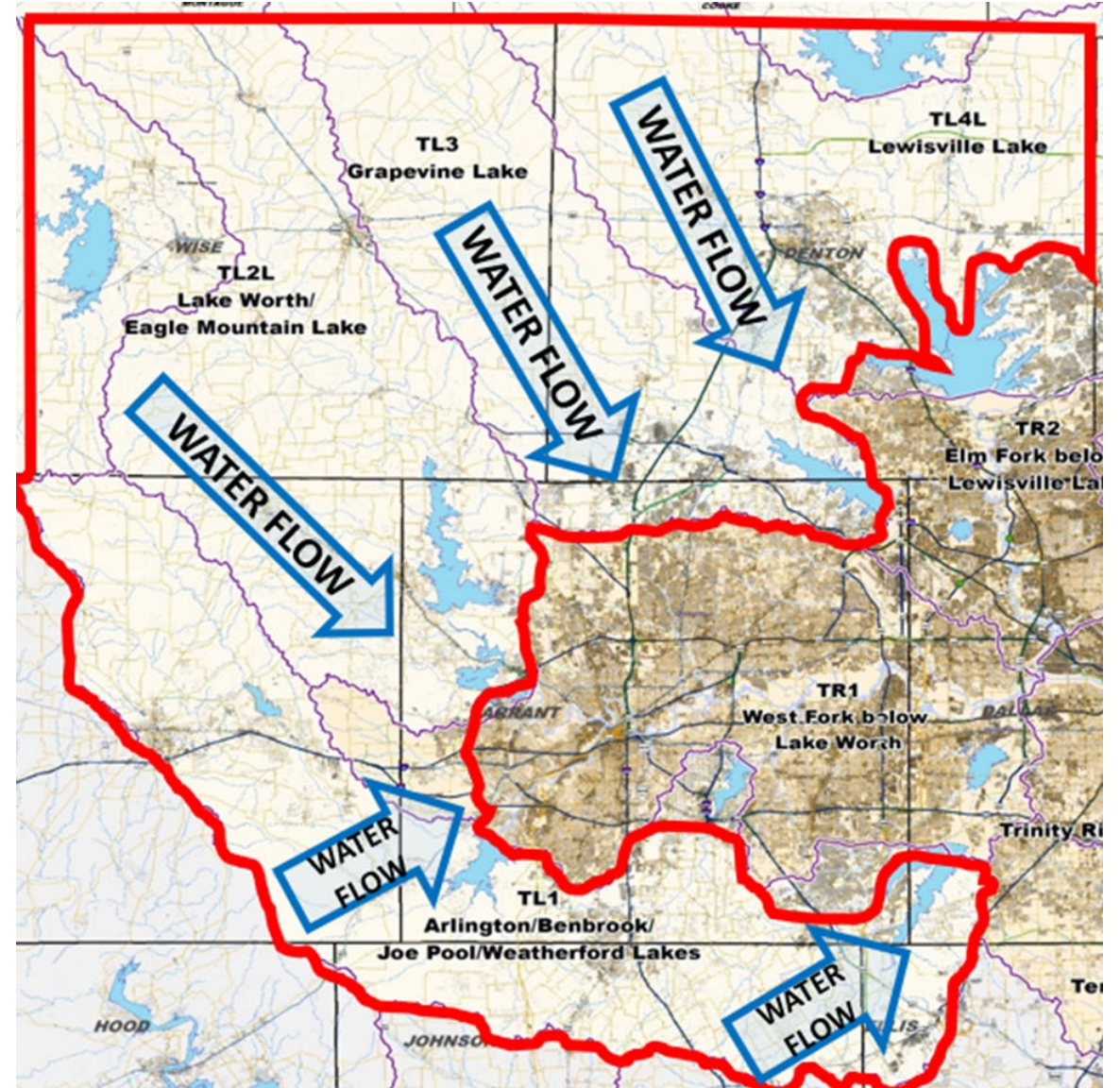
After (75%-100% Impervious Cover)

Water Quality Challenges



Stormwater Challenges

- No regionwide data
- Piece-meal/lacks connectivity
- NOAA Atlas 14 rainfall estimates
 - Required for infrastructure design, planning, and delineation of flood risk
 - 2022 FLOODS Act
 - 10-year updates



Transportation Challenges

- Transportation spending is high and growing
- Rate of deterioration for transportation infrastructure increasing
- Needs can outweigh resources for local governments

Exhibit 2-4: Major Expenditures

Mobility 2045 Update Planning Approach	
Infrastructure Maintenance*	\$42.8
Management and Operations	\$9.6
Growth, Development, and Land Use Strategies	\$1.5
Rail and Bus**	\$44.9
HOV/Managed Lanes + Freeways/Tollways and Arterials	\$49.5
Total, Actual \$, Billions	\$148.3

Values may not sum due to independent rounding

*Includes transit system maintenance

**Transit capital expenditures, including those using innovative revenue sources such as public-private partnerships

Source: NCTCOG, Mobility 2045 Update

Mapping, Modeling, and
Policy Recommendations



Technical Methodology

ENGINEERING SOLUTIONS TO INCREASED IMPERVIOUSNESS
AND FLOOD RISK



How Can *WE* Accomplish This?

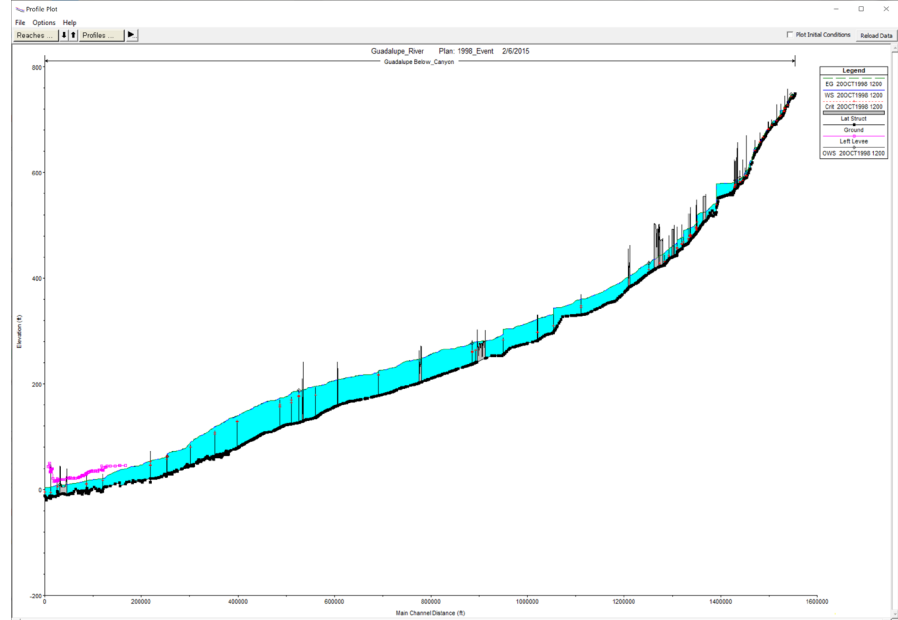
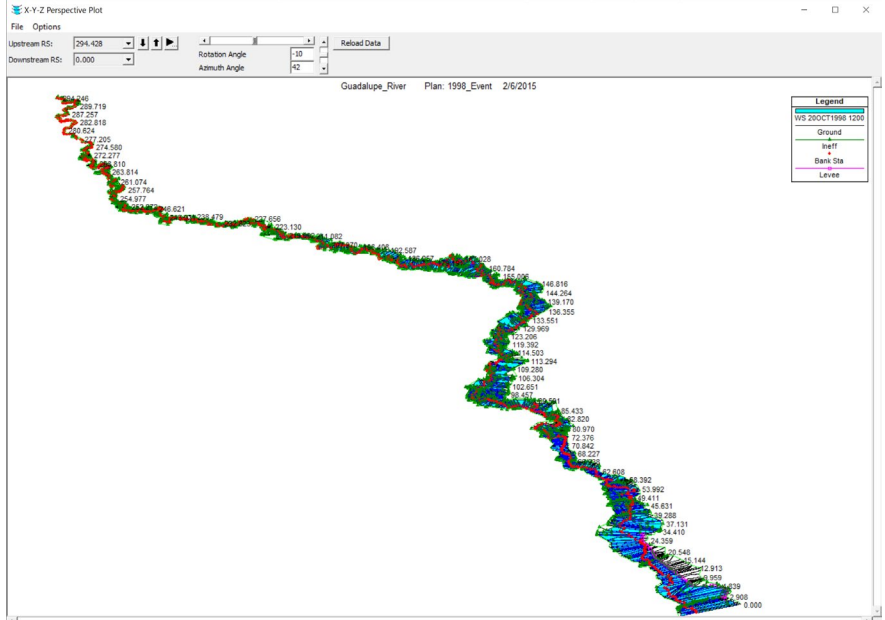
- TSI benefits from valuable flood hazard awareness and resiliency information that has helped reduce uncertainty related to flood risk
- Enables us to further enhance and integrate this information at a regional scale
- Without this information, it would require extensive effort on the front end of the project to get here

Leverage existing Flood Risk Management initiatives...

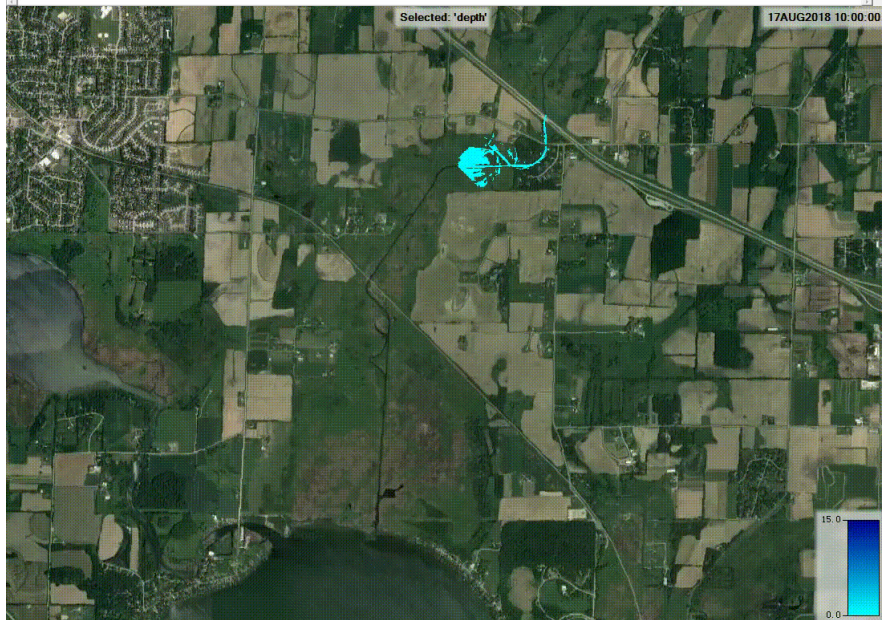


... to innovate at a regional scale

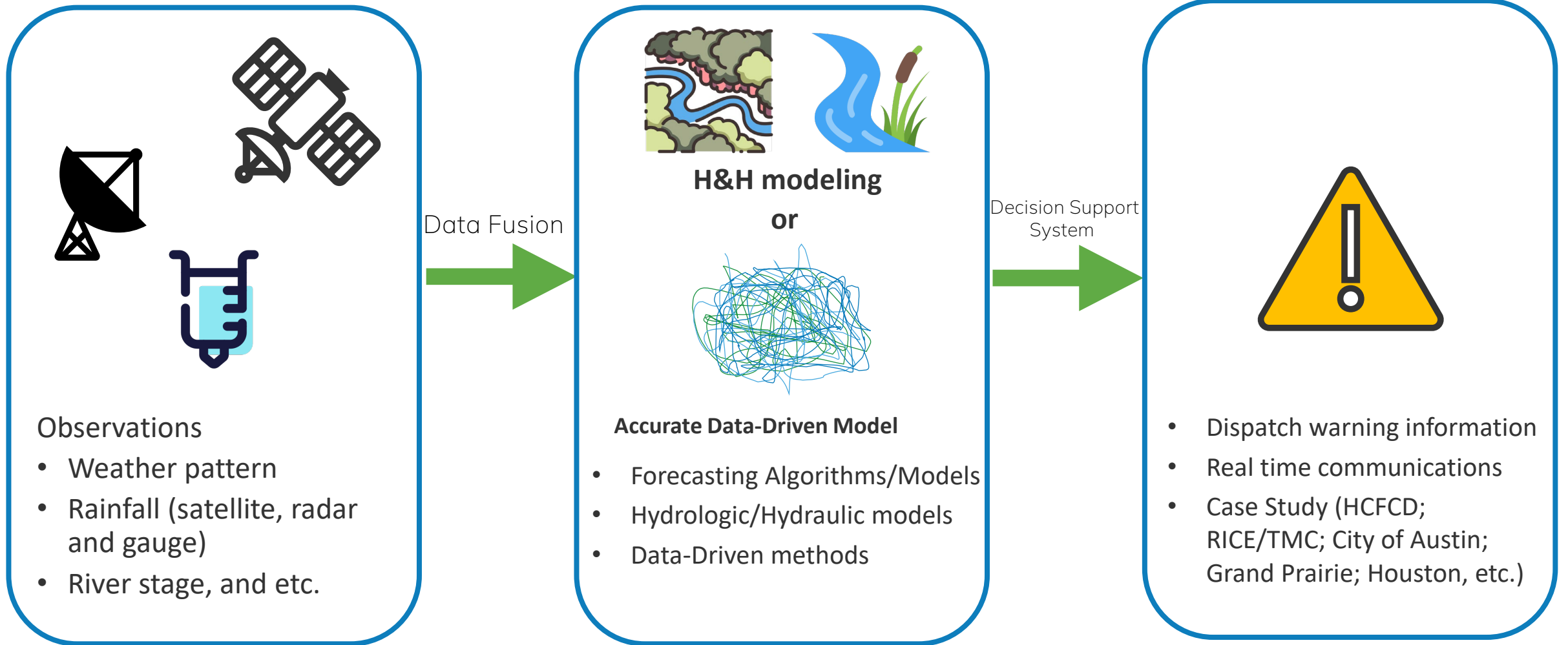
1D



2D

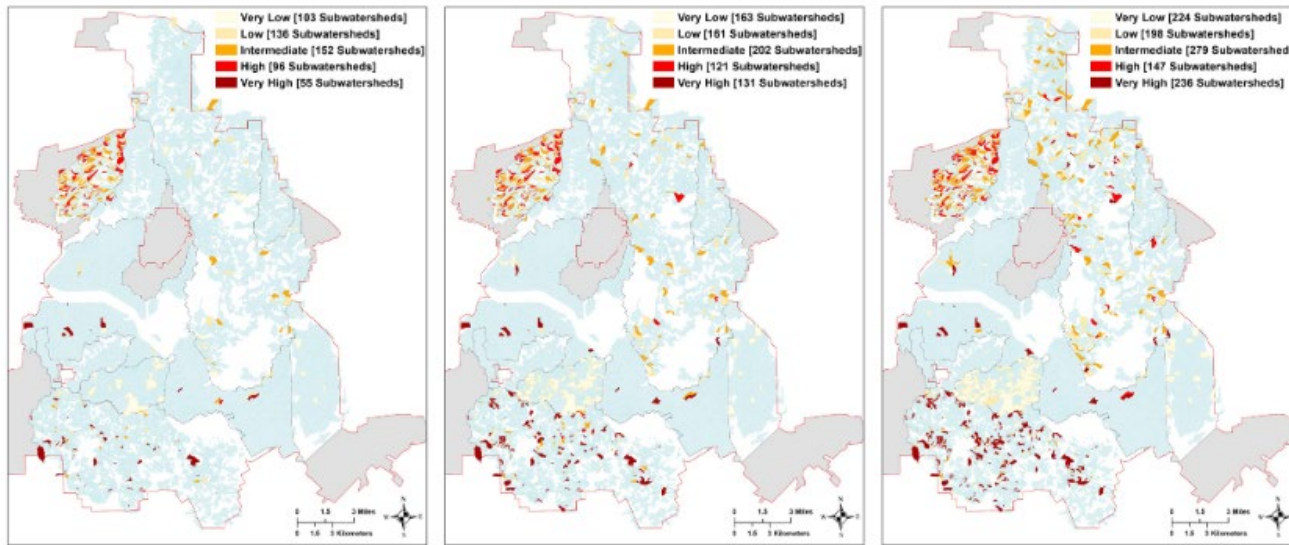


Flood ALERT System



Modeling Green Stormwater Infrastructure

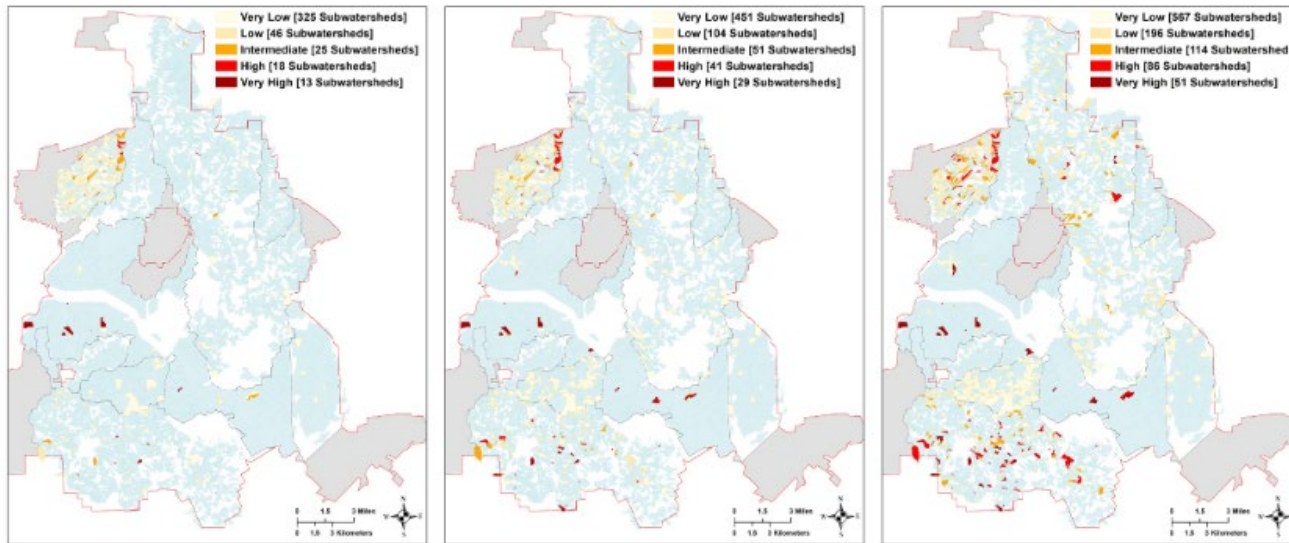
- GSI reduces modeled overflows for all storms in Dallas study
- GSI 77% less costly than gray infrastructure alone
- Bioretention provides biggest bang for buck



2-year (50%)

10-year (10%)

100-year (1%)



Questions
and Discussion



integrating **Transportation**
& **Stormwater Infrastructure**

Contact



Susan Alvarez, P.E., CFM

Director
Environment & Development
North Central Texas Council of
Governments
817-704-5489
salvarez@nctcog.org



Matt Lepinski, P.E.

Lead Hydraulic Engineer
Water Resources Branch – Fort Worth
District
U.S. Army Corps of Engineers
817-886-1683
matthew.t.lepinski@usace.army.mil



Jeff Neal, PTP

Senior Program Manager
Transportation
North Central Texas Council of
Governments
817-608-2345
jneal@nctcog.org



Kate Zielke

Program Supervisor
Environment & Development
North Central Texas Council of
Governments
817-695-9227
kzielke@nctcog.org

USACE as a Technical Advisor

September 2023

Trinity River Common Vision Steering Committee

Matthew T. Lepinski, P.E.

Lead Hydraulic Engineer, Water Resources

US Army Corps of Engineers

Fort Worth District



North Central Texas
Council of Governments
Environment & Development



Overview

- ▶ **What?** The Fort Worth District Water Resources Branch serves as a technical advisor & source of funding assistance to our local, state & federal partners
- ▶ **Why?** Aligns with USACE mission and vision of collaborative engineering solutions

- ▶ **Discussion Topics:**

- ▶ Historical and Extreme Flooding
- ▶ Trinity River Common Vision Program
 - ▶ Support to Flood Management Task Force
 - ▶ Role as Technical Advisor
- ▶ Funding Assistance to Communities
- ▶ Water Management
- ▶ Trinity Operations Study
- ▶ **Precipitation:** Texas Storm Study
- ▶ **Hydraulics:** Base Level Engineering
- ▶ **Hydrology:** Watershed Hydrology Assessments
- ▶ **Other Scenarios:** Regional Storm Shifting
- ▶ **Using the Data:** Community Flood Assessments

- ▶ **Outcome:**

- ▶ Innovative resources, data, and support to enable community awareness and resiliency against flooding
- ▶ **Enables taking action and setting policy**

USACE MISSION: Deliver vital engineering solutions, in collaboration with our partners, to secure our Nation, energize our economy, and reduce disaster risk

USACE VISION: Engineering solutions for our Nation's toughest challenges

Historical Flooding



Sources: Aerial View of Flood in Fort Worth in 1949, photograph, May 17, 1949; (<https://texashistory.unt.edu/ark:/67531/metaph40670/>: University of North Texas Libraries, The Portal to Texas History, <https://texashistory.unt.edu> ; Lockheed Martin Aeronautics Company, Fort Worth.

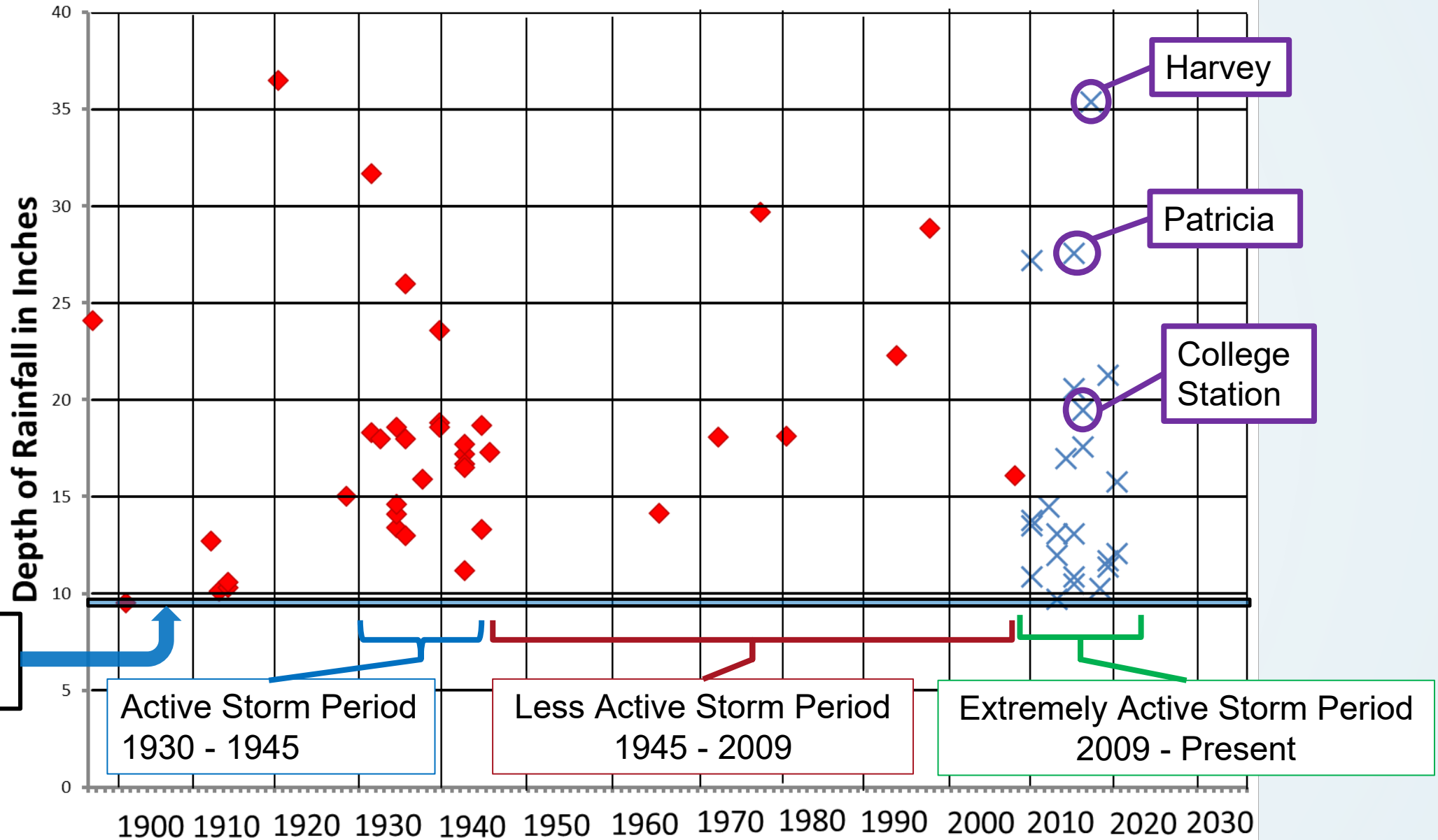


Sources: Flooded Area of Stores and Homes Near Downtown Fort Worth During Flood of 1949; <https://texashistory.unt.edu/ark:/67531/metaph27965/>: University of North Texas Libraries, The Portal to Texas History, <https://texashistory.unt.edu>; Tarrant County College NE, Heritage Room

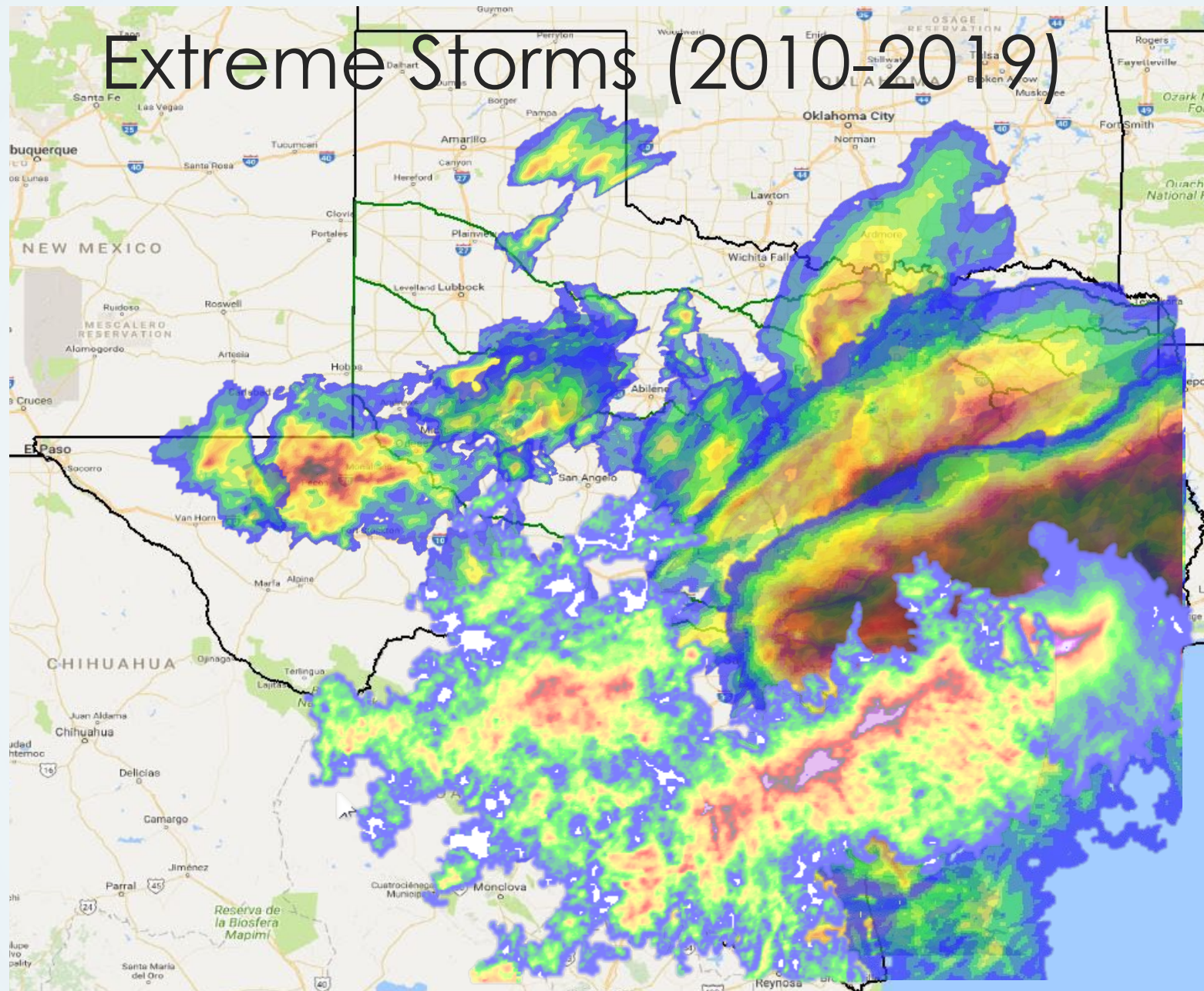
Fort Worth – April 1922 (11” of rain in 2 days) and May 1949 (~11” of rain overnight):

- Levees breached, dozens of deaths & millions in damages
- *Motivated countywide effort to prevent further flooding and provide adequate water supply.*
- *Resulted in extensive improvements to flood control infrastructure*
 - Water District (established in 1924)
 - USACE Fort Worth District (established in 1950)

24 Hour Rainfall Total

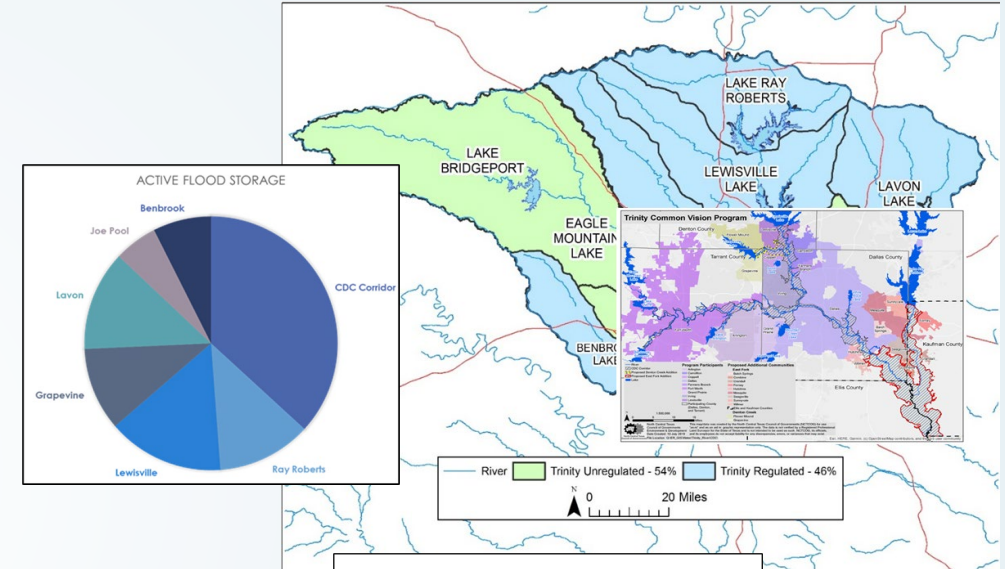


Extreme Storms (2010-2019)



Trinity River Common Vision Program

- Administered by NCTCOG
- Supported by communities along Trinity River Corridor
- Innovative and proactive regional floodplain management program
- Resources
 - Flood Management Task Force (FMTF)
 - Steering Committee
 - Technical advice and reviews – USACE
- Goals
 - Oversight
 - Reduced community risk
 - Increase resources, funding, personnel
 - Bring 160+ communities together
- Status
 - More communities joining
 - Many spinoff programs
 - Tools, analysis and data



North Central Texas Council of Governments

Regionally Recommended Standards in Watershed Management For New Development Within County Regulated Areas

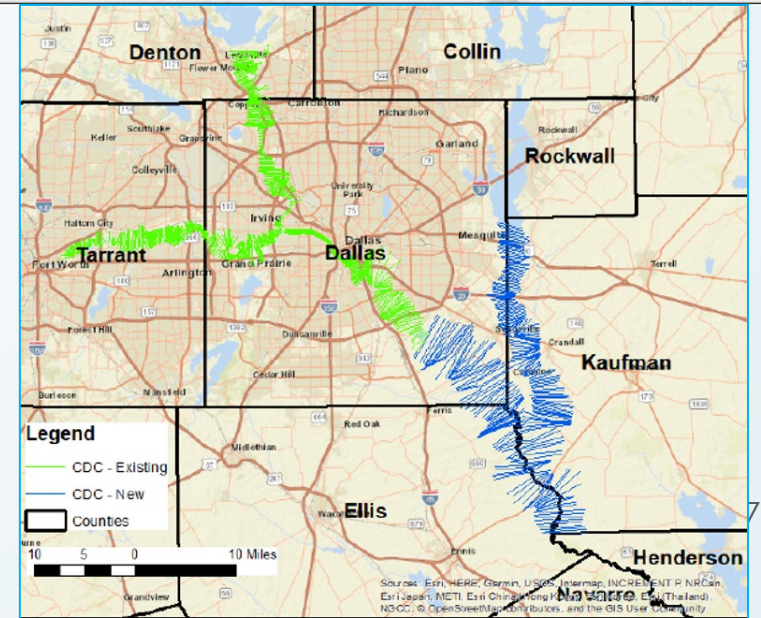
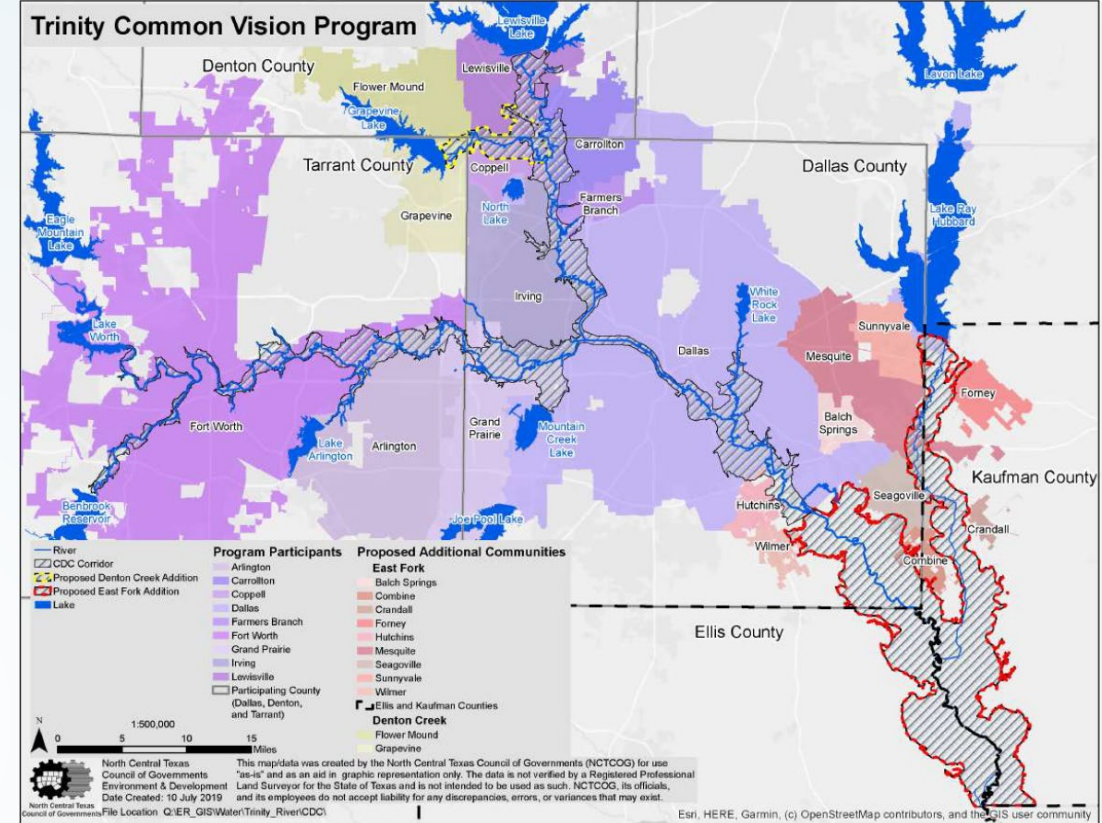
1. Design infrastructure to fully developed conditions with approved land-use maps if data is available
2. Begin protection at the most upstream end of the watershed above Federal Emergency Management Agency Limit of Detail Study
3. Maintain unfilled valley storage areas
4. Protect against and reduce erosive velocities
5. Match pre-developed site runoff
6. Verify/require adequate downstream conveyance
7. Require freeboard from fully developed (if data is available) and changing watershed conditions
8. Define written operation and maintenance responsibilities
9. Size conveyance of street and storm systems adequately to safely convey traffic
10. Create stream buffers and preserve open space; limit clearing and grading
11. Consider regional (on or off stream) detention incentives
12. Implement Conservation and/or Cluster Development incentives
13. Encouraging low impact development techniques and/or green infrastructure

These Regionally Recommended Standards in Watershed Management were developed by the North Central Texas Countywide Watershed Management Roundtable held on March 14, 2017



Support to Flood Management Task Force

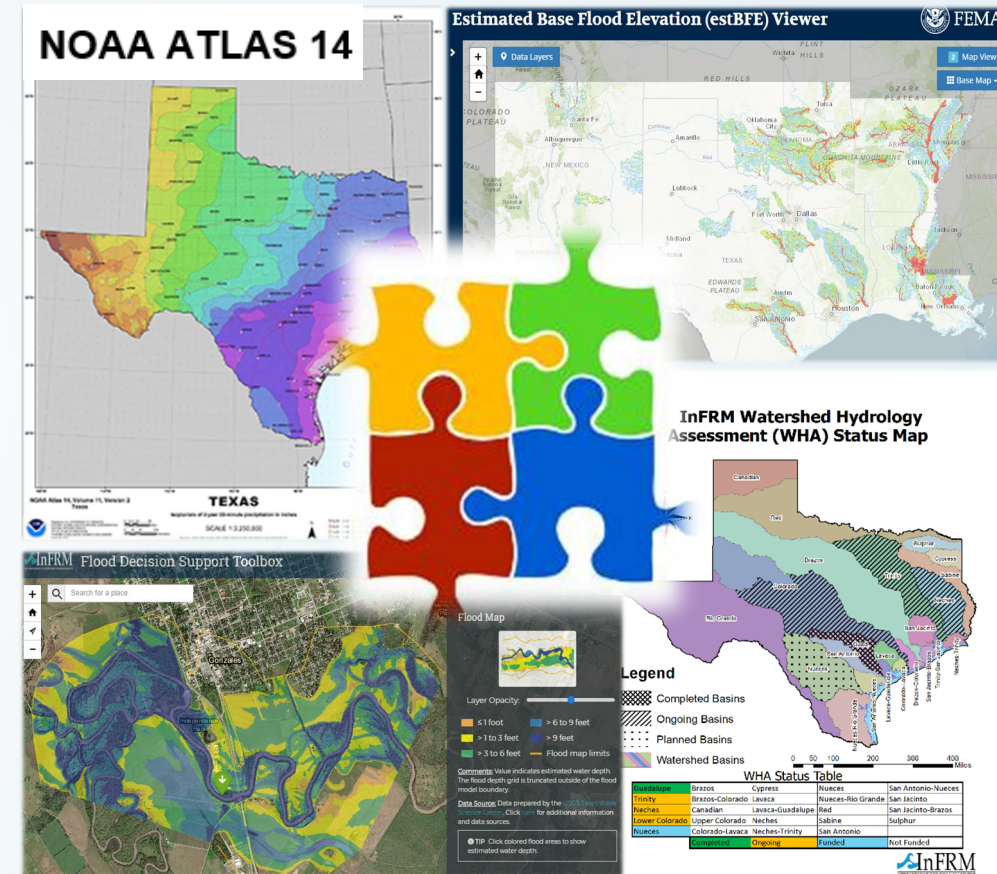
- ▶ **What?** Serve as a technical advisor to FMTF for flooding-related questions and initiatives.
 - ▶ **Example:** helped create first-ever consolidated National Flood Insurance Program (NFIP) and Corridor Development Certificate (CDC) model
 - ▶ Culmination of over \$2.5 million in Federal contributions spent
 - ▶ Update of geo-referenced and consolidated Upper Trinity NFIP-CDC model
 - ▶ Trinity Main Stem and East Fork Trinity CDC model extension
 - ▶ Assisting updates to NFIP-CDC manual
- ▶ **Why?**
 - ▶ Innovative support helps inform and stabilize flood risk during development
 - ▶ Regulating development to future conditions vs. today's
- ▶ **Result:**
 - ▶ Tailored and consistent support
 - ▶ Collaborative, authoritative, and best available flood risk information along Upper Trinity River





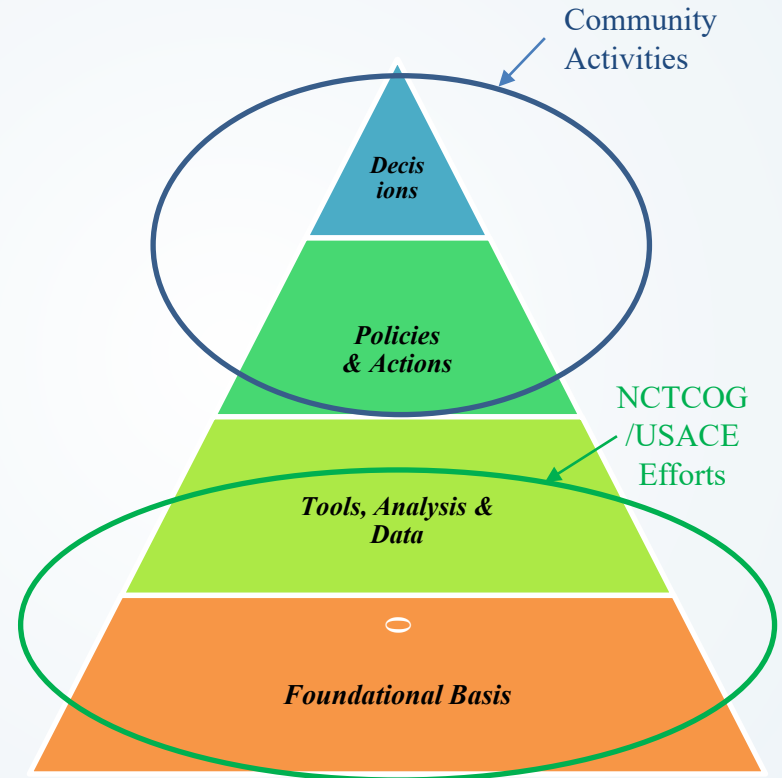
Role as Technical Advisor

- ▶ **What?** Technical advisor for many local, state, and federal activities, providing:
 - ▶ Support to Upper Trinity FMTF, Regional/State Flood Planning Effort, State/Federal, and other flood mitigation initiatives
 - ▶ Interagency Flood Risk Management (InFRM): www.InFRM.US
 - ▶ National & regional resources (planners, program managers, scientist & engineers): leverage expertise for Transportation and Stormwater Integration (TSI) effort
 - ▶ Guidance for regional flood risk management modeling and analysis
 - ▶ Industry standard software/applications for water resources analysis (HEC, RiverWare) & models for Texas
 - ▶ Preparedness and resiliency tools and initiatives (storm shifts, FIA & LifeSim)
 - ▶ Real-time flood forecasting and inundation mapping (CWMS & RTS)
 - ▶ Involved in various compliance programs (Section 404, Section 10, Section 408)
- ▶ **Why?** Uniquely postured to serve as technical expert, data & information supplier, and provider of valuable tools/resources and analysis
- ▶ **Outcome:**
 - ▶ Saving citizens across Texas billions of \$'s and providing innovative and non-regulatory resources for flood risk reduction, while establishing a high-quality reputation with partners





Common Vision - Flood Risk Products and Uses

- ▶ Historical knowledge (30+ year program)
- ▶ Latest data and analysis
- ▶ Tools with state-of-the-art technologies
- ▶ Planning/preparedness/response
- ▶ Scenario planning
- ▶ Emergency response (real-time mapping)
- ▶ Environmental
- ▶ Communities have an opportunity to better understand flood risk, not just the 100-year
- ▶ Communities can take actions and shift policy
- ▶ Can be leveraged for other purposes



USACE as a Technical Advisor

- 
Meteorology
 • How much rain
- 
Watershed Hydrology
 • How much runoff
- 
River Hydraulics
 • How deep will the water get
- 
Consequences
 • Critical infrastructure
 • Homes, Businesses, Hospitals



Funding Assistance to Communities

- ▶ **What?** Annual reoccurring appropriations
 - ▶ Continuing Authorities Program (CAP), all require cost sharing, <https://www.swd.usace.army.mil/About/Directorates--Offices/ProgramsOffices/Programs--Directorate/PlanningDirectorate/Planning--Division/CAP/Division/CAP/>
 - ▶ Should meet USACE analysis and modeling standards as well as utilize USACE approved applications
 - ▶ Section 14 Emergency Streambank and Shoreline Protection: < \$5M federal
 - ▶ Section 103 Coastal Hurricane and Storm Damage Reduction Projects: < \$5M federal
 - ▶ Section 107 Navigation Improvements Project: < \$10M federal
 - ▶ Section 111 Restoration Related to Federal Navigation: < 10M federal
 - ▶ Section 204 Regional Sediment Management: < \$10M federal
 - ▶ Section 205 Flood Protection Projects: <\$10M federal
 - ▶ Section 206 & 1135 Aquatic Ecosystems and Environmental Restoration Projects (non--USACE and USACE areas): < \$10M federal
 - ▶ Section 208 Channel Clearing for Flood Reduction: <\$500k federal
 - ▶ Planning Assistance to States (PAS) Planning Assistance to States (PAS) – funding for a broad range of studies from flooding to water availability (cost sharing)
 - ▶ Flood Plain Management Services (FPMS) - assists communities with floodplain related studies (cost share or reimbursable)
 - ▶ Silver Jackets – Federal, state and local collaboration for flood risk reduction
- ▶ **Why?** Funding assistance to enable community resiliency
- ▶ **Outcome:** Designed and constructed billions of \$'s in statewide flood damage reduction projects, including coastal



Water Management

US Army Corps of Engineers (USACE) Dam Operations

What?

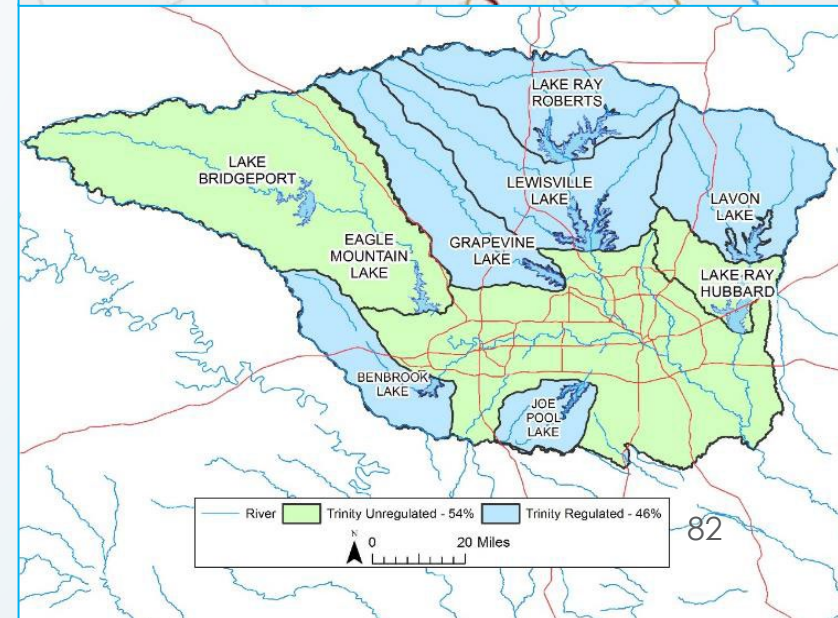
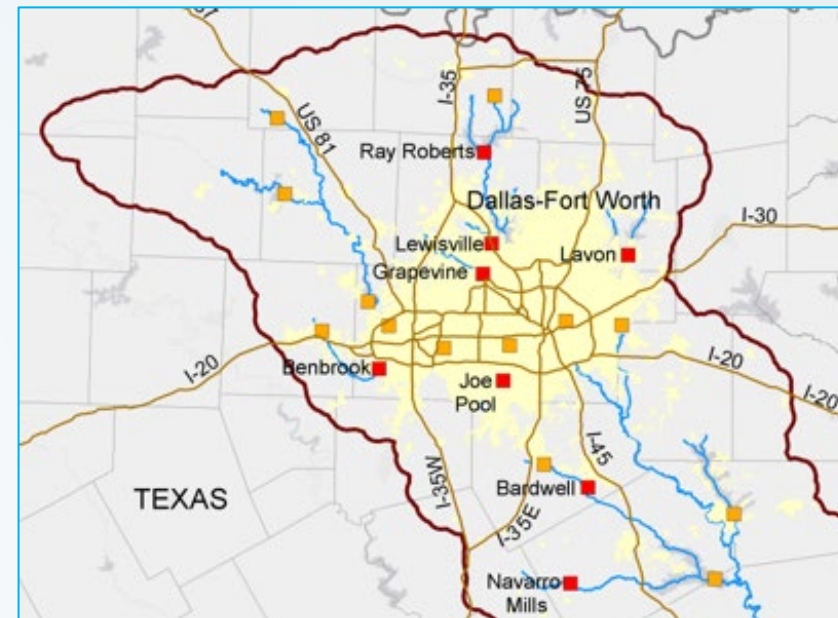
- Operates 29 multipurpose reservoirs
 - 6 for DFW area
- Helps maintain safe river conditions for impacted areas regulated by dams
- Reservoirs establish and maintain river conditions in 7 river systems
 - Supplies 60% of water for DFW Metroplex
- Funding partner for the network of stream and precipitation gages across the state

Why?

- Flood risk management, water supply, environmental, and recreation

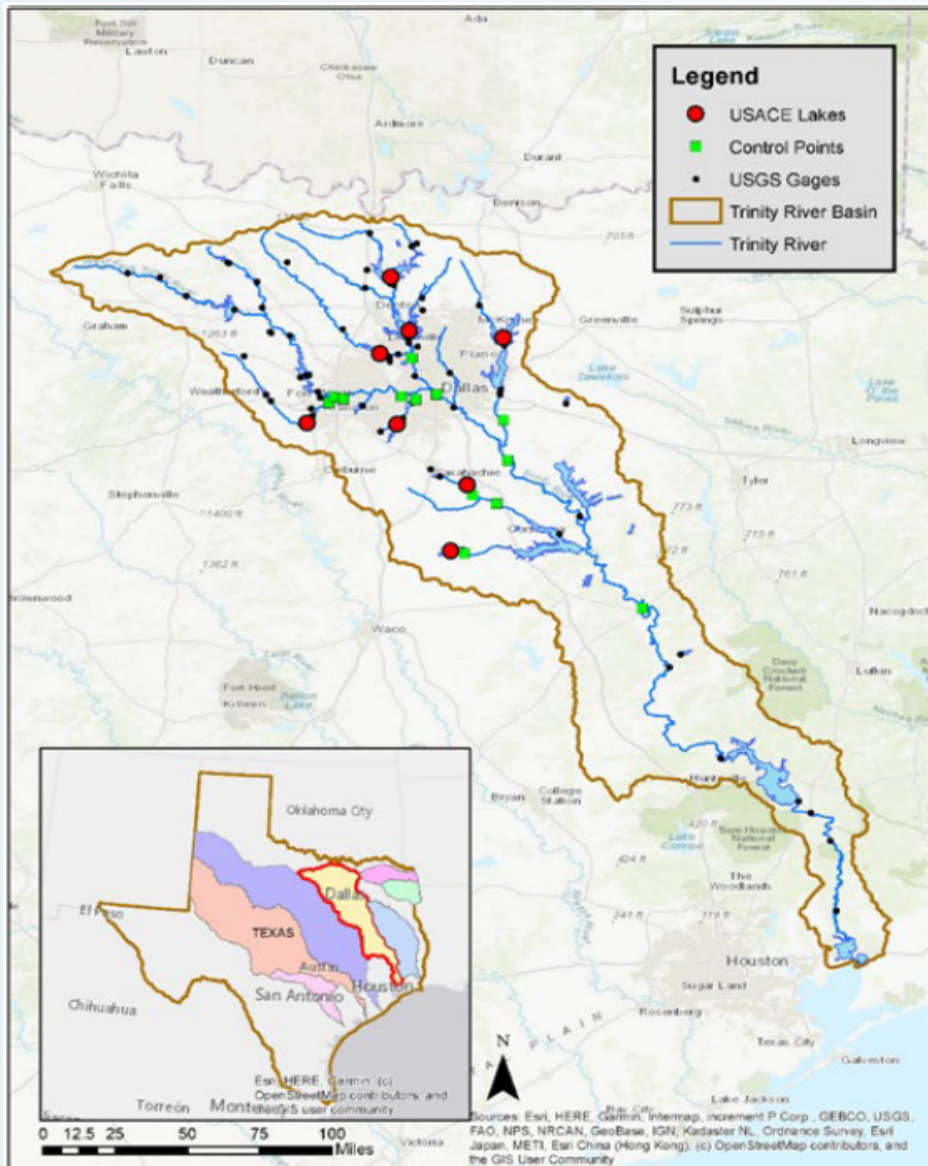
Outcome:

- Reduces disaster risk
- \$100B+ damages prevented





Trinity Operations Study



PURPOSE AND SCOPE

- Ground up approach to identify flexible USACE reservoir operation plans to better serve the reservoir’s authorized purposes and stakeholders.
- Several phases including an Outreach and Planning Phase, Modeling and Analysis Phase(s), and Water Control Manual codification.
- The goal of the project will be to understand system weaknesses and maximize flood damage reduction and water supply benefits by re-evaluating the Reservoir Operation Plans stated in the Water Control Manuals.

Current Stakeholder Study Partners

- City of Dallas
- City of Denton
- City of Grapevine
- Dallas County Park Cities MUD
- NCTCOG
- North Texas Municipal Water District
- Tarrant Regional Water District
- Trinity River Authority
- Upper Trinity Regional Water District
- Looking for more!
- Contact USACE

Scope of Work

- SOW still under development. Possible tasks that are under consideration include:
 - Control Point Flow Investigation
 - Seasonal Rule Curve Analysis
 - Environmental Low Flow Analysis
 - FIRO Analysis/Water Supply Resiliency

SCHEDULE & BUDGET

- Fall 2023 – Fall 2026
- \$400,000



Maxwell Strickler, P.H., CFM

US Army Corps of Engineers

Lead Civil Engineer
Water Management Section
(817) 886-1541 TEL

Maxwell.R.Strickler@usace.army.mil

U.S. Army Corps of Engineers
Fort Worth District (SWF)
819 Taylor Street
Fort Worth, TX 76102



Precipitation: NOAA Atlas 14 & Texas Storm Study

► What?

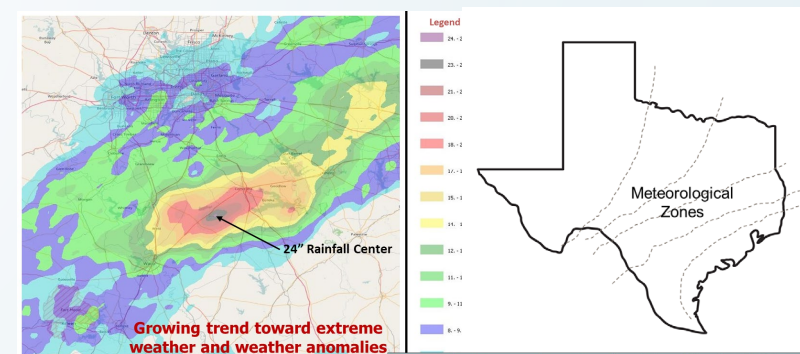
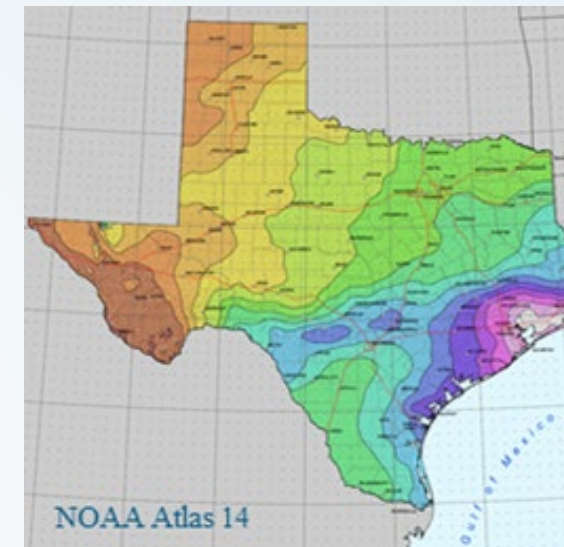
- **NOAA Atlas 14:** precipitation frequency estimates for designing, building and operating infrastructure to withstand the forces of heavy precipitation and floods.
- **Texas Storm Study:** Divide Texas into storm regions and develop a list (catalog) of applicable historical storms that would be appropriate for each of the geographic storm regions

► Why?

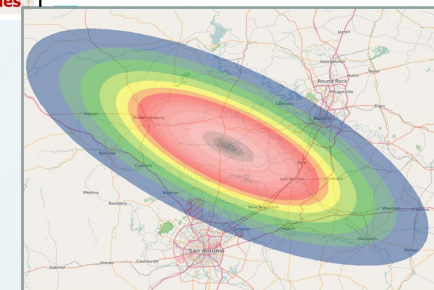
- **NOAA Atlas 14** precipitation frequency estimates are used by engineers and planners to bring knowledge of flood hazards into land use and development decisions, including managing and designing stormwater infrastructure
- **Texas Storm Study** results help make sense of what “design storms” are appropriate to use across Texas

► Outcome

- **NOAA Atlas 14** estimates represent vastly improved data in terms of both period of record and station density, statistical techniques, and spatial interpolation that accounts for variation in terrain
- **Texas Storm Study** documents parameters and a list of storms, based on region, that engineers and scientist can rely upon



Storm
Inventory





Hydraulics: Base Level Engineering (BLE)



➤ What?

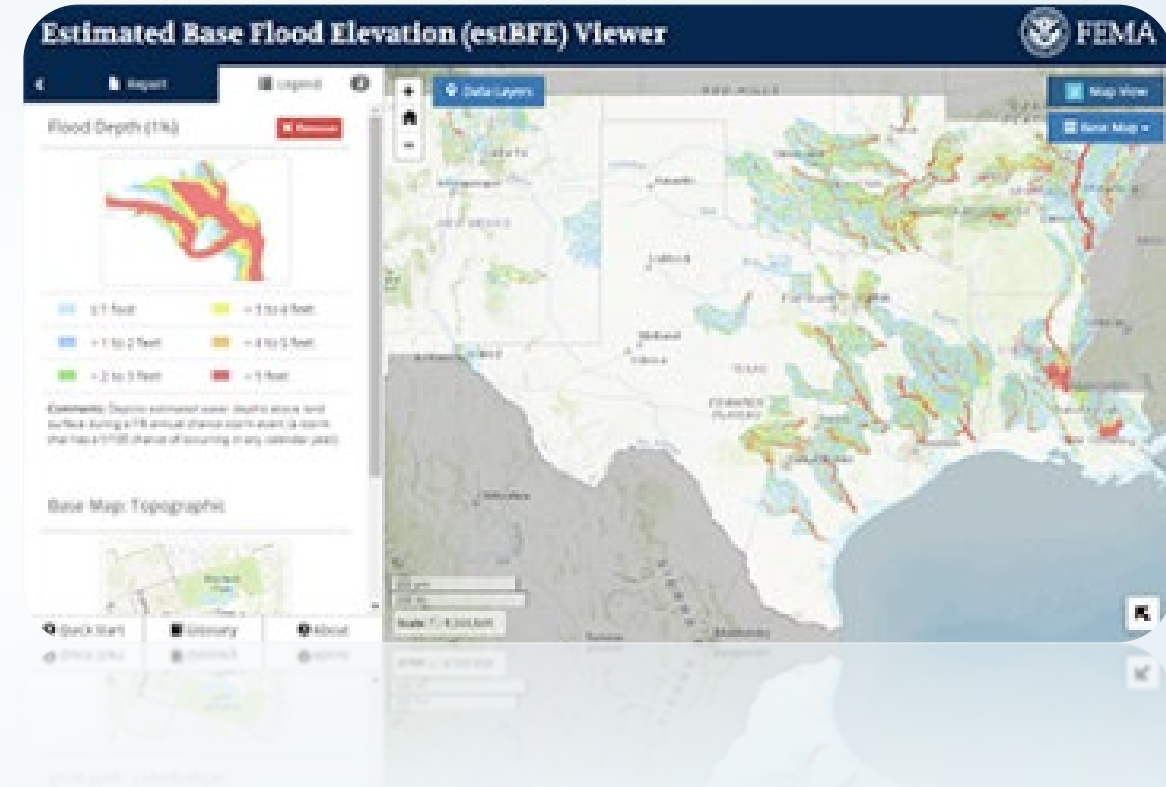
- Watershed-wide engineering modeling method that leverages high resolution ground elevation, automated model building techniques, and manual model review to prepare broad and accurate flood risk data.

➤ Why?

- Centralized and available flood hazard analysis to support floodplain management activities and development review, while increasing risk awareness for individuals.

➤ Outcome:

- Quickly determine the flood risk for various events throughout multiple watersheds at various recurrence intervals (i.e., 10yr, 100yr, 500yr).
- Allows Federal, State, and local governments, as well as individuals, to access and use flood risk information.



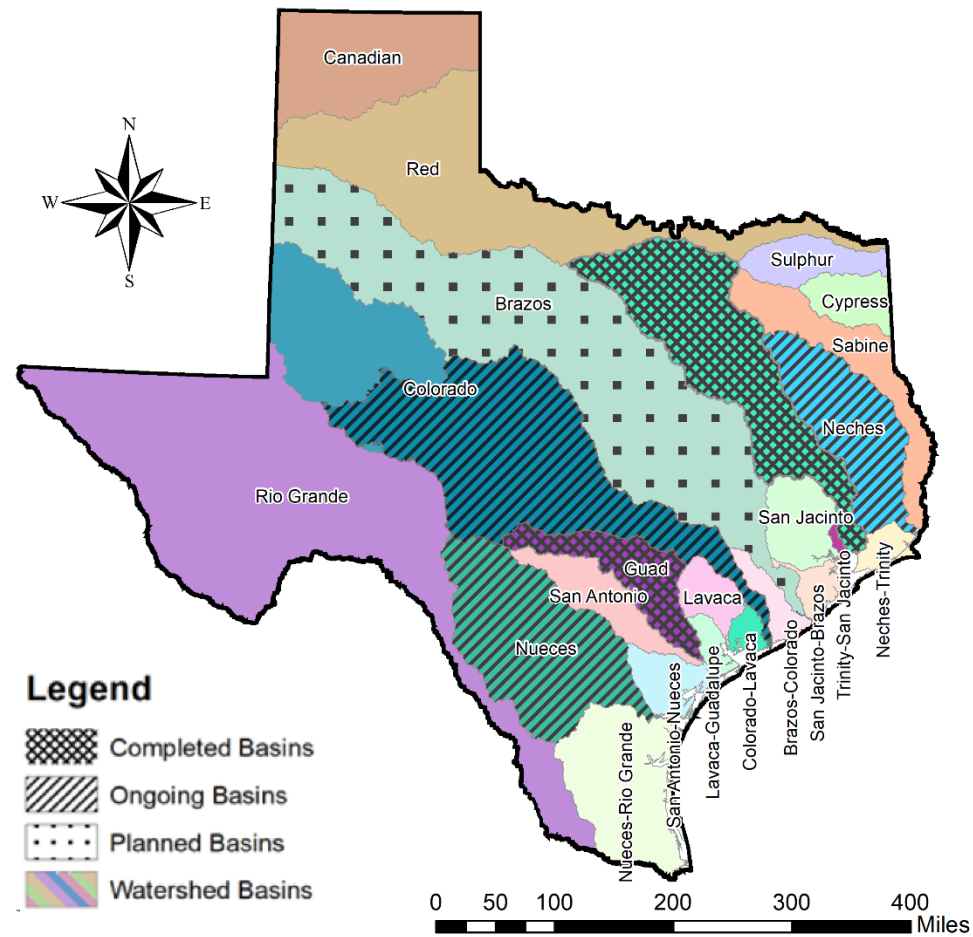
<https://webapps.usgs.gov/infrm/estBFE/>



Hydrology: Watershed Hydrology Assessment (WHA)

- ▶ **What?** Latest & state of the art best estimate for the potential of flooding
 - ▶ Hydrology study (i.e., determines how much water) for large rivers and streams
 - ▶ Data is incorporated into larger modeling efforts
 - ▶ Incorporates NOAA Atlas 14 point-precipitation rainfall totals
 - ▶ Accounts for regulated flow from dams
- ▶ **Why?**
 - ▶ Hydrology remains the single largest source of uncertainty in our understanding of flood risk
 - ▶ Available hydrology information is generally dated and obsolete
- ▶ **Outcome:**
 - ▶ WHA produce consistent 100-yr and other frequency flows across the river basin, based on all available hydrologic information
 - ▶ Provides design data and suggests areas where flood hazard information may need to be updated
 - ▶ **Trinity River Watershed Hydrology Assessment**
 - ▶ Objective: Recently completed high quality hydrology study of 700-mile-long Trinity River Basin (18,000 square miles)
 - ▶ Outcome: Innovative and quality information for use in regional flood studies

InFRM Watershed Hydrology Assessment (WHA) Status Map



WHA Status Table

Guadalupe	Brazos	Cypress	Red	San Jacinto
Trinity	Brazos-Colorado	Lavaca	Rio Grande	San Jacinto-Brazos
Neches	Canadian	Lavaca-Guadalupe	Sabine	Sulphur
Lower Colorado	Upper Colorado	Neches-Trinity	San Antonio	
Nueces	Colorado-Lavaca	Nueces-Rio Grande	San Antonio-Nueces	
	Completed	Ongoing	Funded	Not Funded



Other Scenarios: Regional Storm Shifting

What?

- Storm shifting to simulate the impact of actual regional storms if they occurred somewhere else
- Makes science of meteorology more **relatable**

Why? Questionable historic records and lack of safety factors

- A watershed may have experienced a disproportionate number of small or large historic rainfall events
- No factor of safety in Flood Risk Management

Outcome:

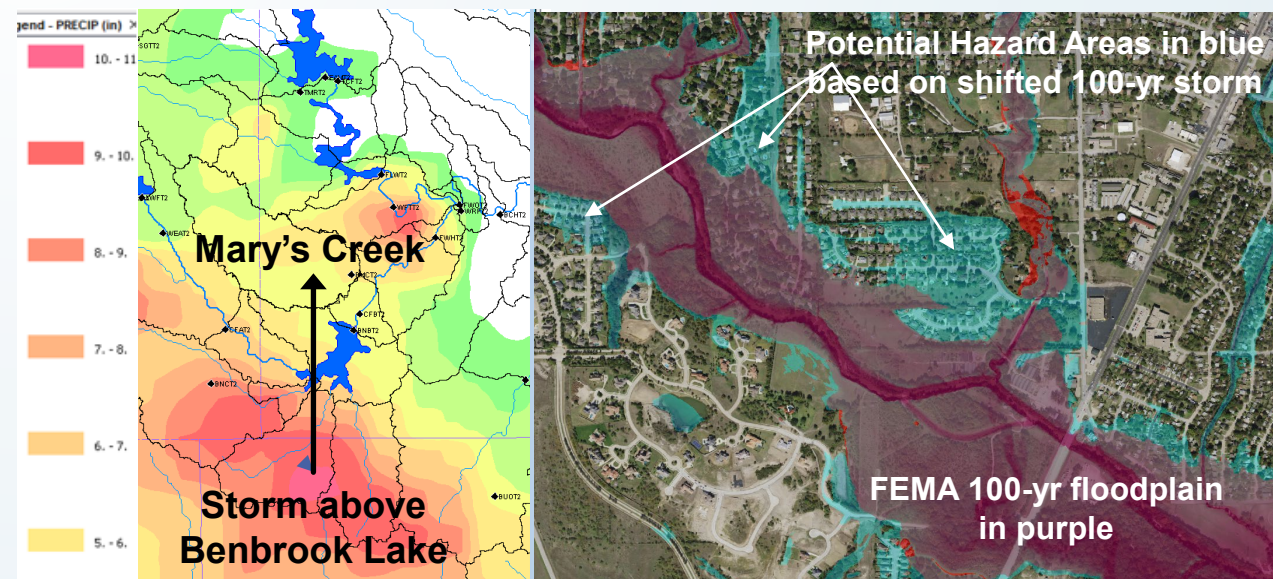
- Storm shifting provides informative, relatable, and non-regulatory data to help communities better understand and mitigate their flood risk
- Valuable non-regulatory planning and design guidance for more resilient communities
- Can be used in EM Action/Hazard Mitigation Plans

Dallas County, TX

- Objective:** Assist with community desire for data-driven information to inform implementing higher standards in local floodplain management and emergency preparedness/response
- Provides informative, relatable, and non-regulatory information to enable action (\$100,000 USACE & \$35,000 partner contributions)
- Outcome:** Collaborative & compelling results for several storms/scenarios. <https://www.nctcog.org/envir/watershed-management/storm-shifting>

Mary's Creek, DFW, TX

- Objective:** Address uncertainty associated with determination of flood potential
- Shifted 100-year± storm from June 2000 ~15 miles
- Outcome:** Flood potential is greater than previously understood

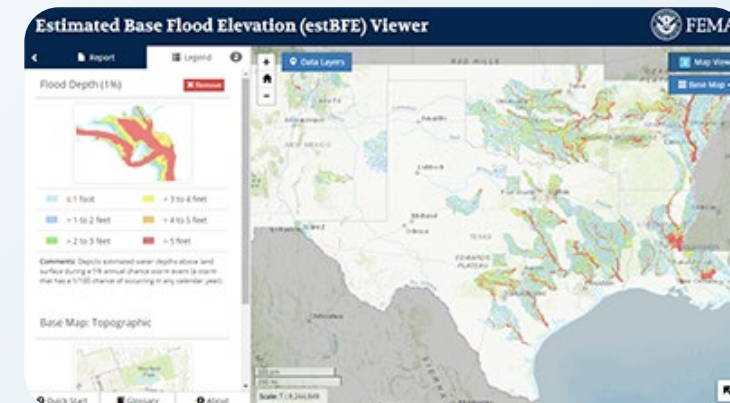
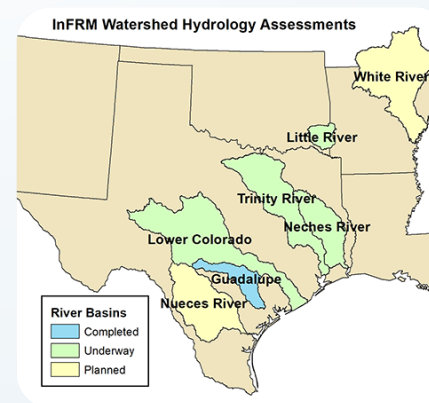
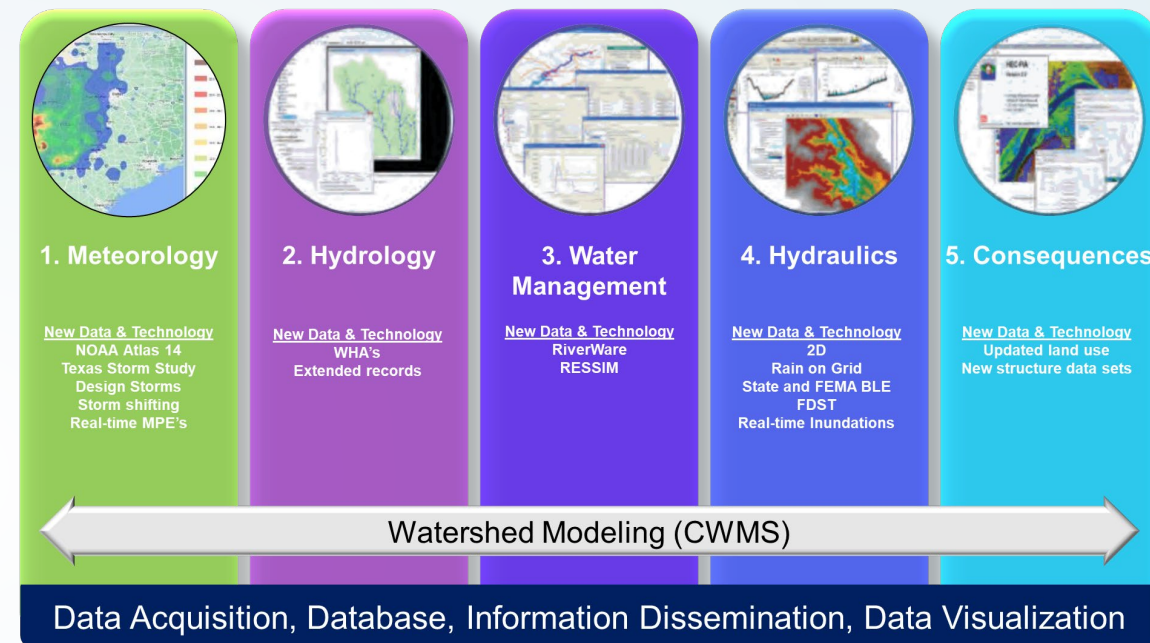




Using the Data: Community Flood Assessments



- ▶ **What?** Updates and enhancement of flood models
 - ▶ Leverage existing engineering information, including:
 - ▶ Precipitation: NOAA Atlas 14 and Texas Storm Study
 - ▶ Hydrology: Watershed Hydrology Assessment
 - ▶ Hydraulics: Base Level Engineering
 - ▶ Leverage land use and other available data
 - ▶ Refine and enhance as appropriate
 - ▶ Add/update hydraulic structures information (i.e., bridges, culverts, dams, etc.)
 - ▶ Add additional subbasins and other detail to hydrology model to create more flow data
 - ▶ Conduct regional storm shifting as additional relatable scenarios
- ▶ **Why?** To aid critical flood studies & emergency management, to inform development, & technological improvements
- ▶ **Outcome:**
 - ▶ Collaborative and enhanced flood models
 - ▶ Best available tools, analysis, and data with many flood risk awareness and resilience applications
 - ▶ Communities can take action and set policies related to flood risk





Questions & Contact



Matthew T. Lepinski, P.E.

Lead Hydraulic Engineer

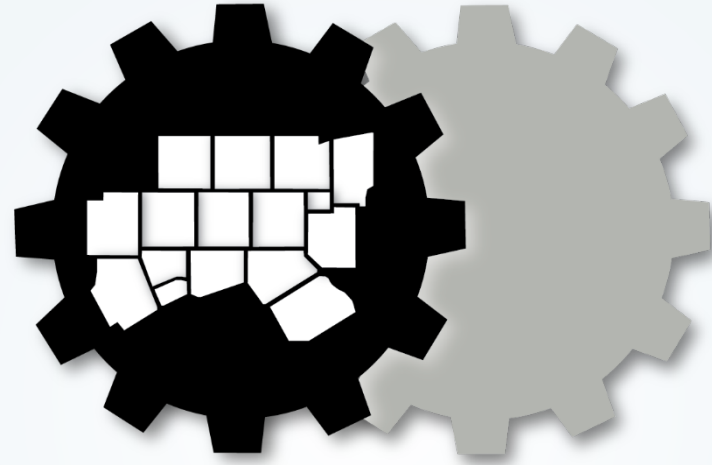
Water Resources Branch

U.S. Army Corps of Engineers

Matthew.T.Lepinski@usace.army.mil

817.886.1683





ROUNDTABLE



Upcoming Events & Meetings

- ▶ **24th Annual Public Works Roundup**
 - ▶ Friday, September 29 · 8:30am – 4:00pm
- ▶ **Floodplain Seminar for Elected Officials and Municipal Staff**
 - ▶ Thursday, October 19 · 9:30 – 11:30am
- ▶ **Transportation & Stormwater Infrastructure Technical Advisory Group Meeting**
 - ▶ TBD - October
- ▶ **28th L0273 Floodplain Management Course**
 - ▶ Monday, December 4 - 7 · 8:00am – 5:00pm
- ▶ **Certified Floodplain Manager Exam**
 - ▶ Friday, December 8 · 8:00am – 11am; 1 pm – 4pm



Contact

Jai-W Hayes-Jackson, CFM

Planner, Environment & Development

Jhayes-Jackson@nctcog.org

817-695-9212

Kate Zielke

Program Supervisor, Environment &
Development

KZielke@nctcog.org

817-695-9227

Sue Alvarez, P.E., CFM

Director, Environment & Development

Salvarez@nctcog.org

817-704-5489

Connect



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EandD@nctcog.org



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