

Countywide Watershed Management Roundtable

March 14, 2017

NCTCOG, Centerpoint II

Transportation Council Room

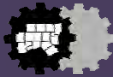
AGENDA

<u>Time</u>	<u>Topic</u>	<u>Speaker</u>
1:30p-1:45p	Welcome and Introductions	<i>Edith Marvin, PE NCTCOG E&D</i>
1:45p-2:00p	Summary of County Survey Results	<i>Mia Brown, CFM NCTCOG E&D</i>
2:00p-2:15p	National Flood Insurance Program Standards and the Regulatory Status of the Region	<i>Jessica Baker, PE, CFM, PMP TFMA/Halff Associates</i>
2:15p-2:45p	The Benefit of Higher Standards	<i>Jerry Cotter, PE USACE Chief Water Resources</i>
2:45p-3:00p	Stormwater and Transportation Infrastructure Nexus	<i>Dan Kessler, NCTCOG Transportation Department</i>
3:00-3:30p	Legislation and Tools for Counties	<i>John Ivey, PE, CFM</i>
3:30p-4:30p	Roundtable Discussion on Preferred Regional County Standards	<i>Led by Edith Marvin and Mia Brown</i>
4:30p	Next Steps/Wrap Up	<i>Edith Marvin, PE NCTCOG E&D</i>

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

If you plan to attend this public meeting and you have a disability that requires special arrangements at the meeting, please contact Mia Brown by phone at (817) 695-9227 or by email at mbrown@nctcog.org 72 hours in advance of the meeting. Reasonable accommodations will be made to assist your needs.

Countywide Watershed Management Survey Responses

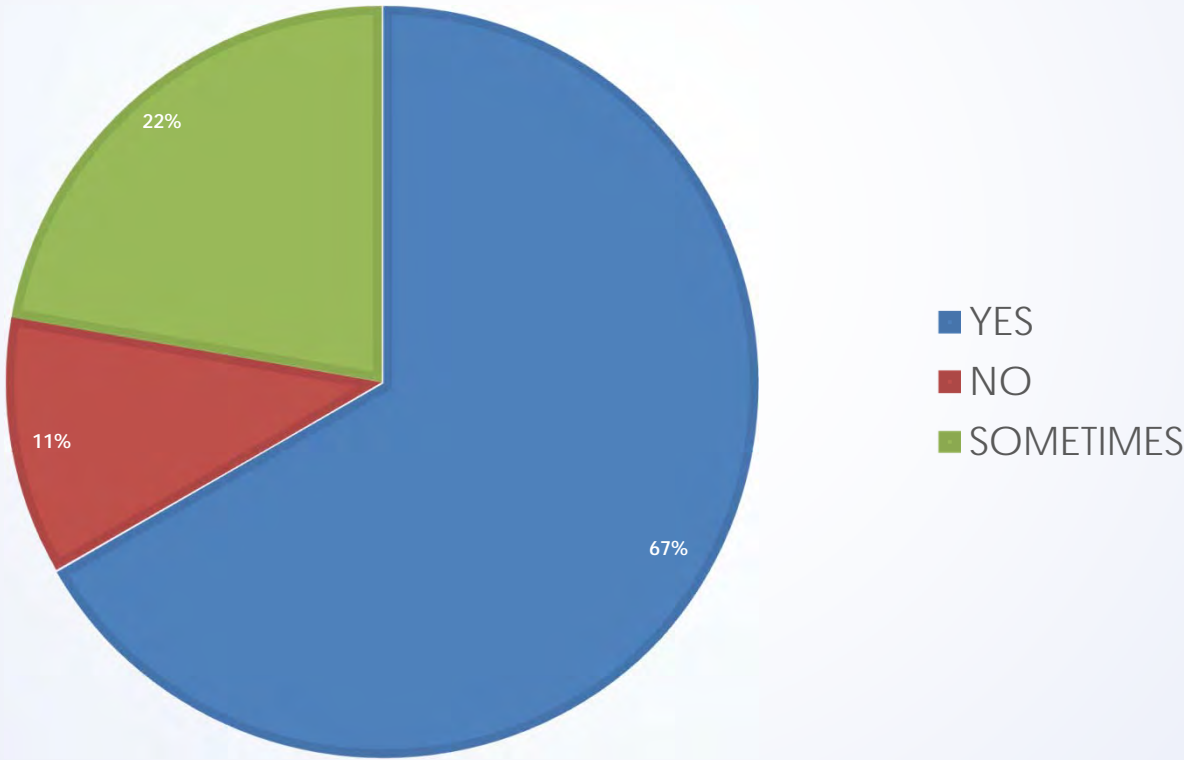


North Central Texas
Council of Governments
Environment & Development

Thank You To Our Survey Respondents!

- ▶ Collin County
- ▶ Dallas County
- ▶ Denton County
- ▶ Ellis County
- ▶ Kaufman County
- ▶ Navarro County
- ▶ Palo Pinto County
- ▶ Tarrant County
- ▶ Wise County

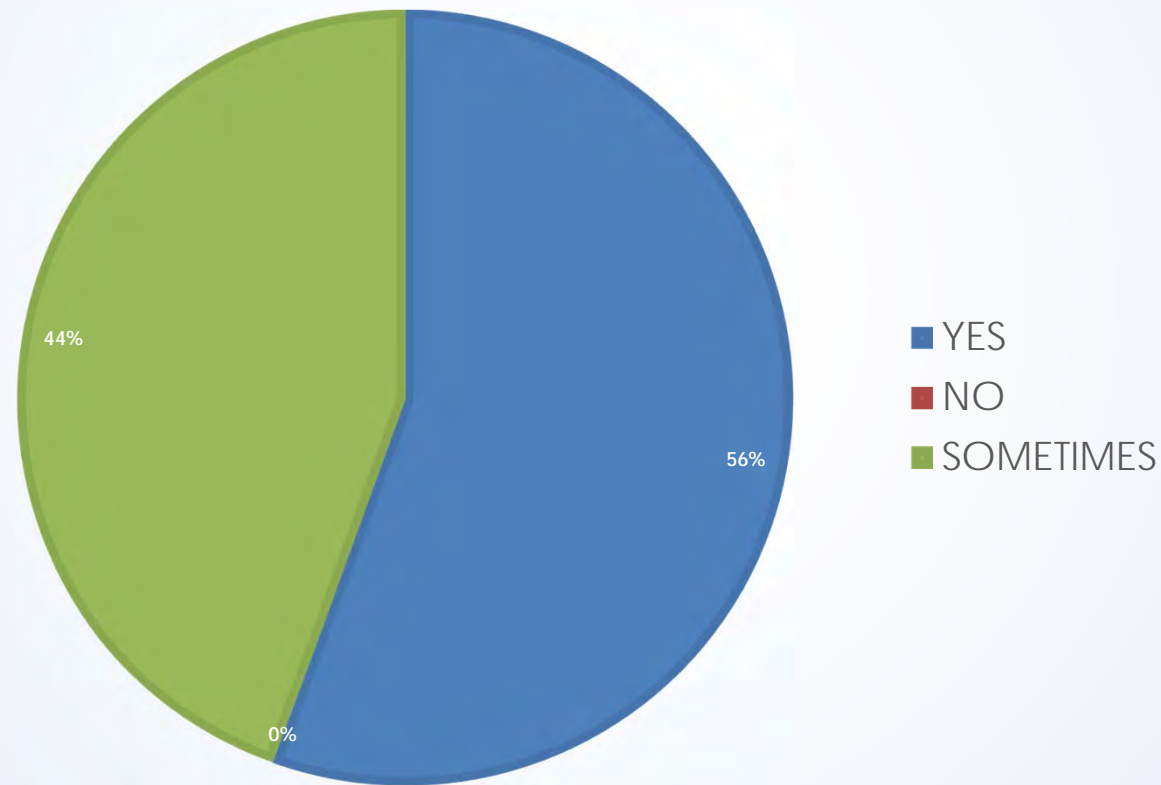
1. Do you require developments (individual and/or multi-lot) to submit plans for permitting to determine compliance with your regulations?



1. Responses

- ▶ Yes. We issue floodplain permits for all residential and commercial developments in the County. We require a more extensive design for commercial or multi-lot residential than for single lot residential.
- ▶ Depends on floodplain, type of development, platting required, etc. Long story short, we are limited by our authority and we can only regulate what the State allows us to regulate (floodplains, driveways, utilities, salvage yards, sexually oriented business, etc.)

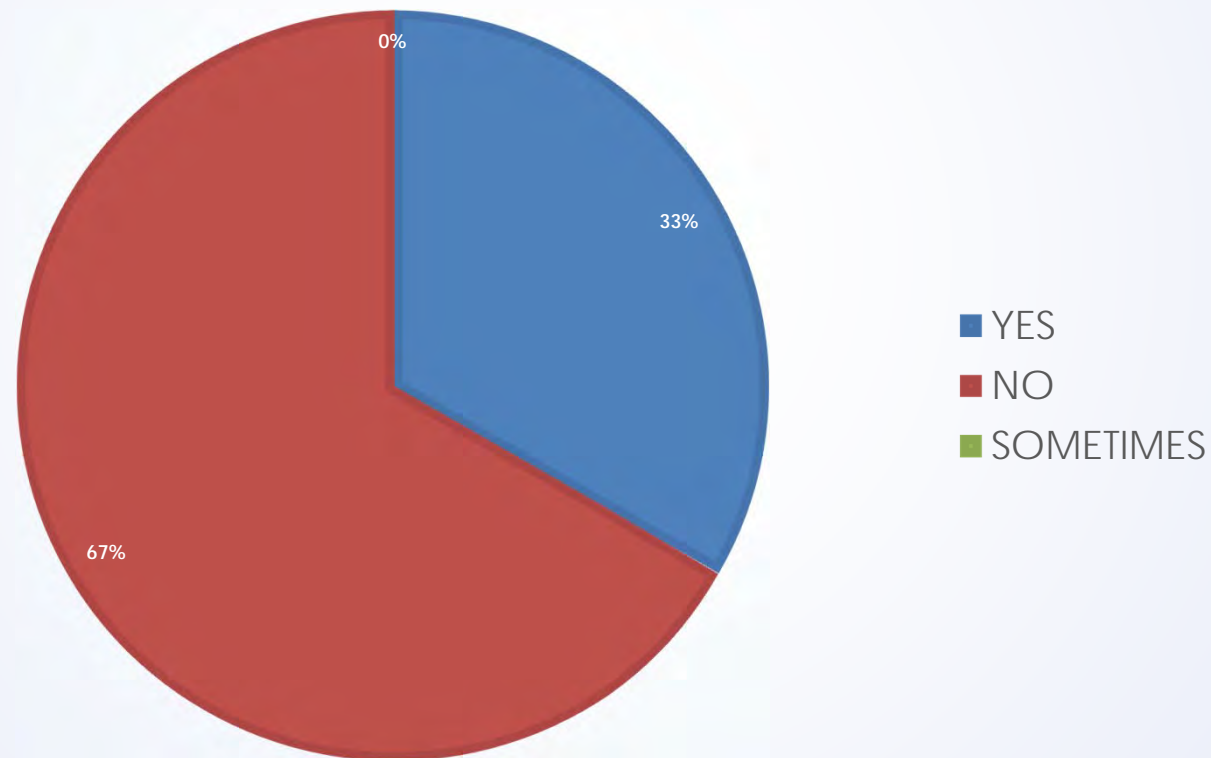
2. Do you regulate cities' ETJ areas within your county process for development permitting?



2. Responses

- ▶ Again, it depends on the agreements with each City.
- ▶ Development permitting, yes. Platting, no.
- ▶ Yes, when notified by courtesy review.

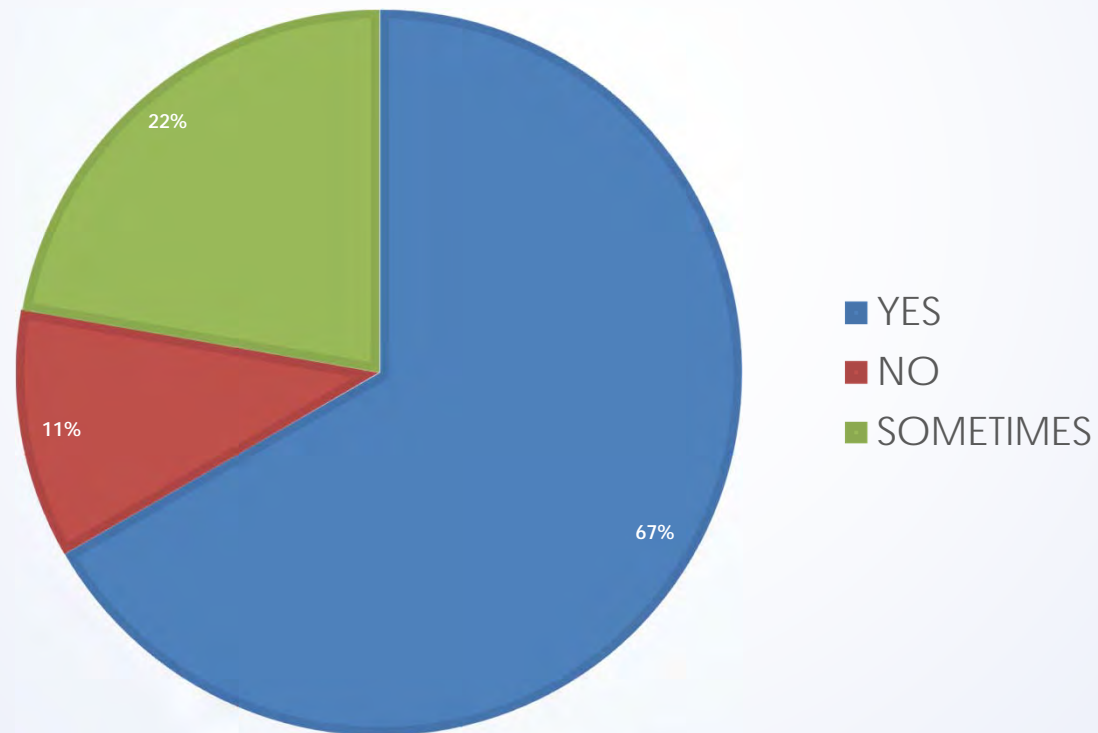
3. Do you currently only regulate to FEMA's minimum standards and established mapping when permitting development?



3. Responses

- ▶ We regulate BFE +1. However, we follow FEMA's map.
- ▶ Yes, only to FEMA. I have contacted Austin for advice on a recent development.
- ▶ No. Also have the County flood prevention ordinance
- ▶ We regulate above FEMA minimum relative to freeboard (2 feet above the BFE).
- ▶ No-we exceed the minimum requirements with higher freeboard and no adverse impacts on development

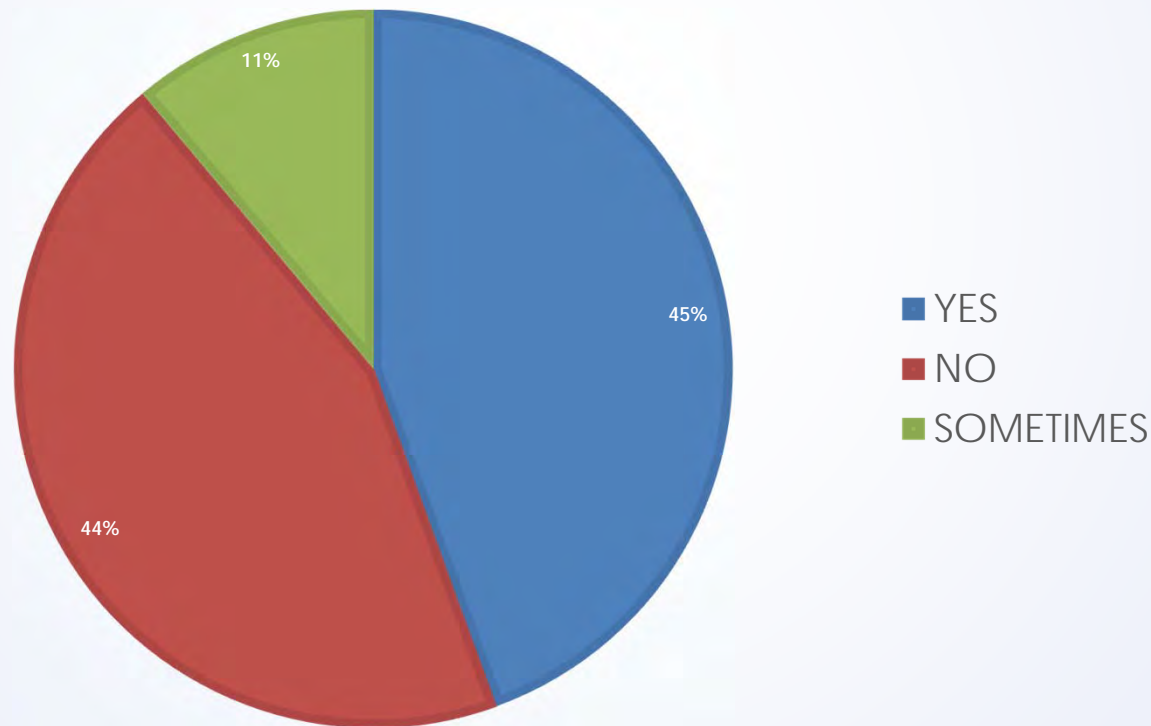
4. New development may increase runoff and adversely impact downstream properties. Do you require developers' engineers to determine pre and post development condition discharges?



4. Responses

- ▶ Yes, no more than 0.10' change in BFE
- ▶ We require most commercial projects to submit pre and post development conditions as well as any multi-lot residential subdivisions.

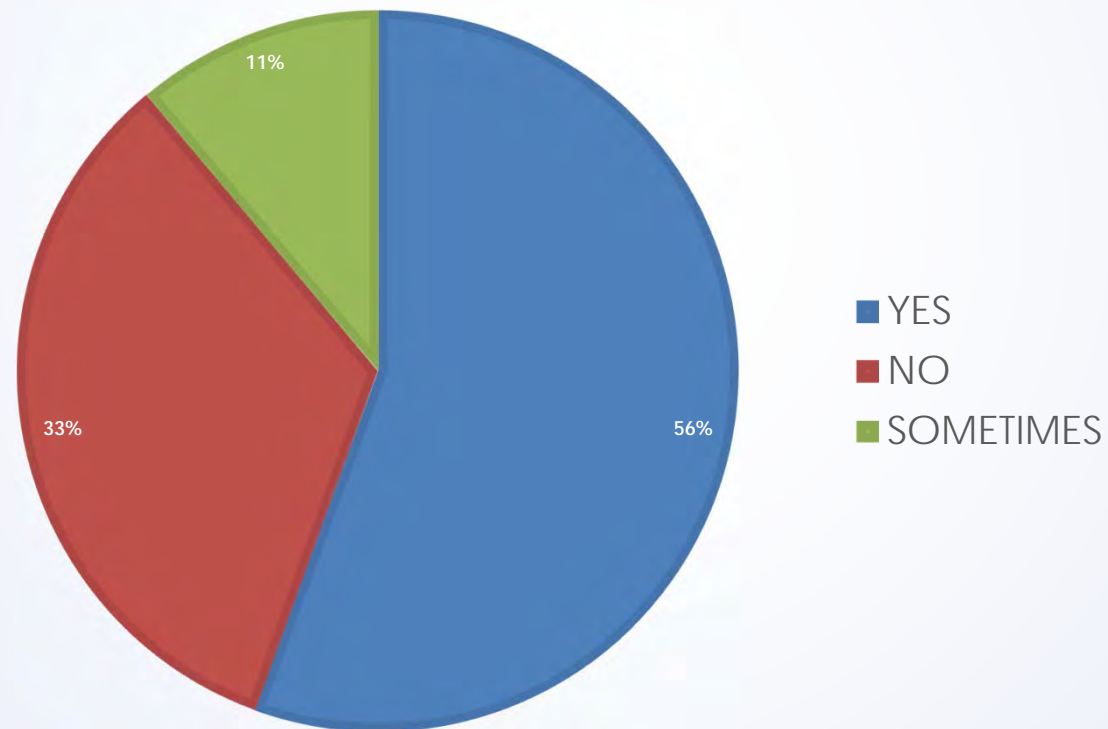
5. Do you require evaluation of a proposed development's impacts on downstream conveyance capacity? If so, do you require the developer to mitigate those impacts with detention or other measures?



5. Responses

- ▶ Yes... in this case we only require what the minimum standards are within FEMA's regulations

6. Do you require utilization of fully developed watershed flows (per adopted land use plans or zoning maps) for designs and development permits when that information is available?

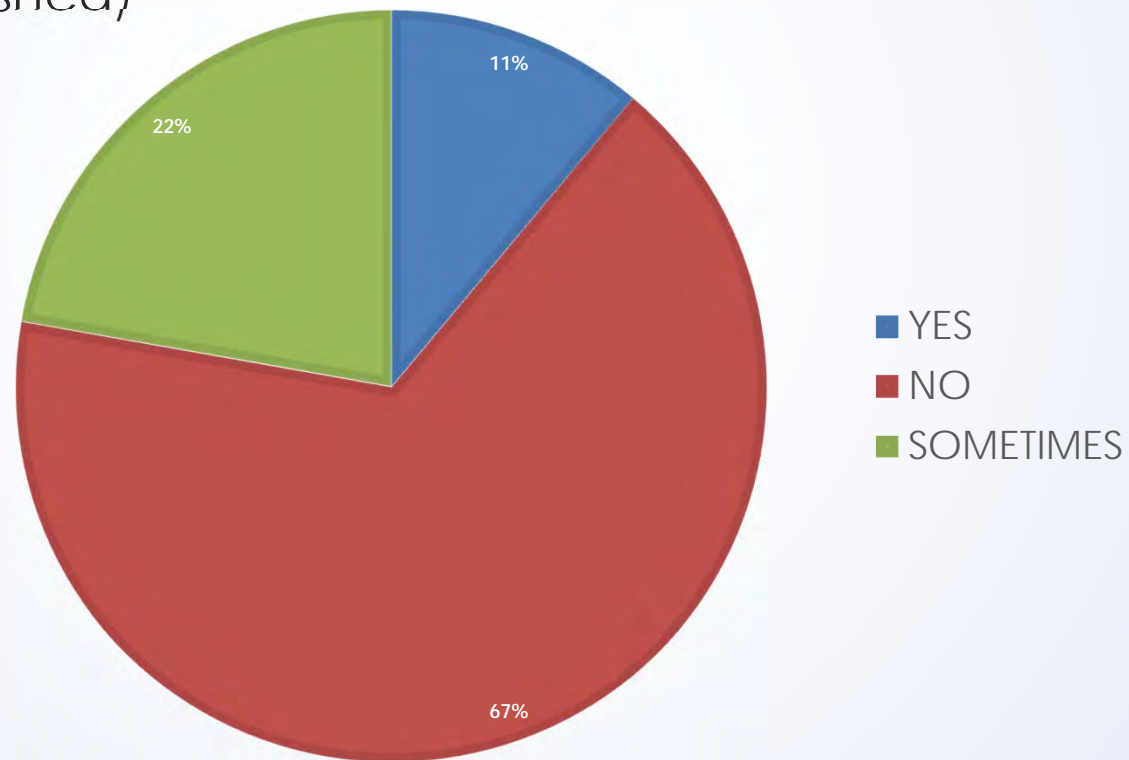


6. Responses

- ▶ No-in the unincorporated areas there are no land use plans or zoning as that is prohibited by State law, with special exceptions
- ▶ Mainly just LIDAR and FEMA floodplain lines

7. Do you require flood studies for development along stream segments or waterways that are upstream of the FEMA mapped flood zones?

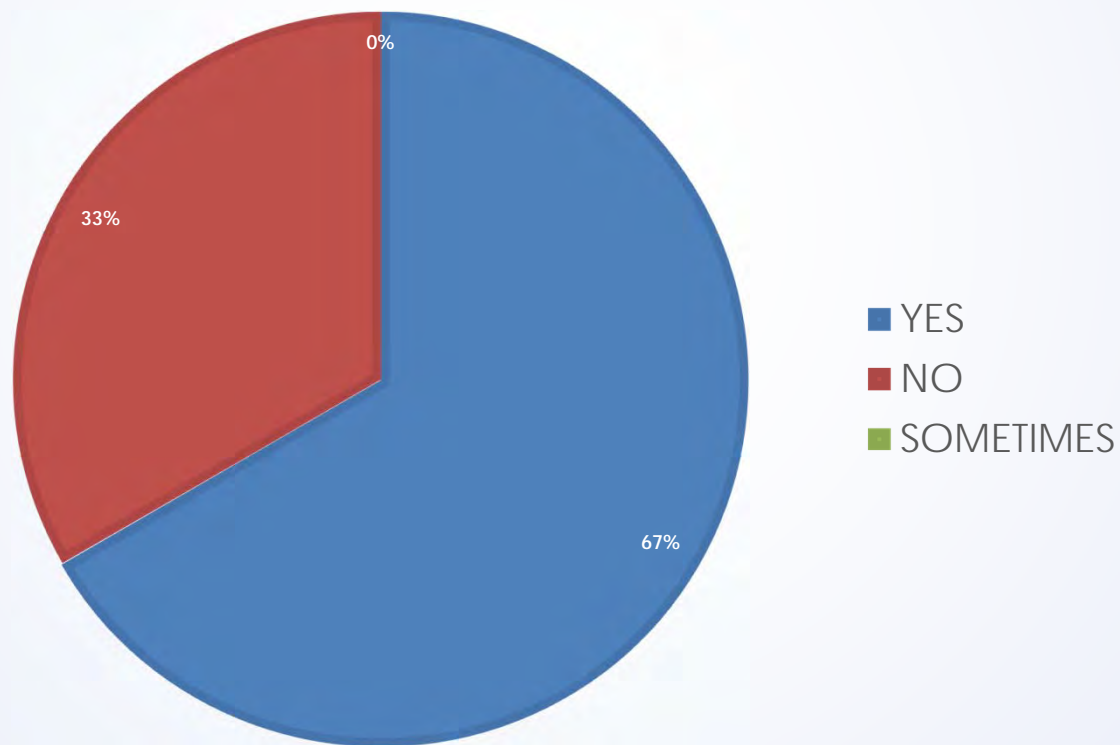
(FEMA's are generally established at a point 1 mile downstream within the watershed)



7. Responses

- ▶ Yes, to determine pre/post development runoff

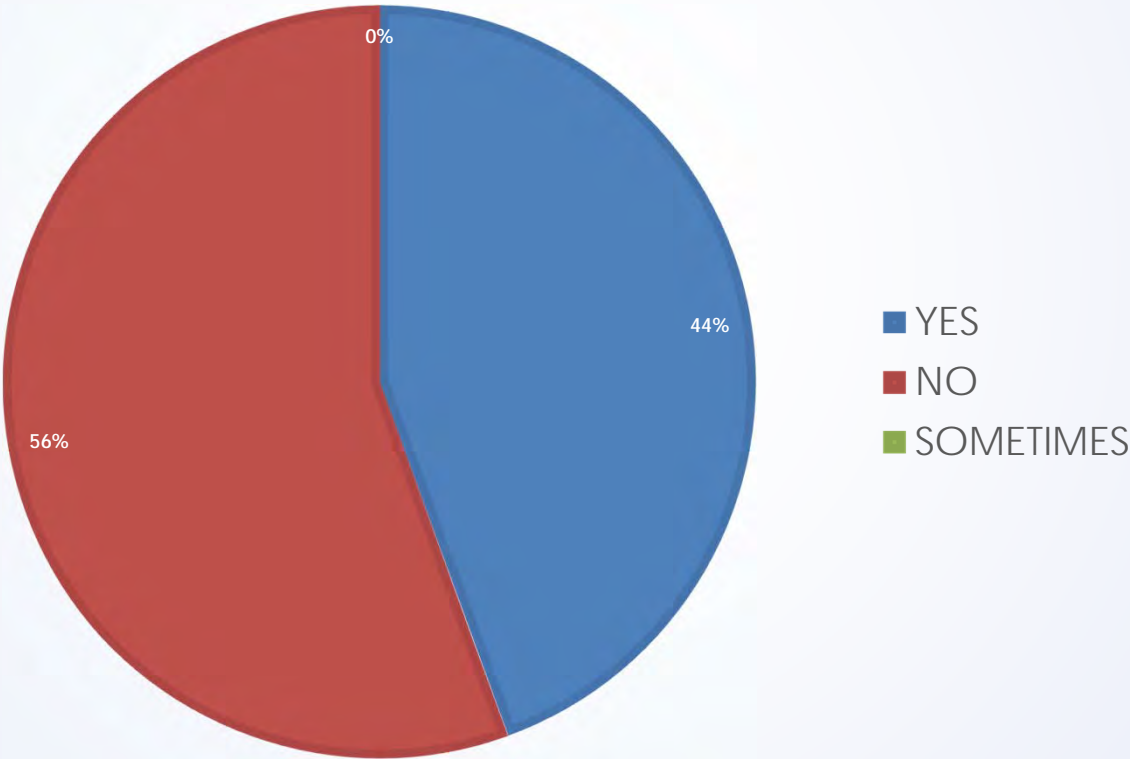
8. Do you have a freeboard requirement for residential and/or commercial building structures or culverts/bridges/roadways? If yes, what are those freeboard requirements? Are they based on fully developed watershed conditions or FEMA mapped elevations?



8. Responses

- ▶ Freeboard requirements for residential and commercial structures are 2 feet above the BFE. We require 1 foot of freeboard for bridges. All for fully developed conditions.
- ▶ Yes, residential development is required 2 ft. above BFE and commercial is 2 ft. above BFE and/or flood proof up to 2 ft. above with no adverse impacts. These are based on FEMA's mapped elevations or we allow them to provide detailed studies in Zone A.
- ▶ Yes, there is a 2ft freeboard requirement for "x" Reservoir based on elevation 318 MSL.

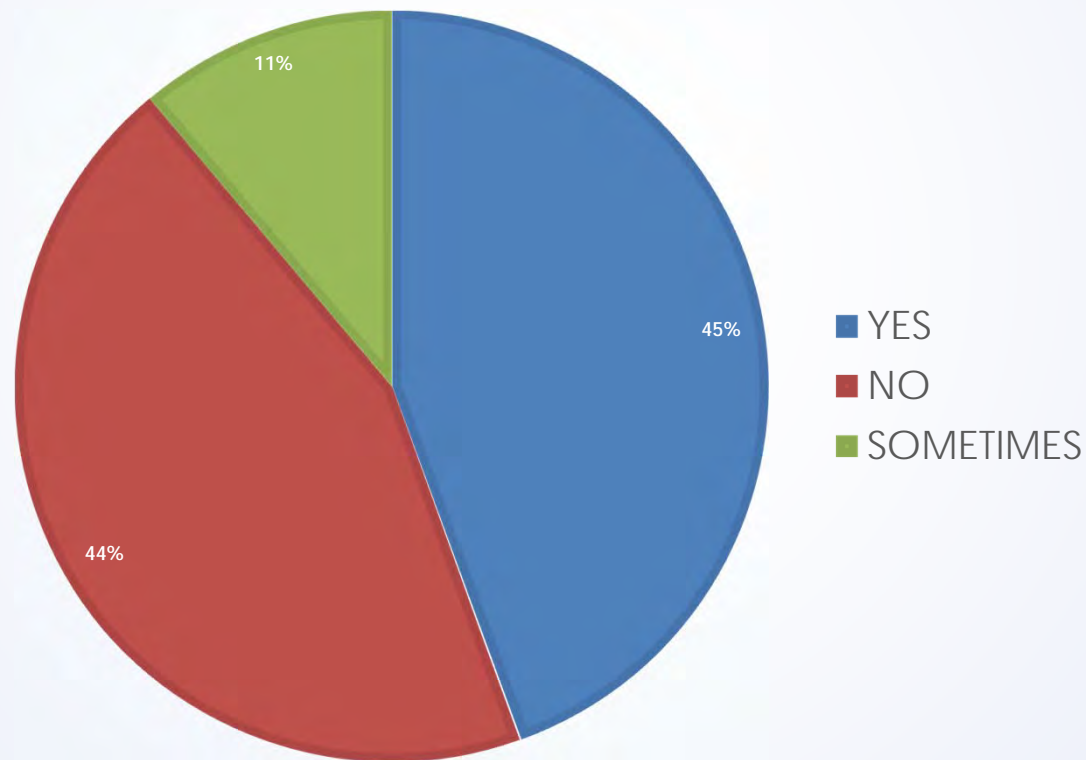
9. Do you require roadway infrastructure designs to provide at least 1 unsubmerged drive lane using a 25-yr or 100-yr fully developed flow condition?



9. Responses

- ▶ Yes. We require one 12 foot lane to remain clear for the 100 year event.
- ▶ We allow 1 ft. over the roadway with a 100 year storm post development
- ▶ No, we do not have that regulation.

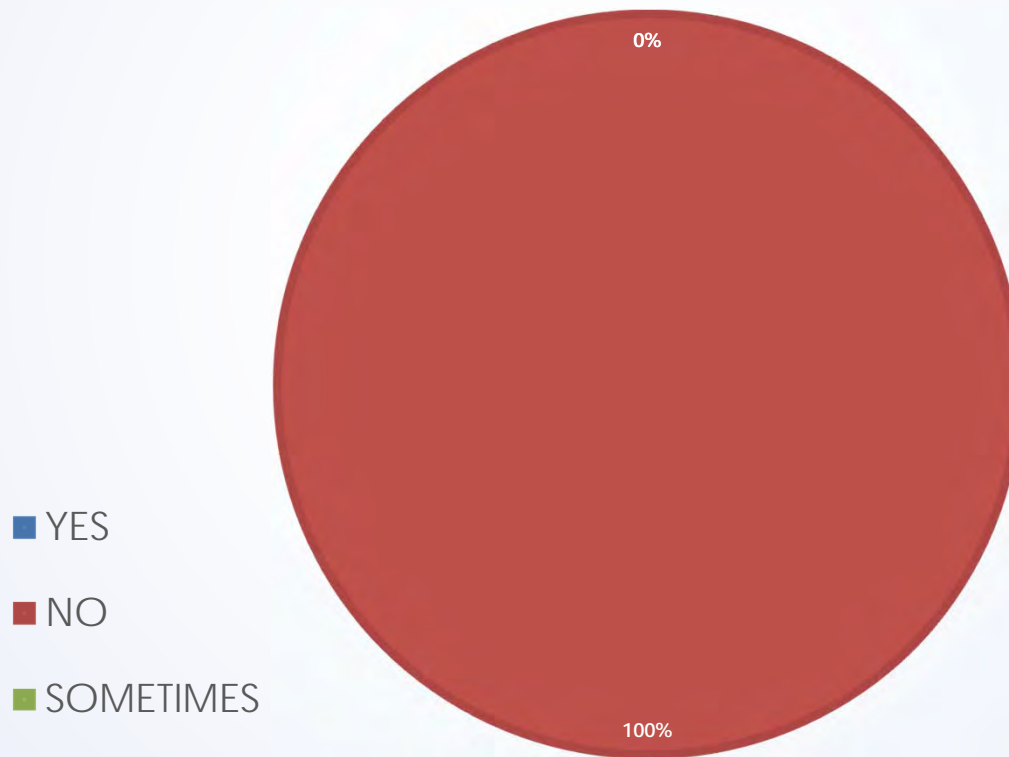
10. Do you allow uncompensated loss of flood storage with permitting of developments (filling of FEMA flood fringe or ineffective flow areas)?



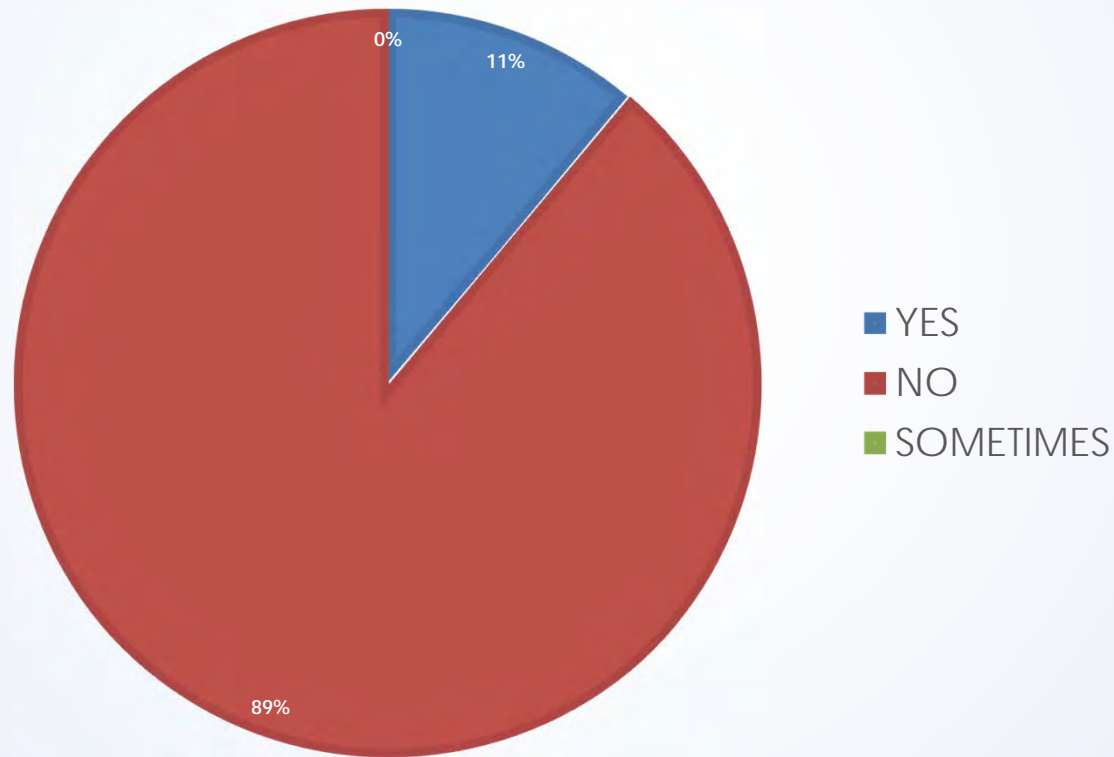
10. Responses

- ▶ Yes within limits 0.10' +/- BFE
- ▶ We require 1:1 flood storage mitigation in the flood fringe.
- ▶ Yes, as long as no adverse impacts occur to adjacent property owners where development is occurring

11. Do you require floodplain setbacks or vegetative buffers to reduce erosion, improve water quality, or take natural stream meandering into account?



12. Do you regulate any other higher watershed management standards than those previously listed (questions 6-12)?



12. Responses

- ▶ Yes. Preserve the BFE 0.10 +/-

Roundtable Discussion

1. Design infrastructure to fully developed conditions (approved land-use maps)
2. Begin protection at the most upstream end of the watershed – not where FEMA shading starts
3. Maintain valley storage areas (unfilled)
4. Protect against and reduce erosive velocities
5. Match pre-developed site runoffs
6. Verify/require adequate downstream conveyance
7. Require freeboard from fully developed & consider climate change
8. Define operation & maintenance responsibilities (written)
9. Size conveyance of street and storm systems adequately to safely convey traffic
10. Create stream buffers & preserve open space; limit clearing and grading
11. Consider regional (on or off stream) detention incentives
12. Implement Conservation/Cluster Development incentives
13. Encouraging low impact development techniques/green infrastructure

Next Steps

- ▶ Develop a modular Resolution for counties based on feedback
- ▶ Obtain NCTCOG Executive Board approval of the Resolution
- ▶ Host a Summit of County District Attorneys and Judges to present this information to them
- ▶ Begin county meetings

Contact

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National Flood Insurance Program Standards & The Regulatory Status of the Region

Jessica Baker, PE, CFM, PMP

TFMA President

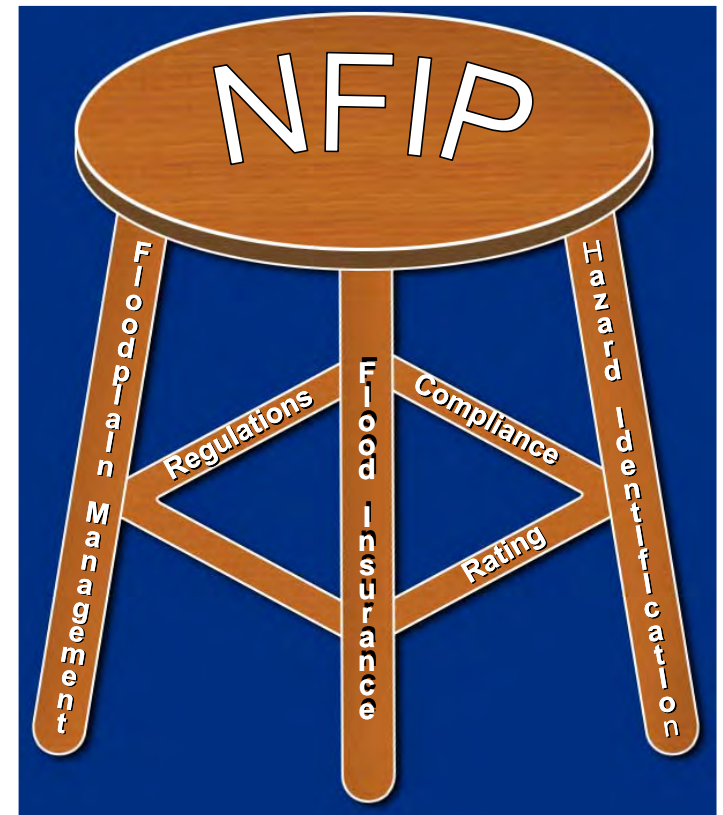
National Flood Insurance Program - Background

- After record flooding in the 1950's and 60's Congress passed the 1968 National Flood Insurance Act and created the National Flood Insurance Program (NFIP).
- In 1973 flood insurance became mandatory for Federal financial assistance (loans) for properties located in the Special Flood Hazard Area (100-year or 1% annual chance floodplain) [Flood Disaster Protection Act of 1973]
- The NFIP is based on the 100-year or 1% annual chance flood. This standard has been questioned, challenged and studied but still remains the NFIP standard.

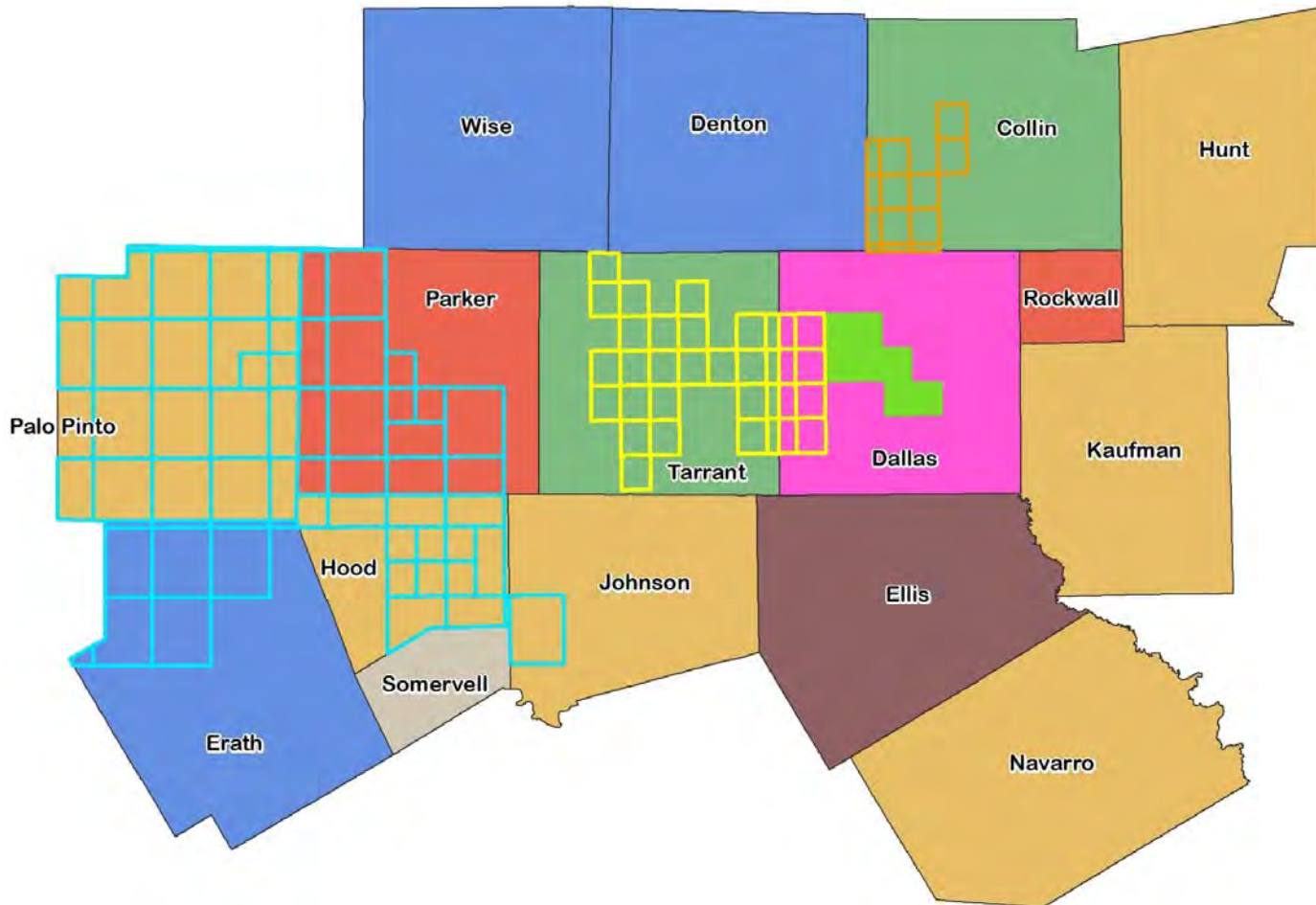
National Flood Insurance Program

Participation in NFIP allows communities to:

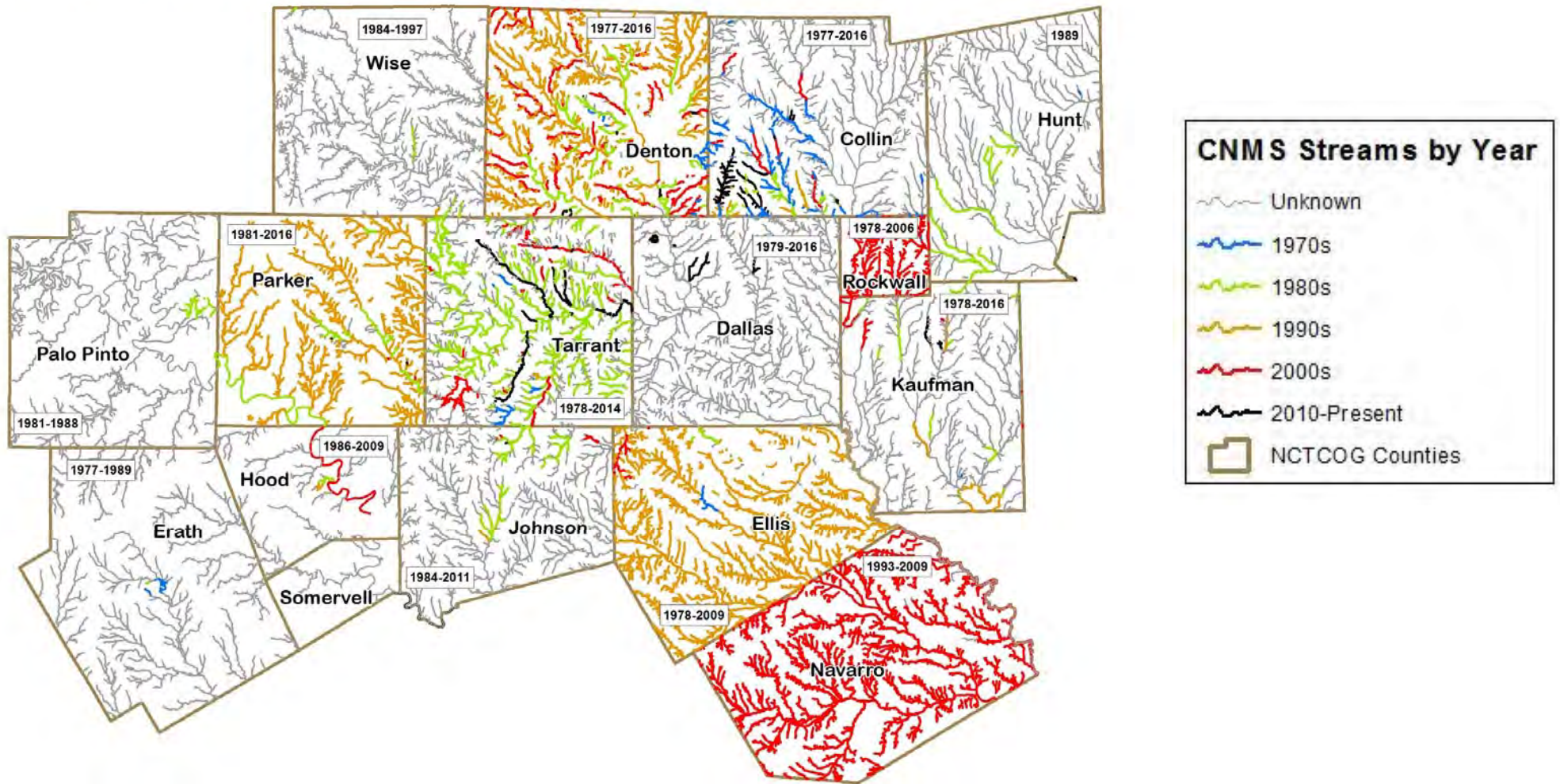
- protect life and property through ordinances;
- identify areas at risk through mapping;
- prohibit or restrict new development through permitting.
- enable citizens to purchase flood insurance through the federal government.

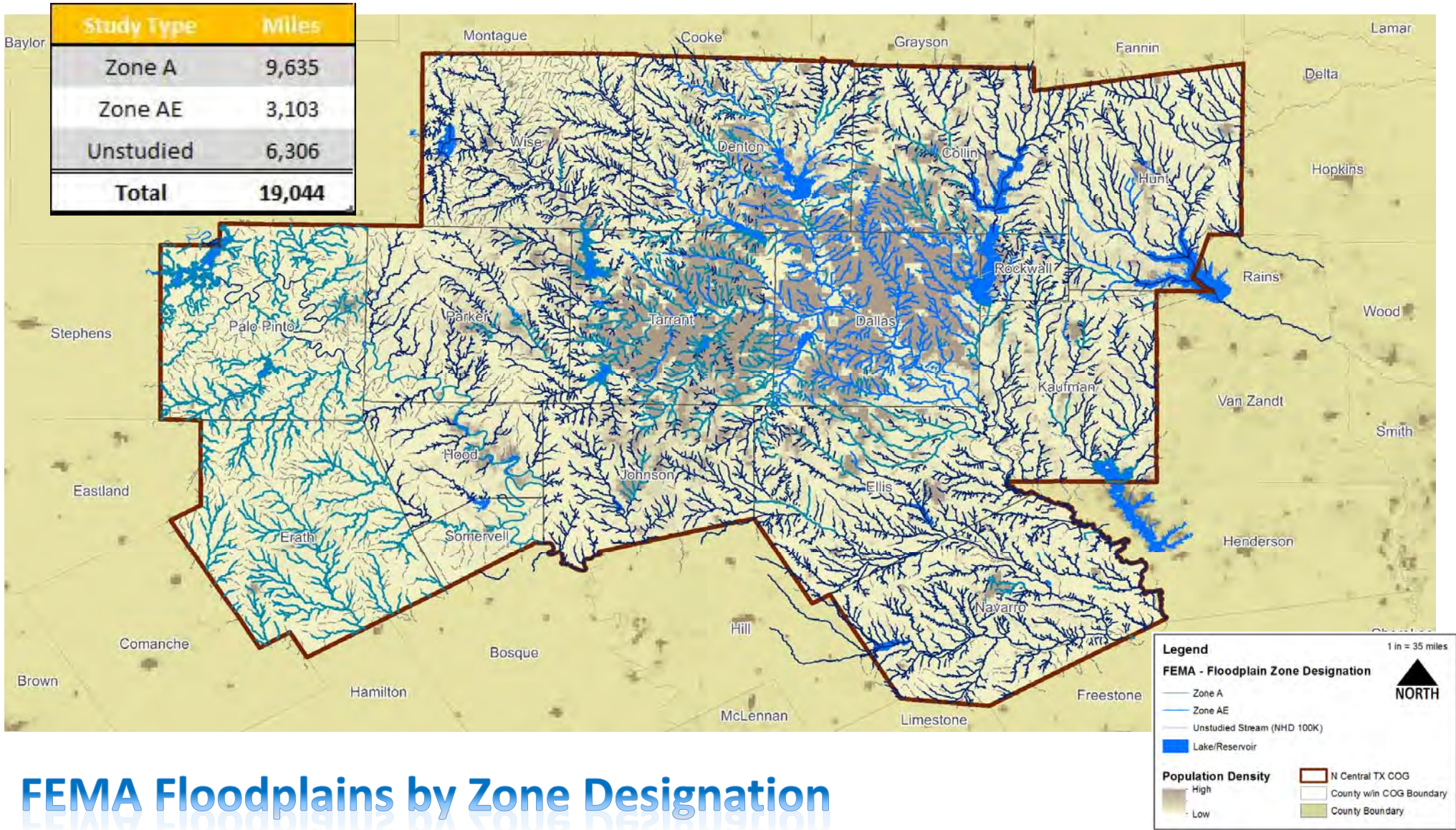


Status of FEMA FIRM Maps in NCTCOG Counties



Study Age for Streams





FEMA Floodplains by Zone Designation

FEMA Flood Zones

Special Flood Hazard Areas (SFHA)

High Flood Hazard

- Zone A – No detailed study or BFE's
- Zone AE – Detailed study / BFE's determined

Moderate Flood Hazard

- Zone X (shaded) – Areas outside the 100-yr floodplain but inside the 500-yr floodplain

Minimal Flood Hazard

- Zone X (unshaded) – Areas outside the 500-yr

Average Costs for Detailed Modeling Methods

\$50000

Average per mile cost

\$250

4

Floodway Analysis

Zone AE

Determination of floodway extents

3

Detailed Structure Survey

Zone AE

As-Built Drawings or Field Survey for Structure Info

2

Limited Detail Analysis

Zone AE

Culvert Invert, Top of Road, Generalized Culvert/Bridge Info

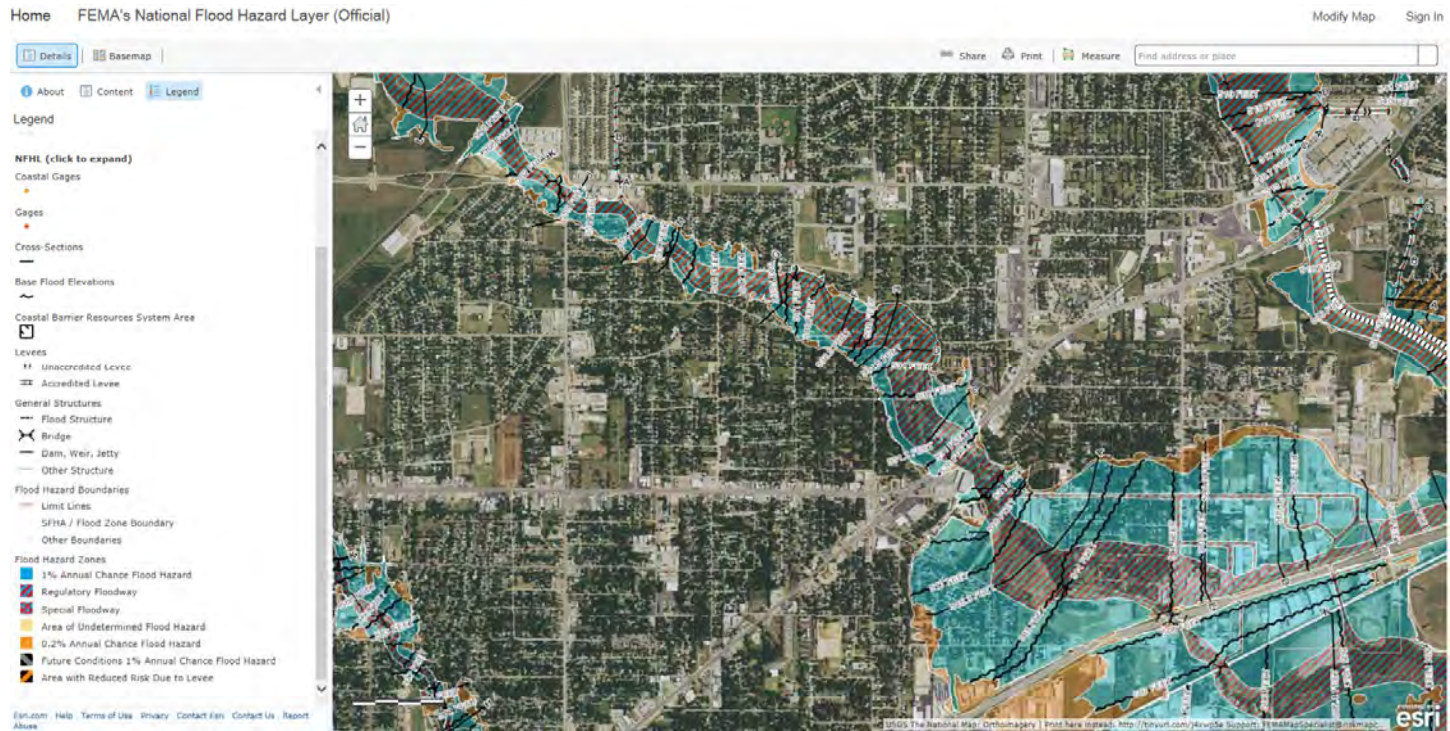
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Automated Model Preparation

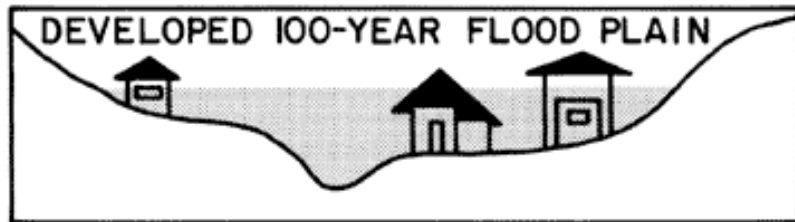
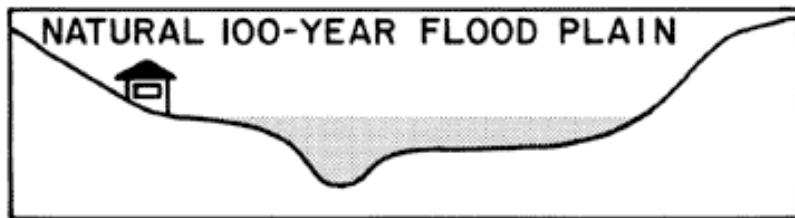
Zone A

LiDAR, manual model adjustment for cross-section placement

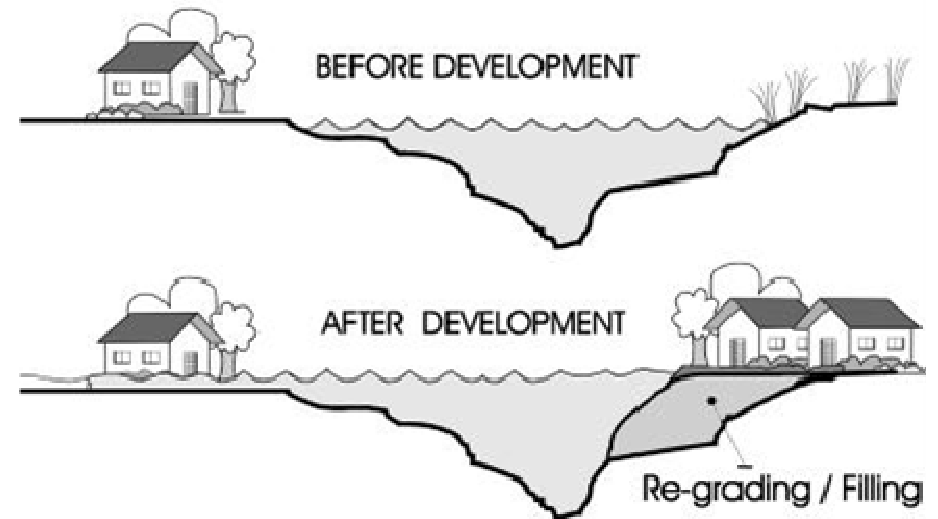
FEMA National Flood Hazard Layer



Importance of Regulating Floodplain Development



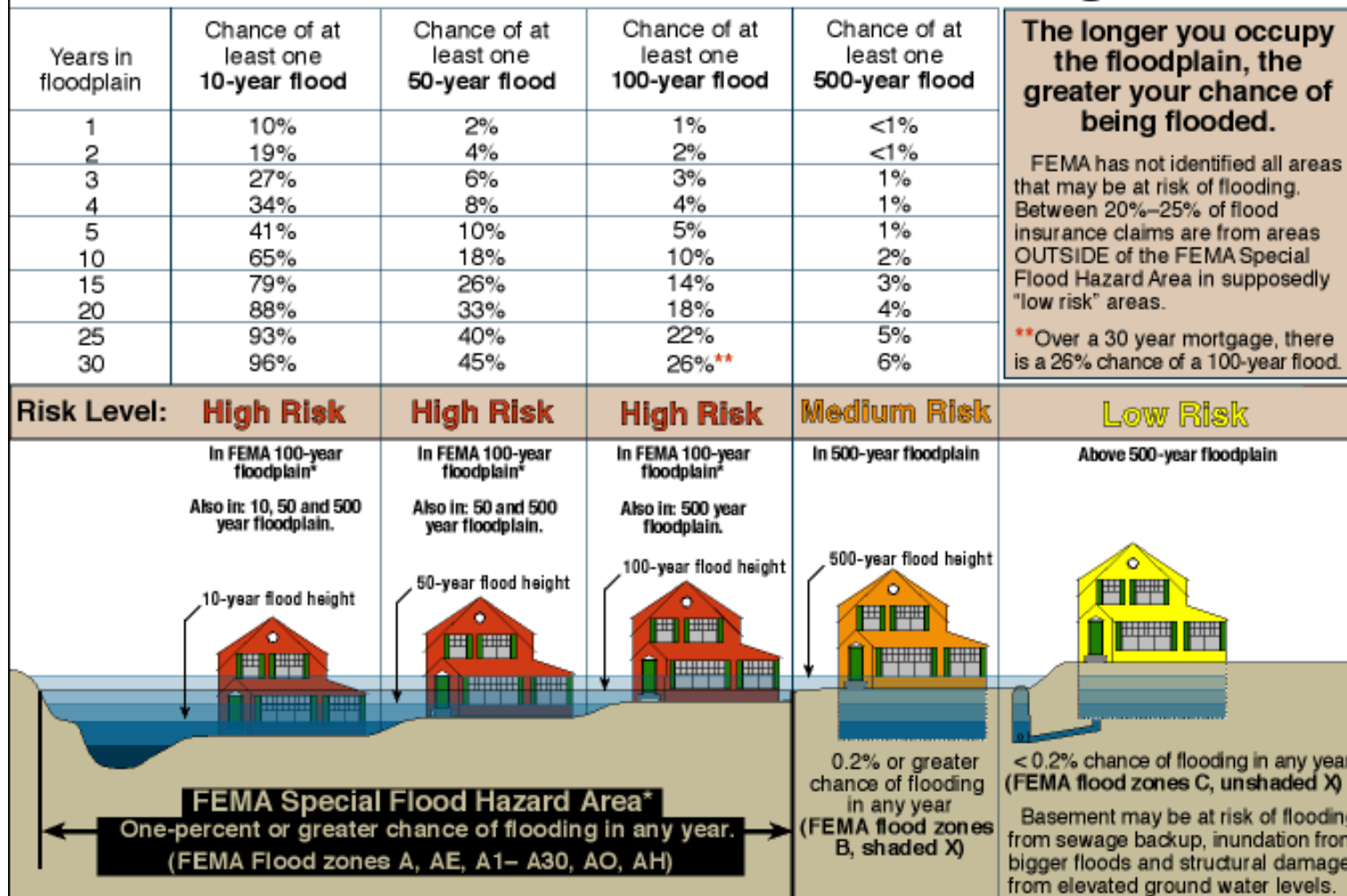
BUILDING ON FLOOD PLAINS INCREASES THE RISK OF FLOOD HAZARDS



Importance of Regulating Floodplain Development

- Development: Any man-made changes to improved or unimproved real estate, including but not limited to:
 - buildings or other structures;
 - dredging, filling or grading;
 - excavation;
 - drilling operations;
 - storage of equipment or materials.
- The federal basis of a community's power to adopt and enforce its ordinance is in Title 44 of the Code of Federal Regulations (44 CFR), Part 60: Criteria for Land Management and Use.
- A strong floodplain management program will lower the amount of property that will be damaged and lives that may be put at risk.

What is the Likelihood of Flooding?

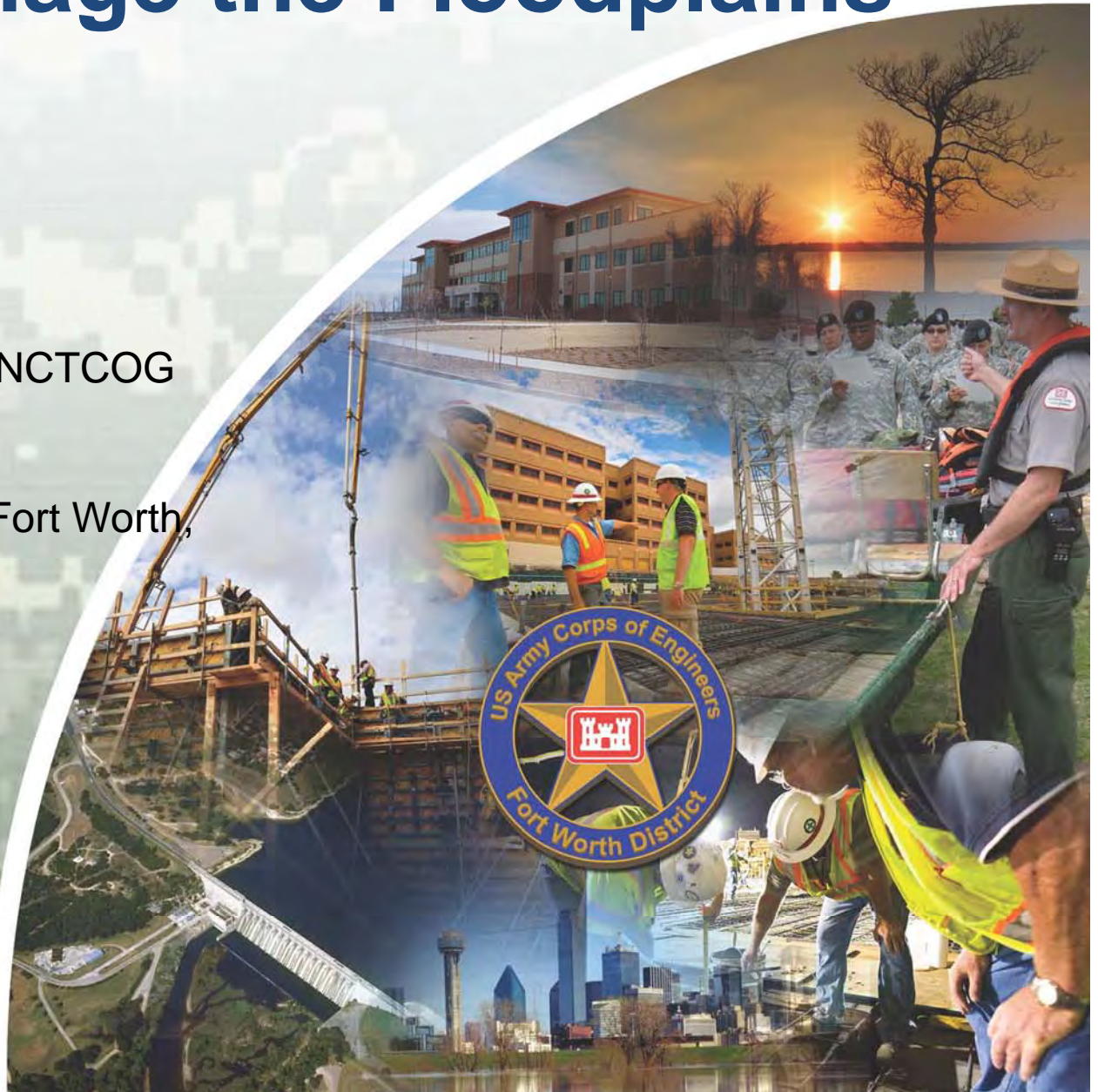


Why Manage the Floodplains

Date: 14 March 2017

Audience: County Summit - NCTCOG

By: Jerry L. Cotter P.E.
Chief of Water Resources – Fort Worth,
US Army Corps of Engineers



Dallas Fort Worth Flood Control System



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Reservoir Development

Dallas-Fort Worth Floods



1908 Carrollton, TX



1908 Carrollton, TX



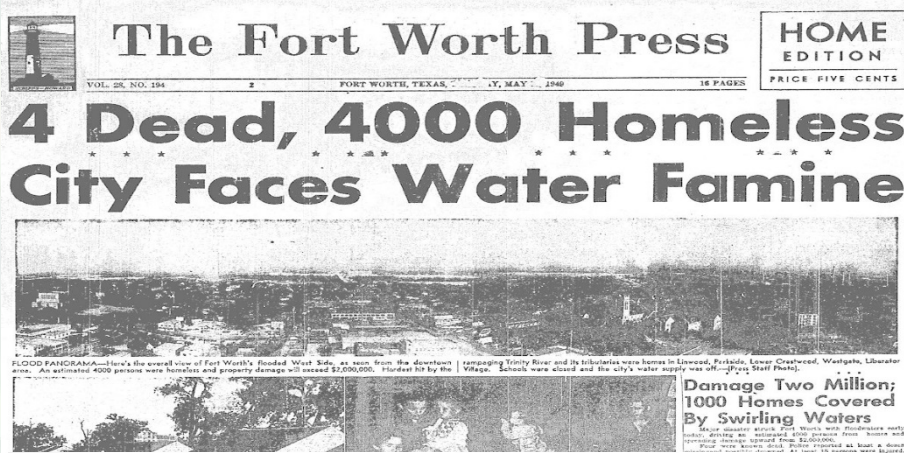
1942 Dallas, TX



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Reservoir Development

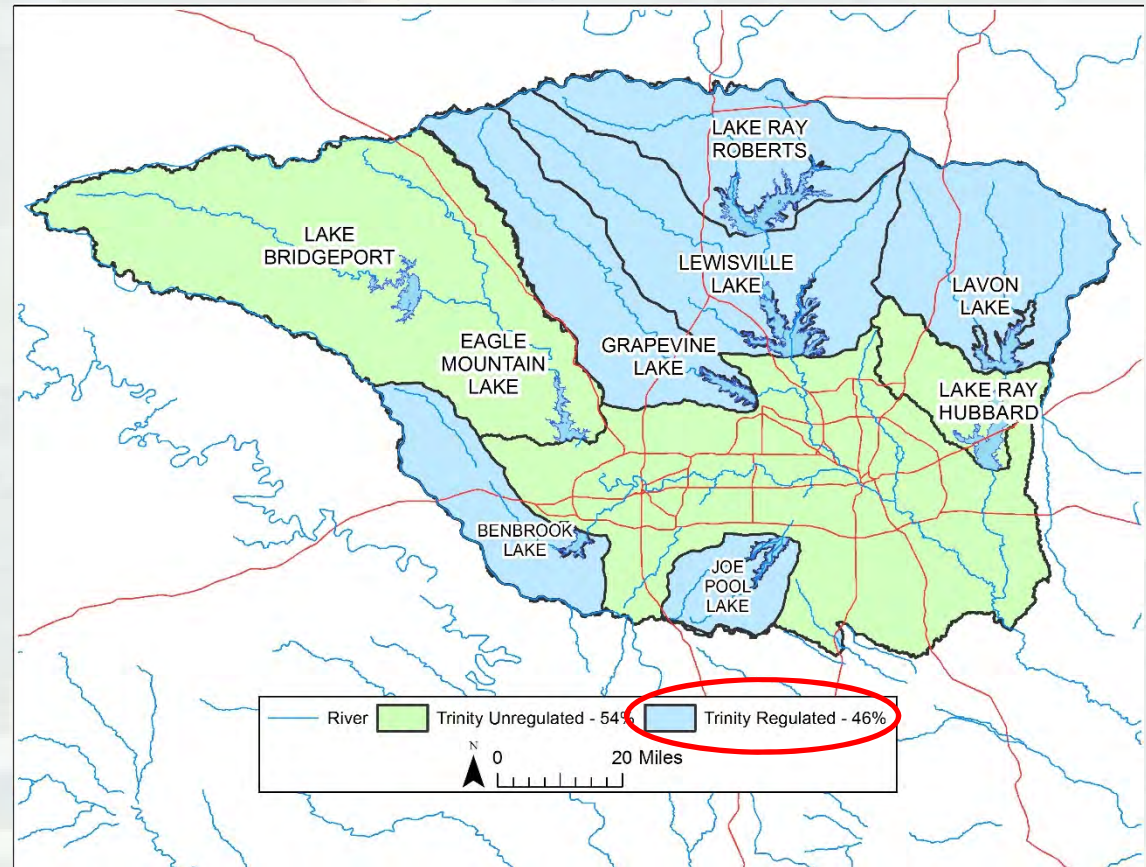
Dallas – Fort Worth Floods



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Dallas-Fort Worth - Flood Control and Water Supply System

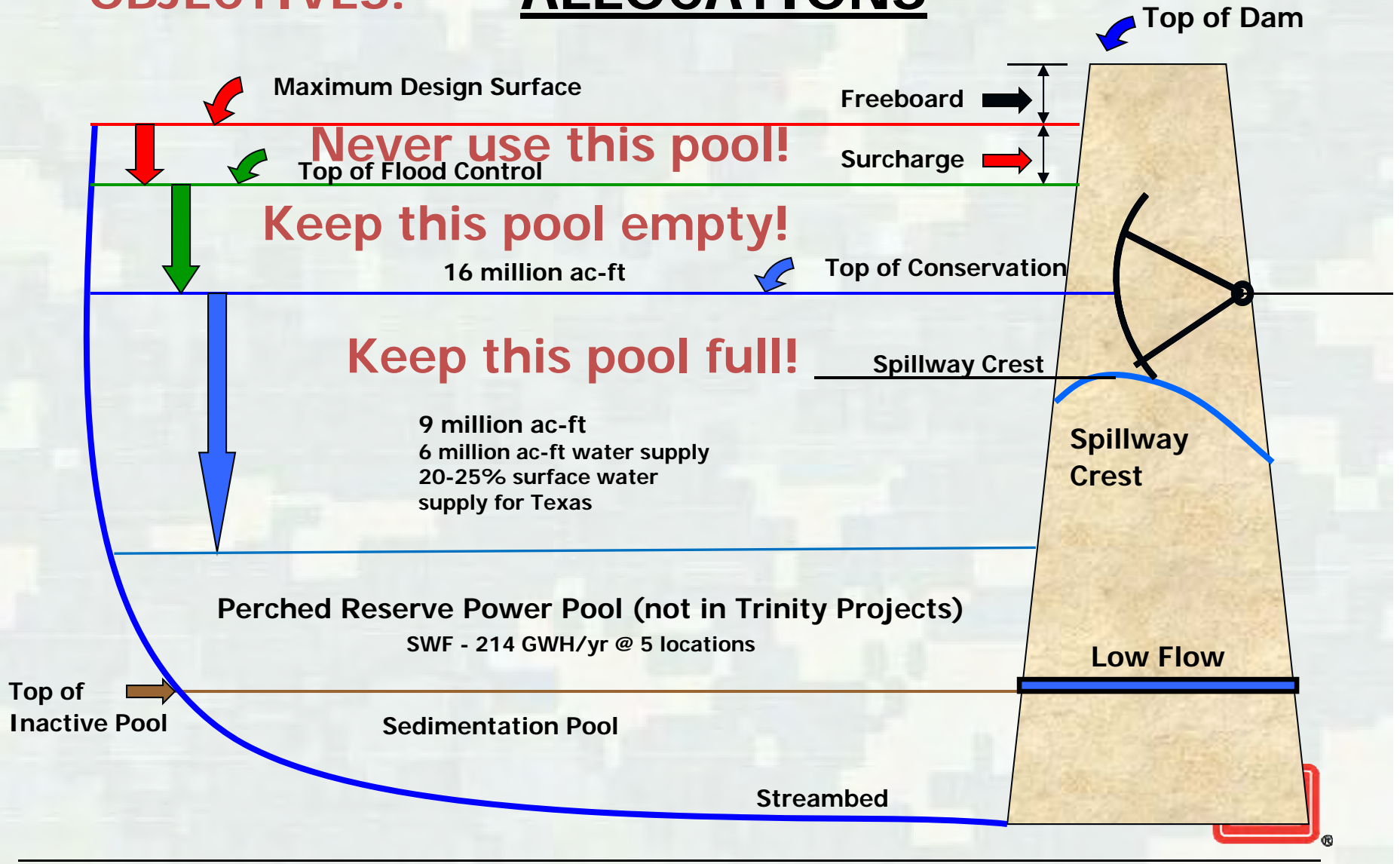
- Devastating floods, 1908, 1942, 1949
- 6 multi-purpose reservoirs
- 2 federal levee systems
- DFW Flood Control System
 - ▶ \$79 billion in damages prevented
 - ▶ \$2 - \$3 billion annually
- Water supply system
 - ▶ 7 million served
- Total cost \$2.5 billion



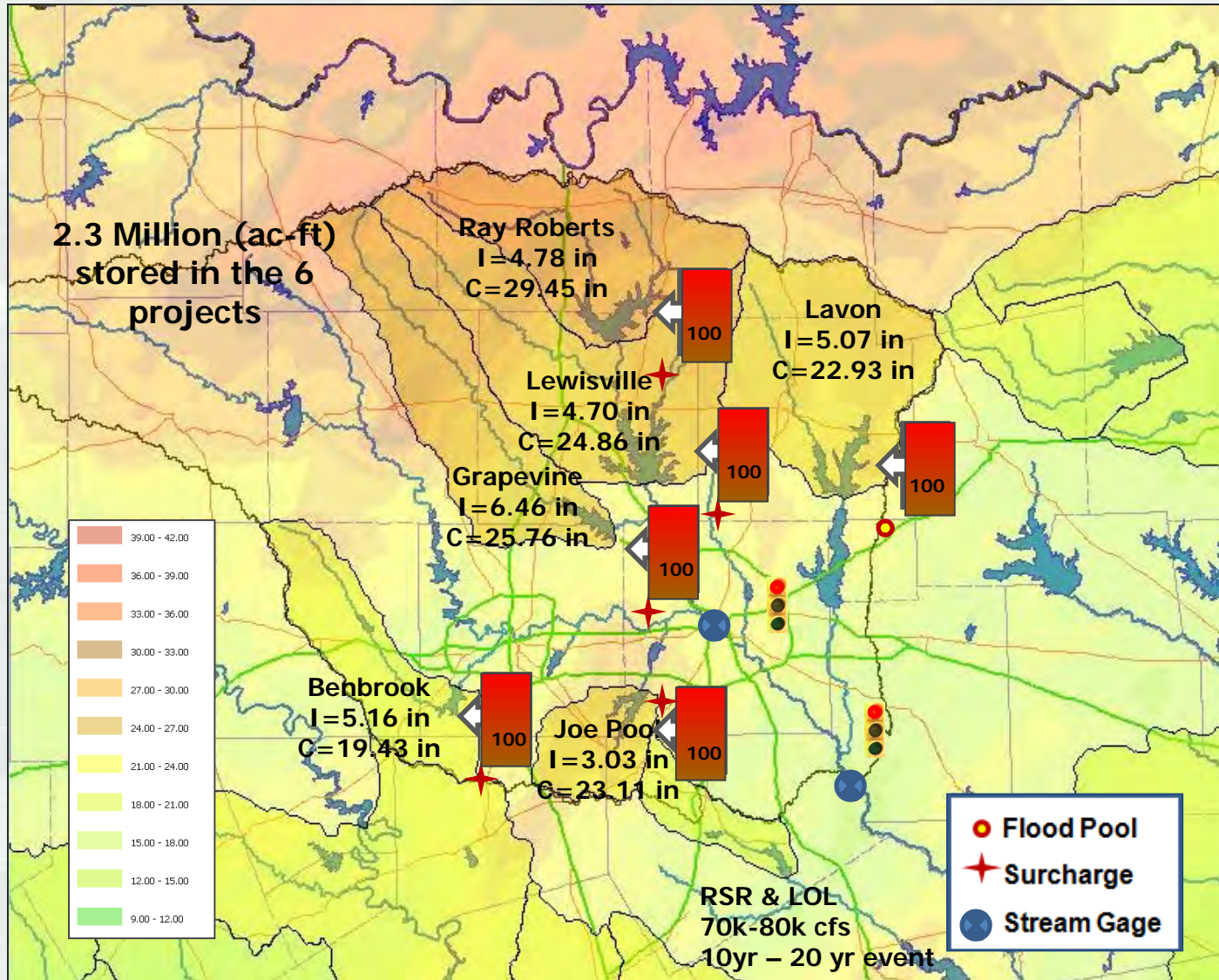
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GOALS AND OBJECTIVES!

RESERVOIR ALLOCATIONS



May-June 2015 Flooding

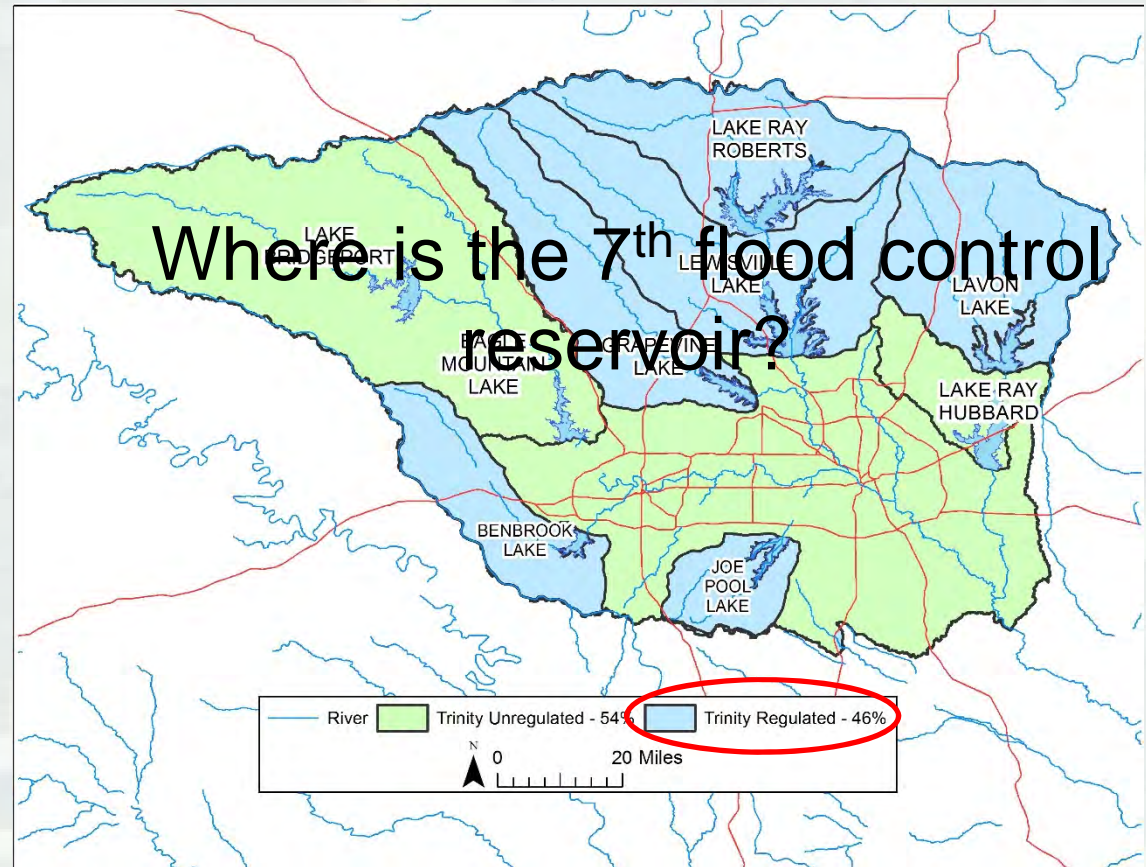


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*Pool percent taken on the last day

Dallas-Fort Worth - Flood Control and Water Supply System

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Seventh Flood Control Reservoir NCTCOG - CDC Regulatory Program

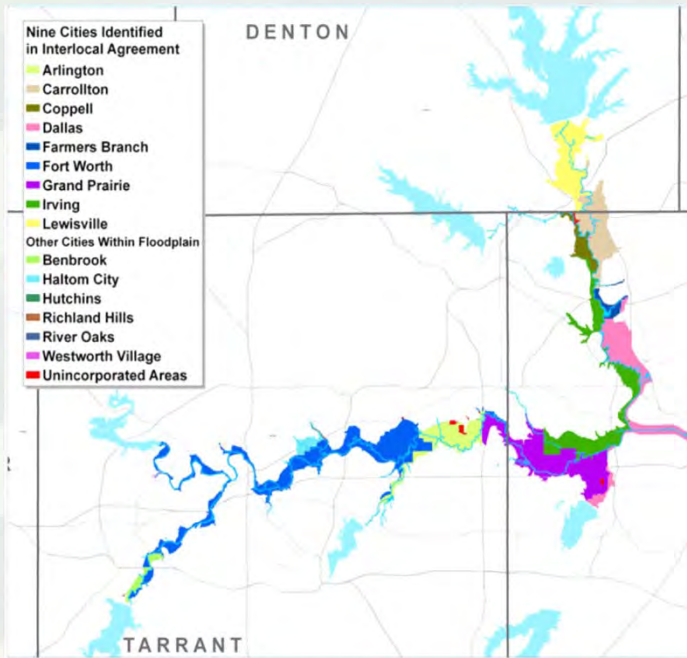
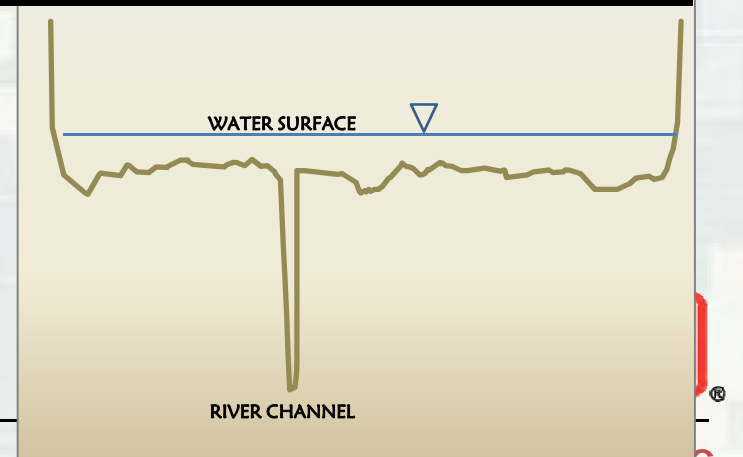
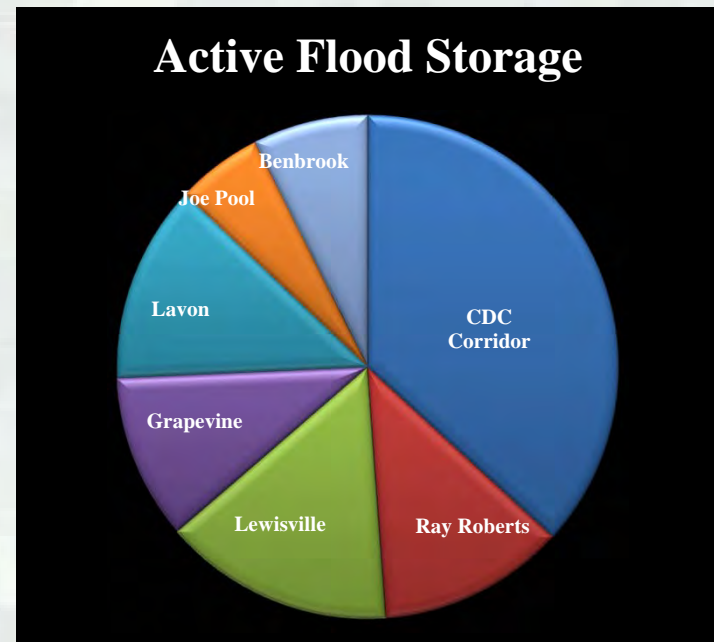


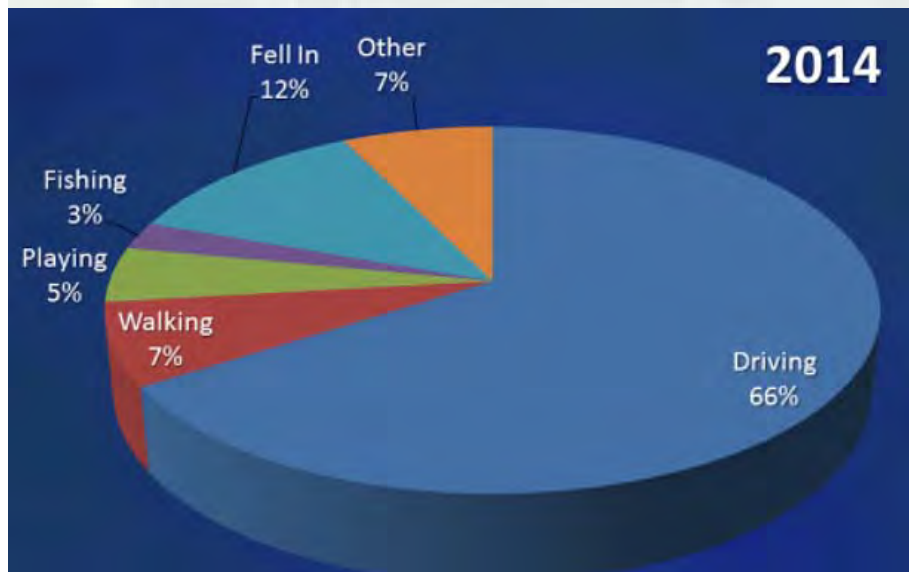
Figure is for demonstration purposes only and should not be used in determining exact cover



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Full floodplain conveyance and storage

Background – Flooding in the US

- Floods are the leading cause of natural disaster losses in the US
- 30yr average = \$7.96 billion in damages/year, 82 fatalities/year



Year	Flood Damages (Water Year) <small>Adjusted to 2014 Inflation Water year (e.g. WY 2014 is Oct 1, 2013 through Sep 30, 2014)</small>	Flood Fatalities <small>Calendar Year (Jan 1-Dec 31)</small>
2014	\$2,861,426,089	38
2013	\$2,210,809,876	80
2012	\$522,119,985	29
2011	\$9,102,294,087	113
2010	\$5,615,860,859	103

Texas Is Subject to Extreme Flooding

- 2015-2016 Record flooding
- 1000s of Structures impacted across TX and LA in 2015-2016
- \$850M Damages in 2015 in TX alone

Fixing Fort Worth flooding issues could top \$1 billion, report says



Drivers become stranded in high waters across North Texas



Somerville, TX 2016



Brazos River, 2016

Brandon Wade/Star-Telegram via AP Photos



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Flooding Impacts Lives

- 48 deaths in Texas in 2015
- 29 deaths in Texas April – June 2016



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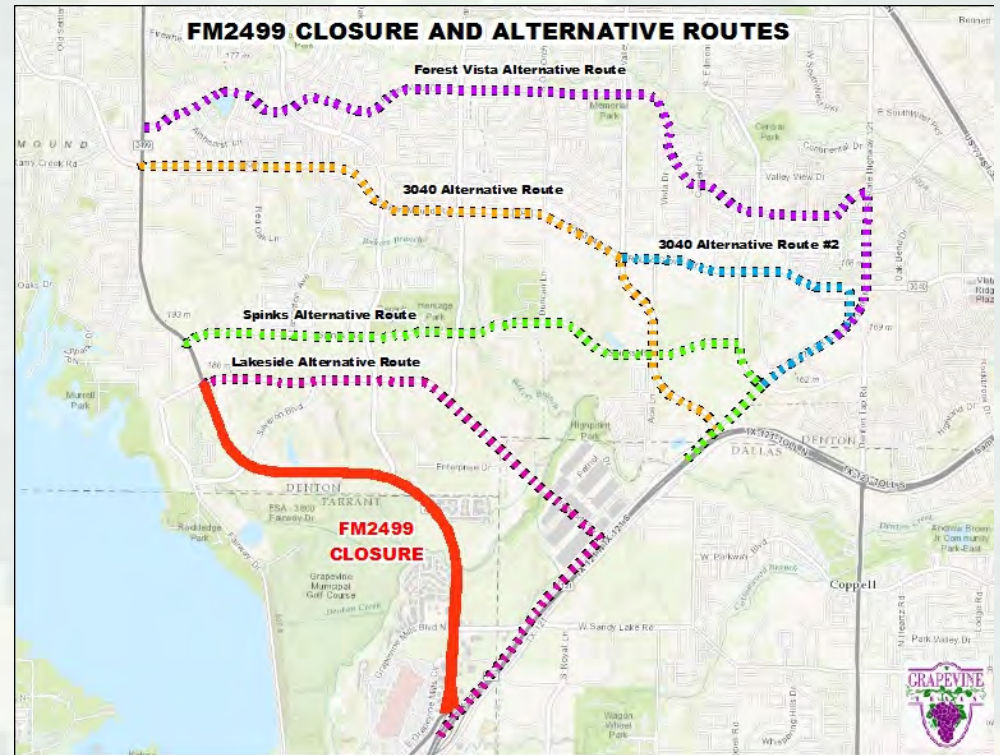
Flooding Impacts Transportation Infrastructure

- Largest loss of life
- Access issues
- Long rebuild schedules
- 10's of millions



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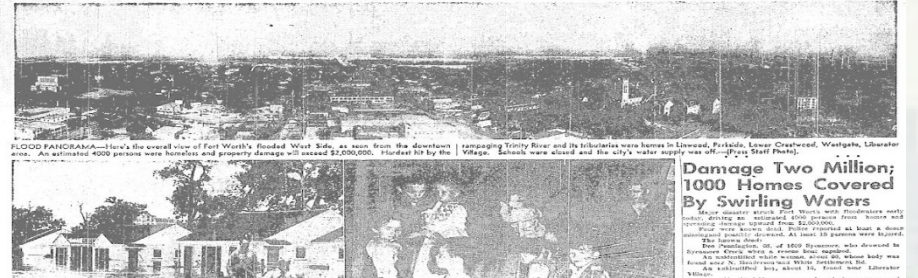
FM 2499 Closure



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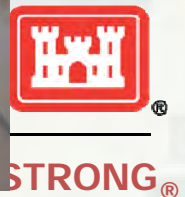
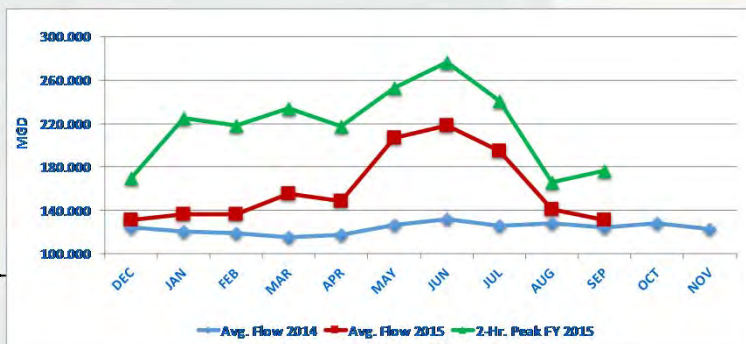
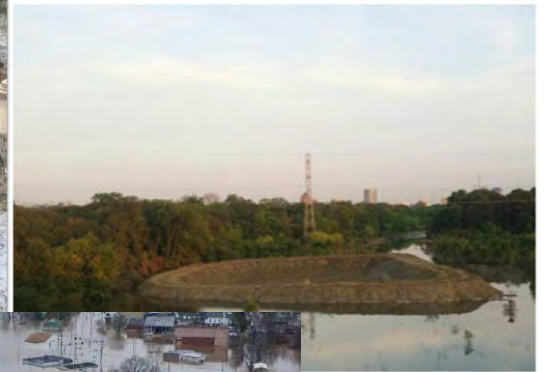
Flooding Impacts Water Systems

- Fort Worth water system impacted, 1949
- Eastland County and Cisco, Texas loss of potable water system, memorial day 2016 flood
- Treatment plants
- Pipelines
- Can impact whole communities

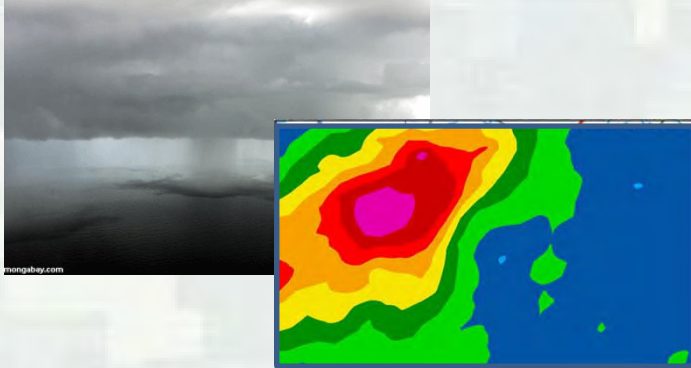


Flooding Impacts Sanitary Sewer Systems

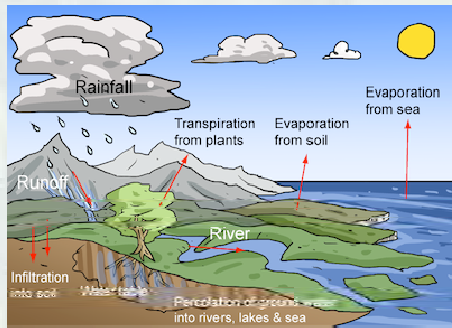
- 2015 - TRA and USACE partner to mitigate flood impacts on regional sanitary sewer for DFW
- Uncertainty in determining flood potential
- Treatment plants
- Damaged pipelines



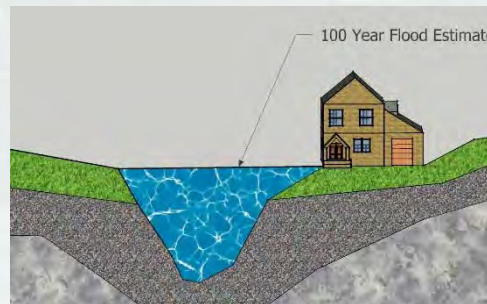
Components of Flood Impact Determinations



- **Meteorology**
 - ▶ How much rain
 - ▶ Medium uncertainty



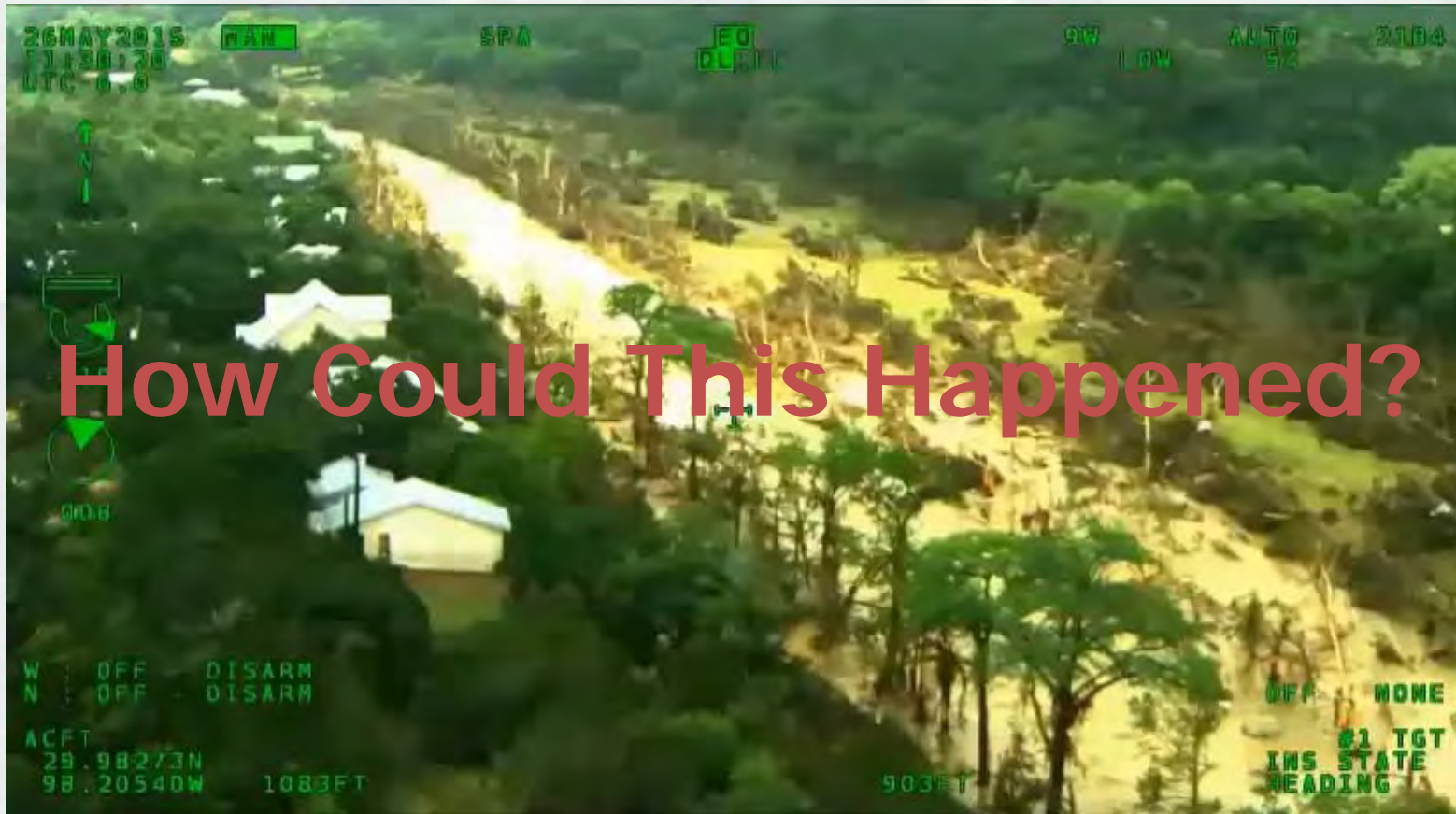
- **Watershed Hydrology**
 - ▶ How much runoff
 - ▶ High uncertainty



- **River Hydraulics**
 - ▶ How deep will the water get
 - ▶ Low uncertainty



Blanco River May 23-24, 2015



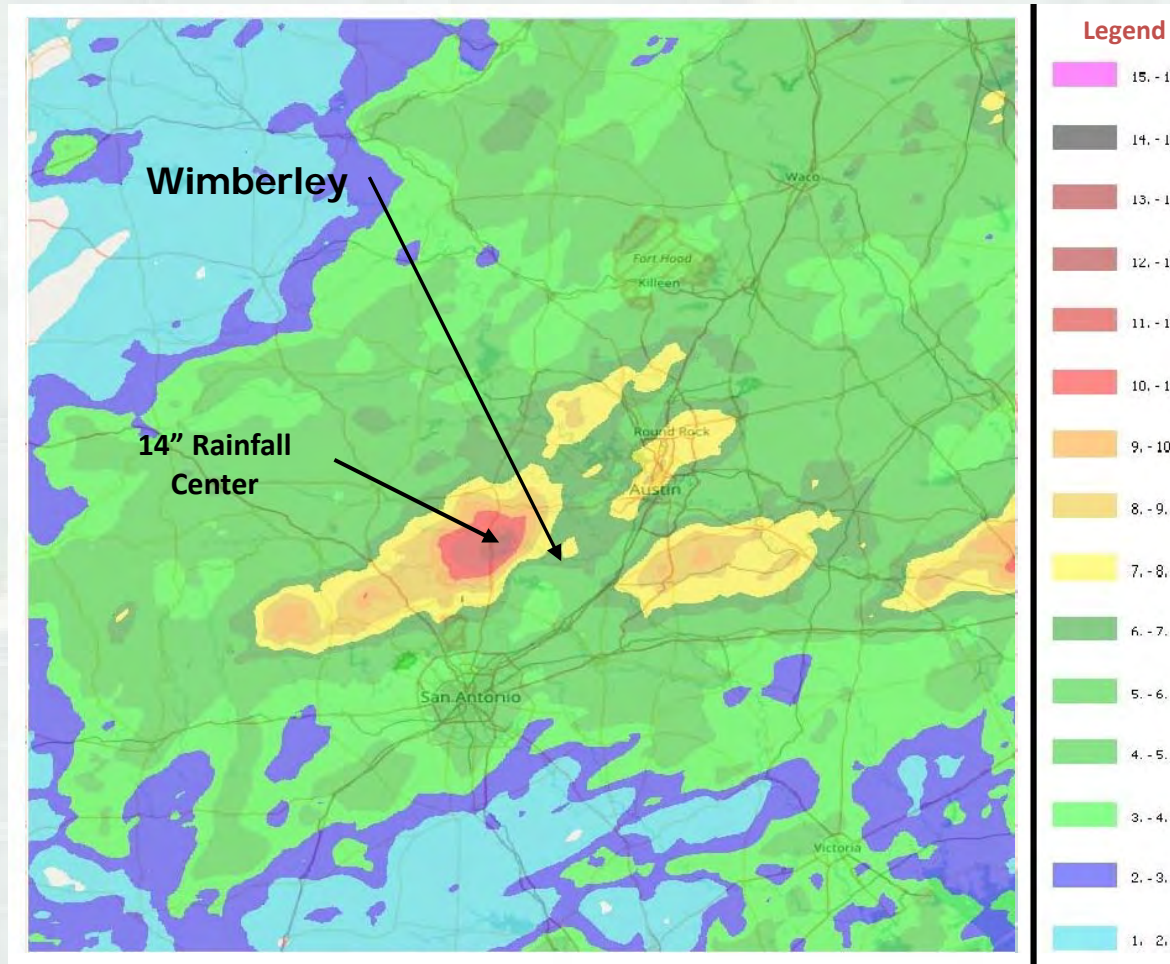
12 Lives Lost, \$30M Total Damages

<http://features.texasmonthly.com/editorial/wimberley-floods-memorial-day-weekend-2015/>



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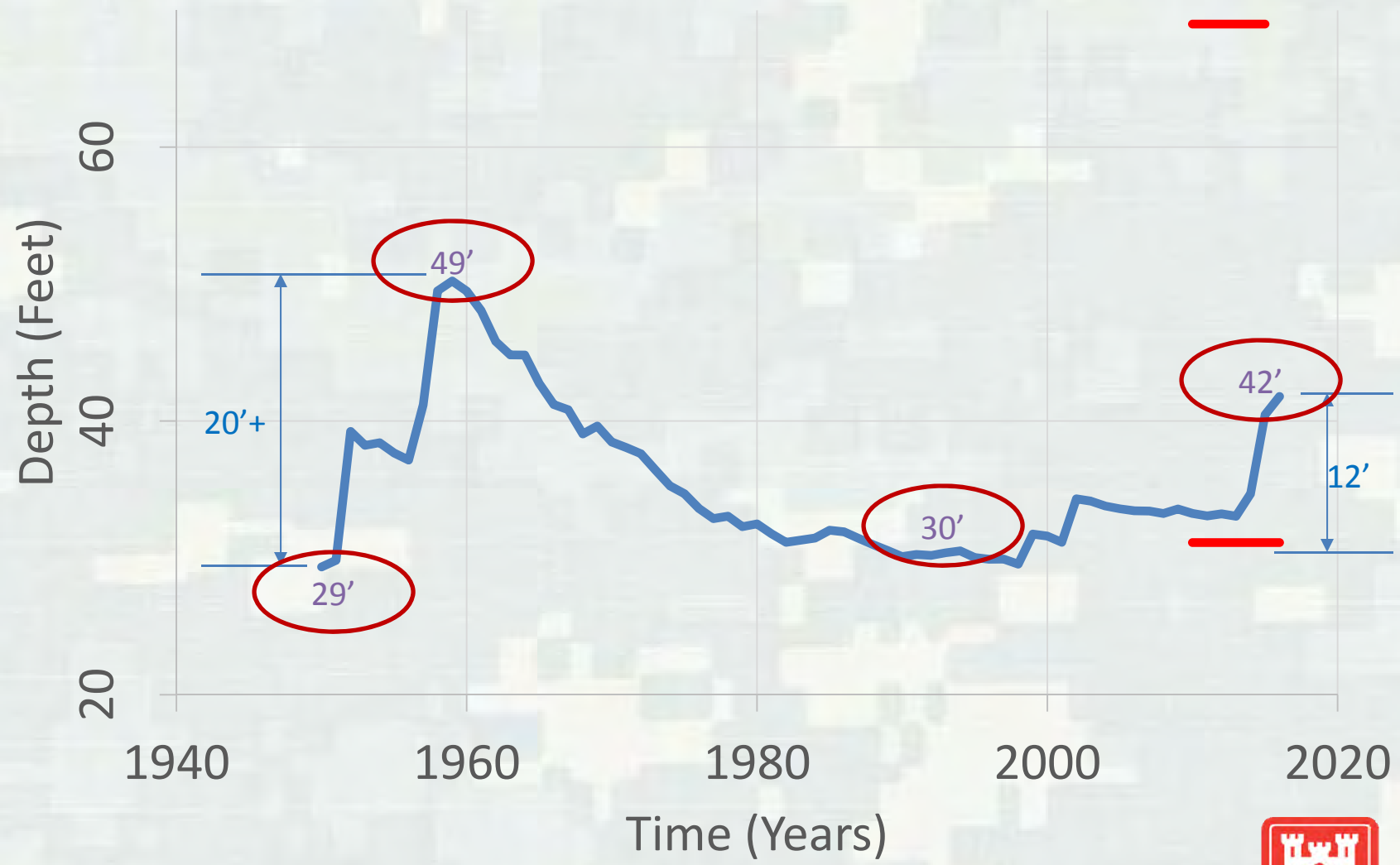
Wimberley Flood – May 2015



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100-Year Depth Estimates - Statistical - Wimberley

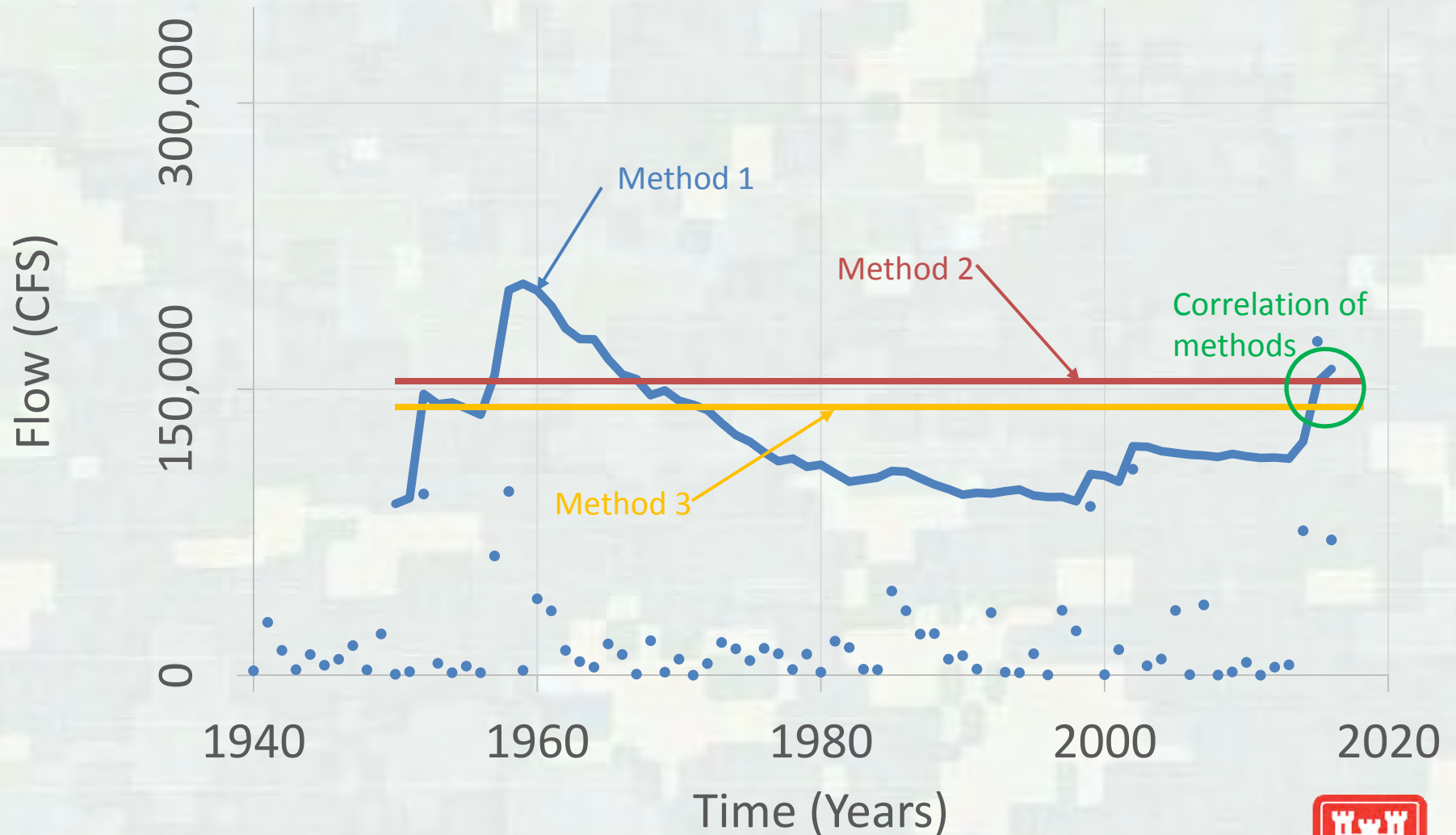
— 100-Year Estimate — 95% Confidence Limits



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100-Year Flow Estimates - Model - Wimberley

— 100-Year Estimate • Annual Peak Flows

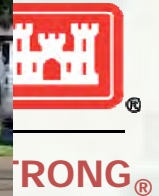
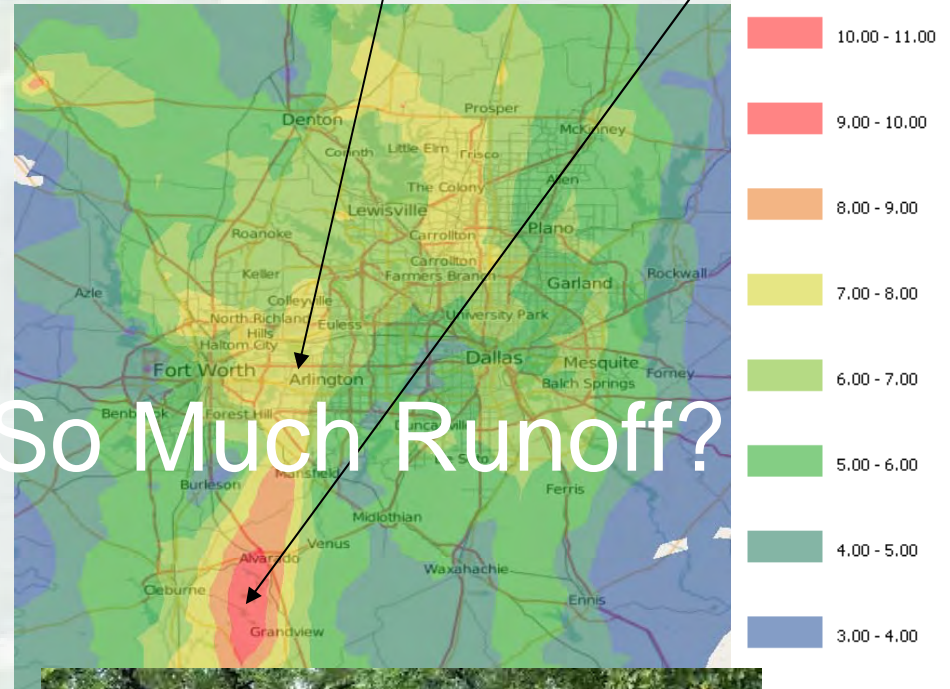


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2010 Tropical Storm Hermine Flood Rush Creek, Arlington, TX

7-8" Rain over Rush Creek

11" Rain

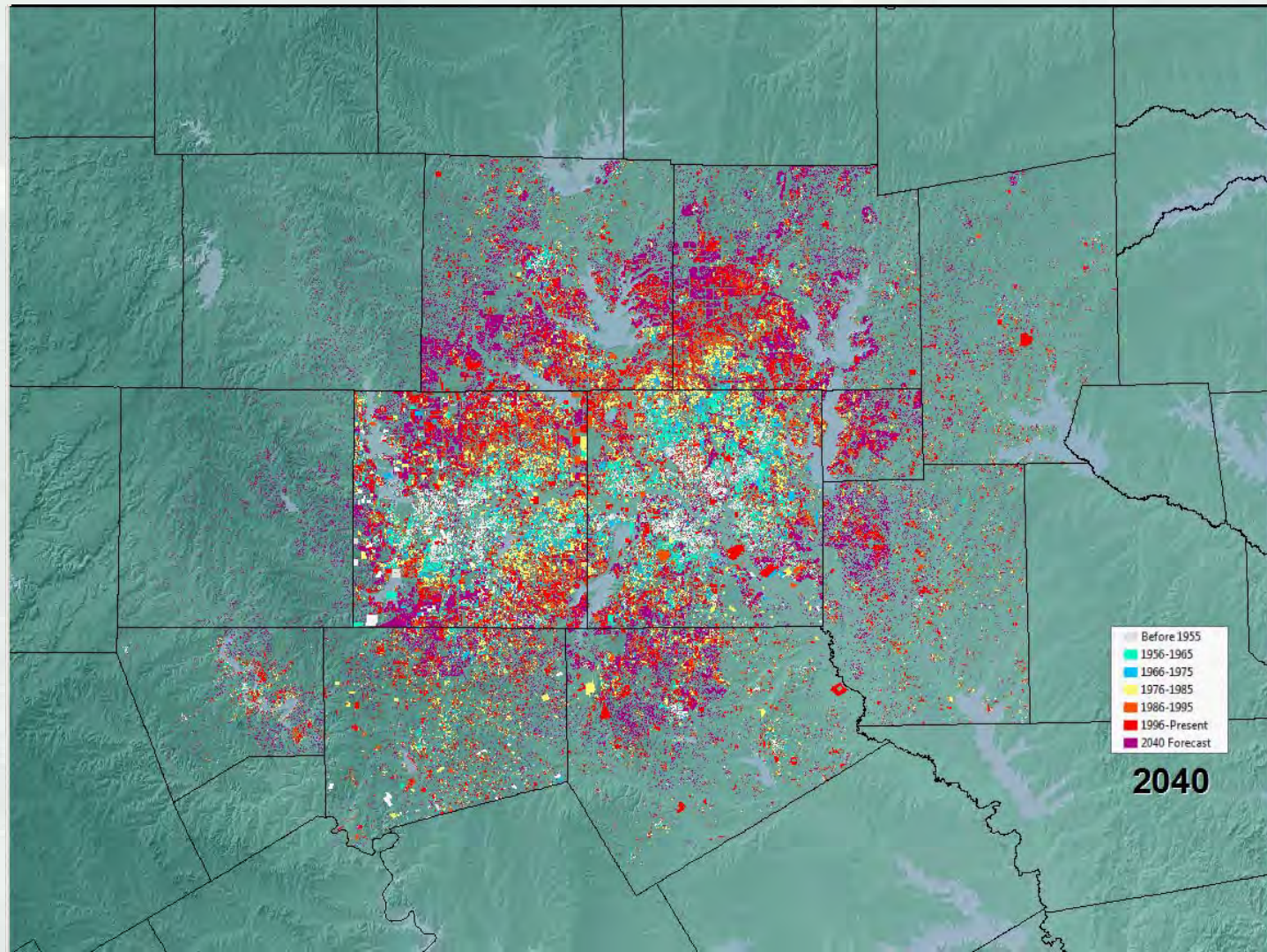


Rush Creek Buyouts Arlington, Texas

- 49 homes
- 100 unit condominium
- \$17 million total cost
- Repetitive loss buyouts
 - ▶ \$150k to \$800k each year + 90% matching grant
- Causes
 - ▶ Lack of regulatory products
 - ▶ Inadequate regulatory products
 - ▶ Upstream urbanization
 - ▶ Vegetation management



1950-2040 Growth Animation



Grapevine Lake

May 2015 Event

Current Development

- Spillway Crest Elev. 560.0
- Significant rain began on 6 May 2015
- Reached Spillway Crest on 30 May 2015
- Peak Elevation – 562
- Peak observed outflow – 3,100 cfs
- Duration – 42 days

Future with Development

- Spillway Crest Elev. 560.0
- Same rainfall event
- Reaches Spillway Crest on 24 May 2015
- Peak Elevation – 564
- Peak observed outflow – 13,250 cfs
- Duration – 49 days

**2+ feet higher elevation,
10,150 cfs higher peak outflow
7 days additional spillway flow**

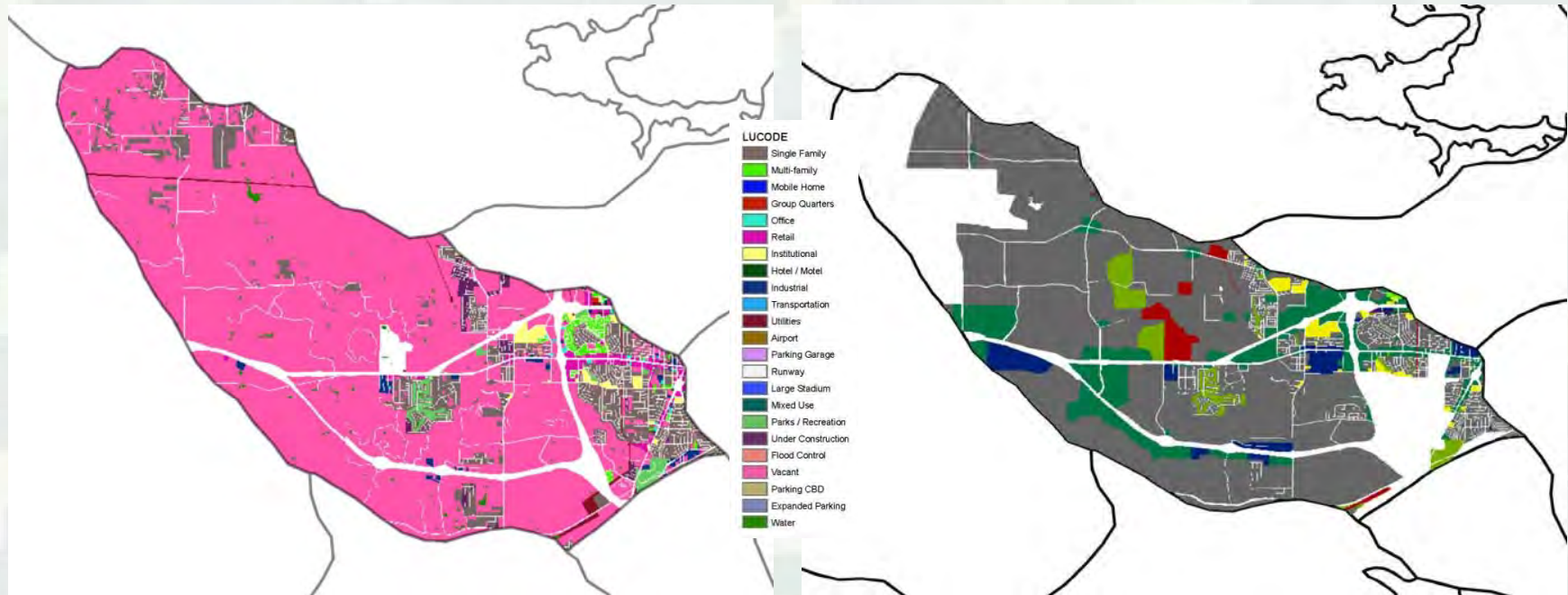


BUILDING STRONG®

Urbanization Impacts - Mary's Creek

2005

2055



100-yr = 27,400 cfs

100-yr = 37,300 cfs

36% Increase



BUILDING STRONG®

Onion Creek Buyouts Austin, TX

- Federal project
 - ▶ 483 to be purchased
 - ▶ \$30 million federal funding
 - ▶ 1999 to “still underway”
- City of Austin project
 - ▶ No –federal funding
 - ▶ 232 homes



Onion Creek Buyouts Austin, TX

Rescue the rescuers

- October 2013 flood (Halloween Flood)
 - ▶ 4 deaths
 - ▶ 825 homes flooded in 2013
 - ▶ 300 had already been purchased in federal buy-out
- Causes
 - ▶ Lack of regulatory products
 - ▶ Inadequate regulatory products
 - ▶ Upstream development



BUILDING STRONG®

Texas Weather

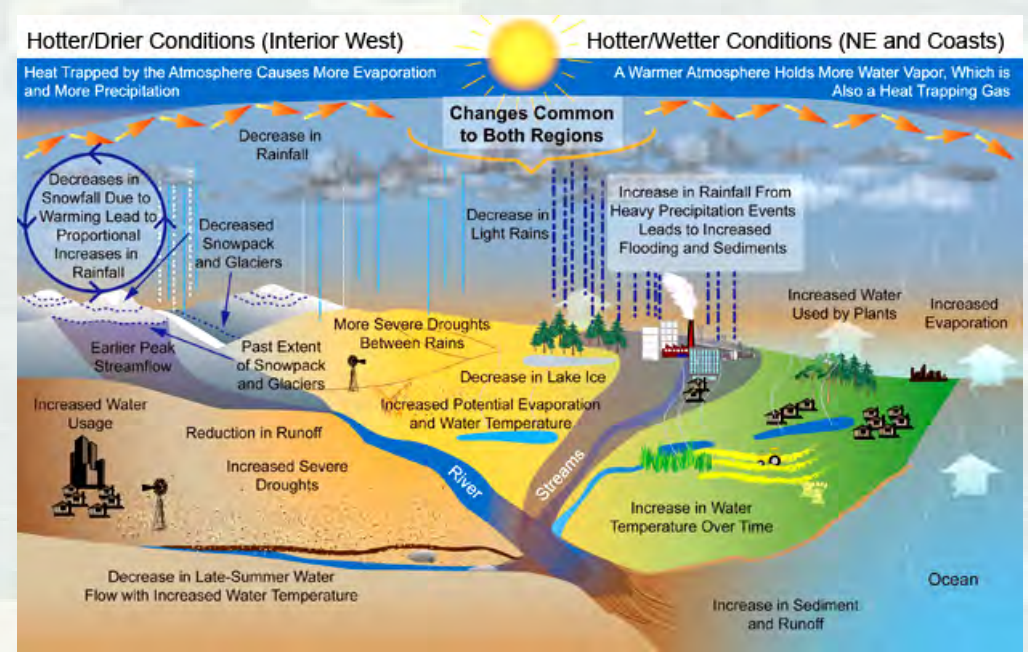
Significant Climate Variability

Droughts to Floods

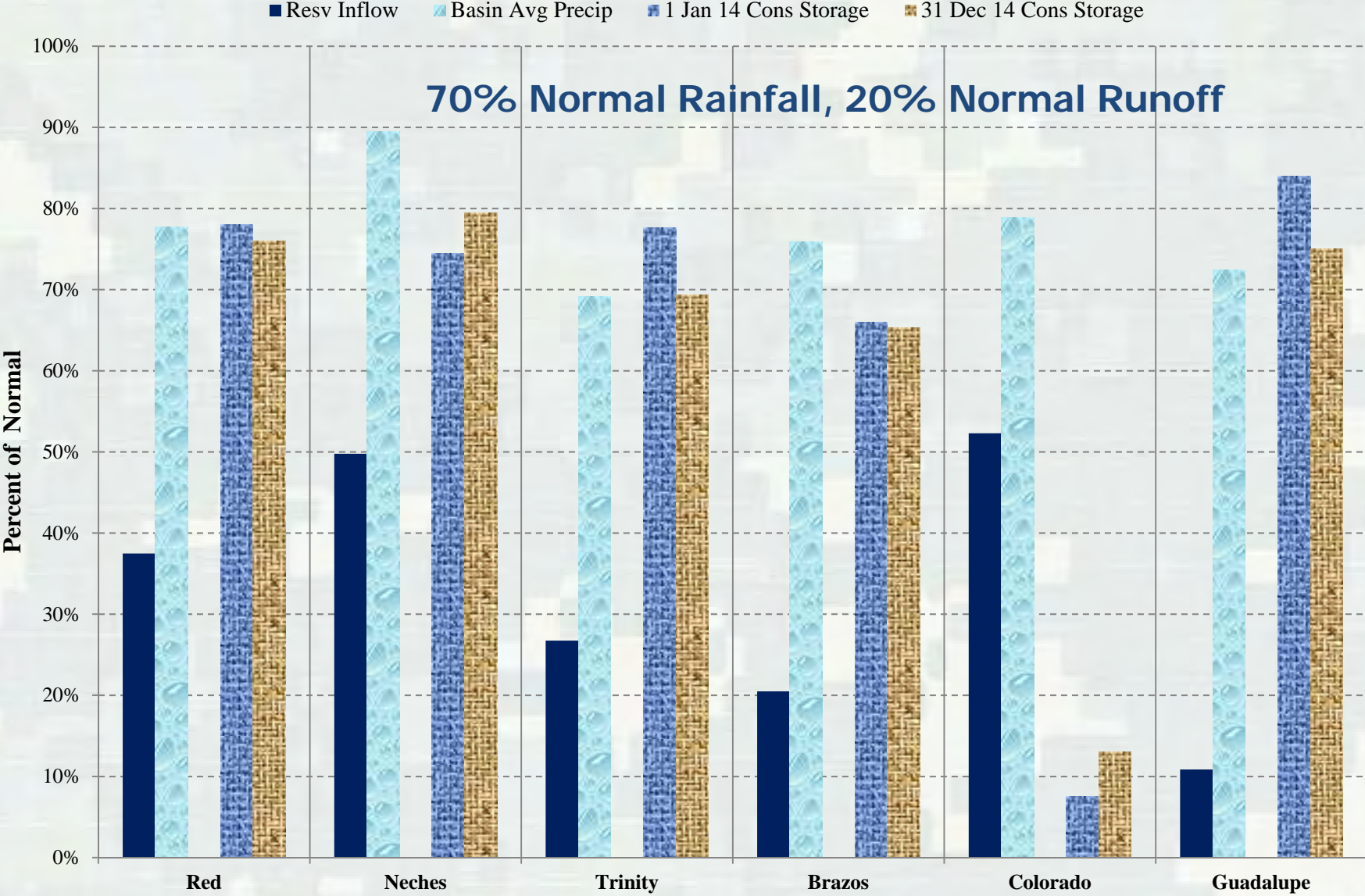


Managing the Impacts of Climate Change and Climate Variability

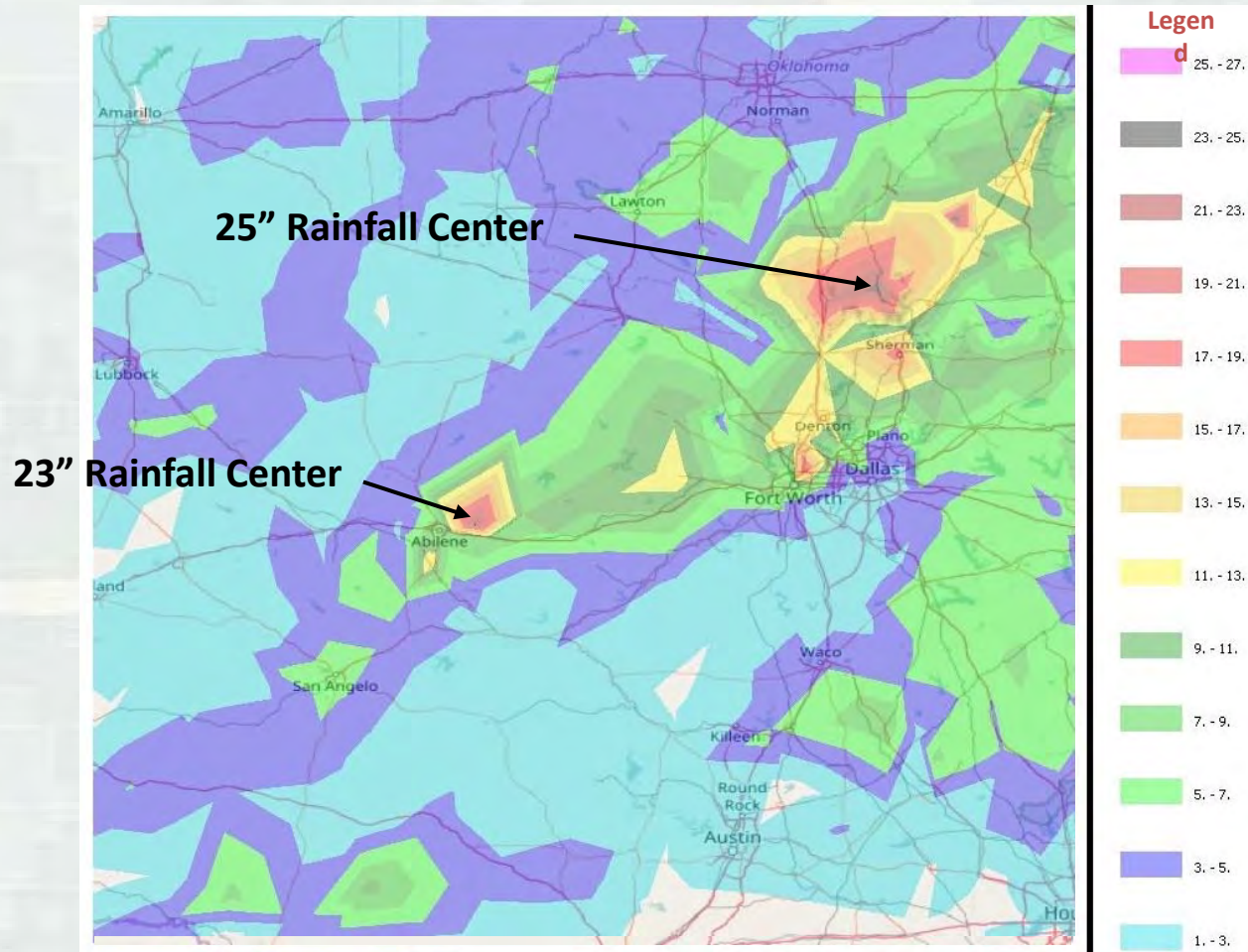
- Hotter/drier interior and west
- Hotter/wetter NE and coasts
- Decrease in light rainfall events
- Increase in extreme storm events
- More severe droughts



Summary of Projects Averages for CY2014 Reservoir Inflow & Basin Average Precip



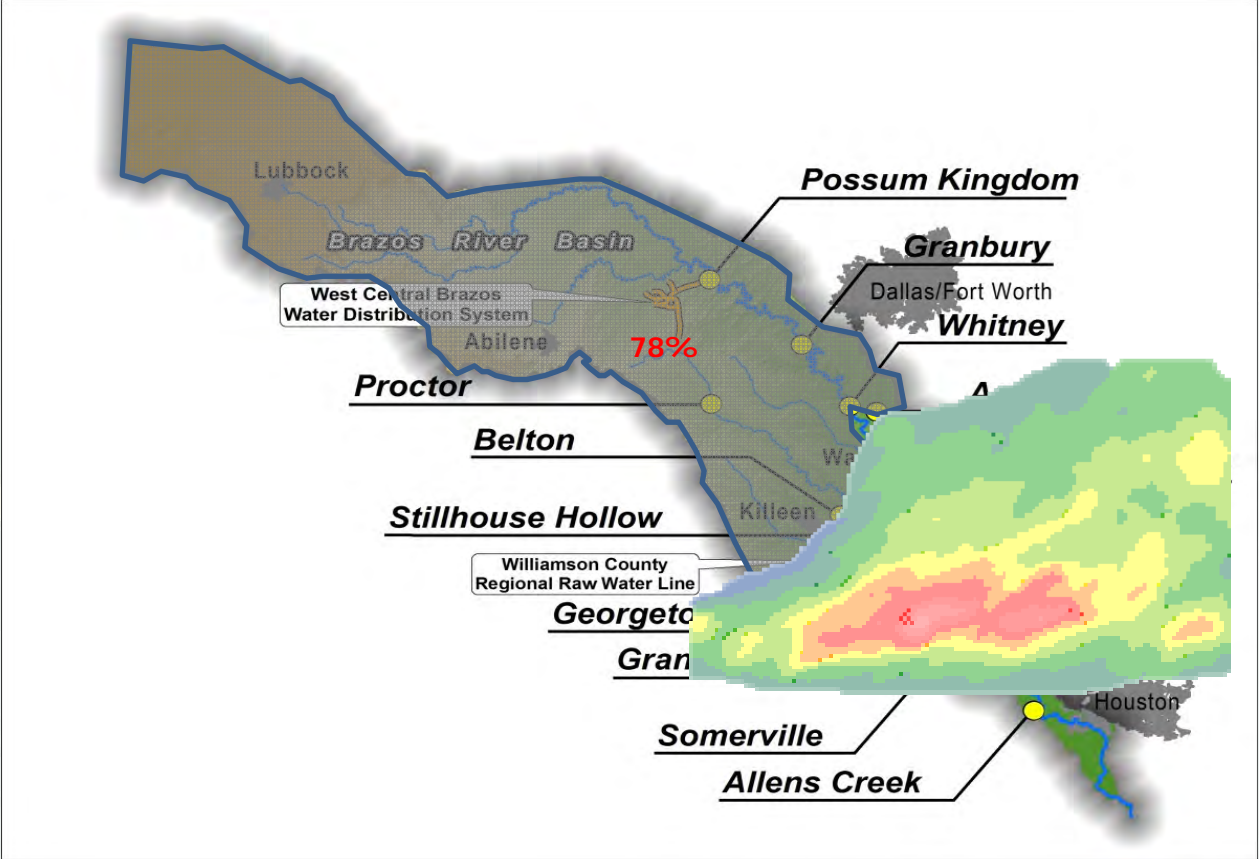
Clyde, TX – October 1981



BUILDING STRONG®

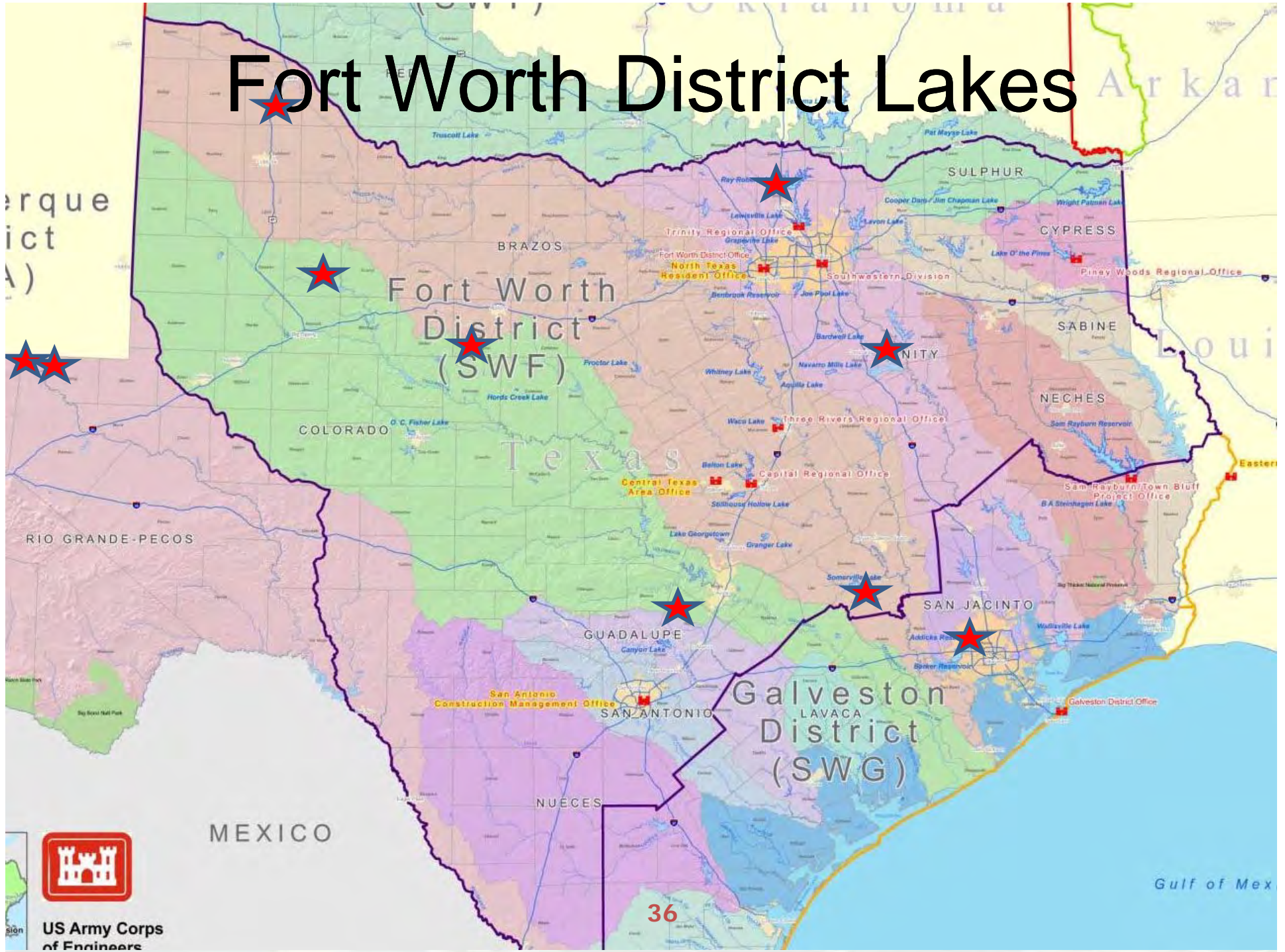
Brazos River Basin Reservoirs

May 26-27, 2016



BUILDING STRONG®

Fort Worth District Lakes



US Army Corps
of Engineers

Higher Standards

- Existing National Standard (Is this Appropriate for Texas)
 - ▶ 1% exceedance or 100-year elevation
 - ▶ 1' above the 1% exceedance or 100-year elevation
- Higher standards
 - ▶ 2', 3', 4' ... above the 1% exceedance or 100-year elevation
 - ▶ At or above the .2% exceedance or 500-year elevation
- Executive Order 11988 amended by 13690
 - ▶ 2' or 3' above the 1% exceedance or 100-year elevation
 - ▶ At or above the .2% exceedance or 500-year elevation
- Why
 - ▶ Less risk
 - ▶ Decrease future losses and costs
 - ▶ Lower insurance premiums



Questions?



**US Army Corps
of Engineers**

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

Jerry L. Cotter, P.E.

Chief Water Resources

(817) 886-1549 TEL

(817) 454-1290 CEL

Jerry.L.Cotter@usace.army.mil



BUILDING STRONG®

Stormwater and Transportation Infrastructure Nexus

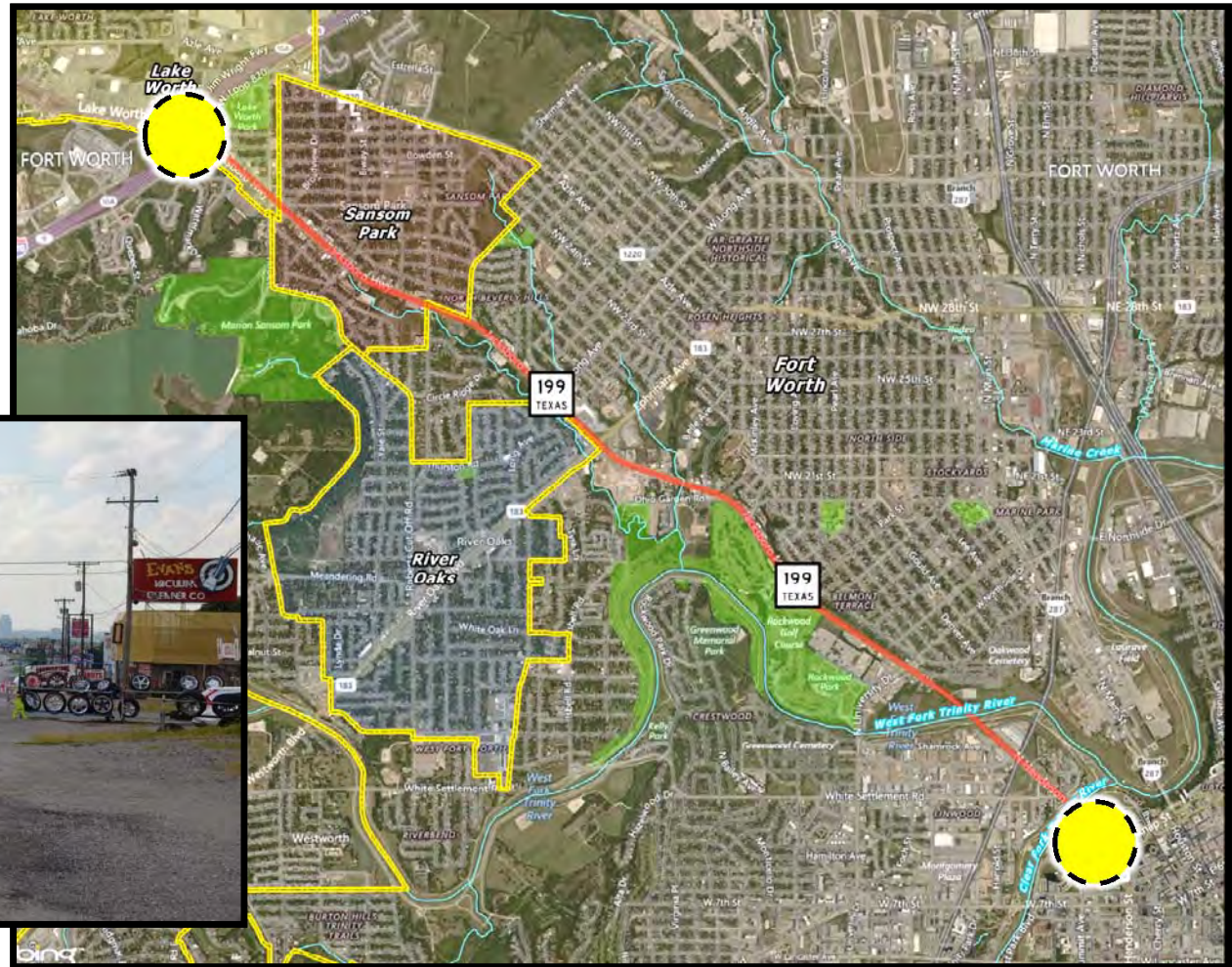
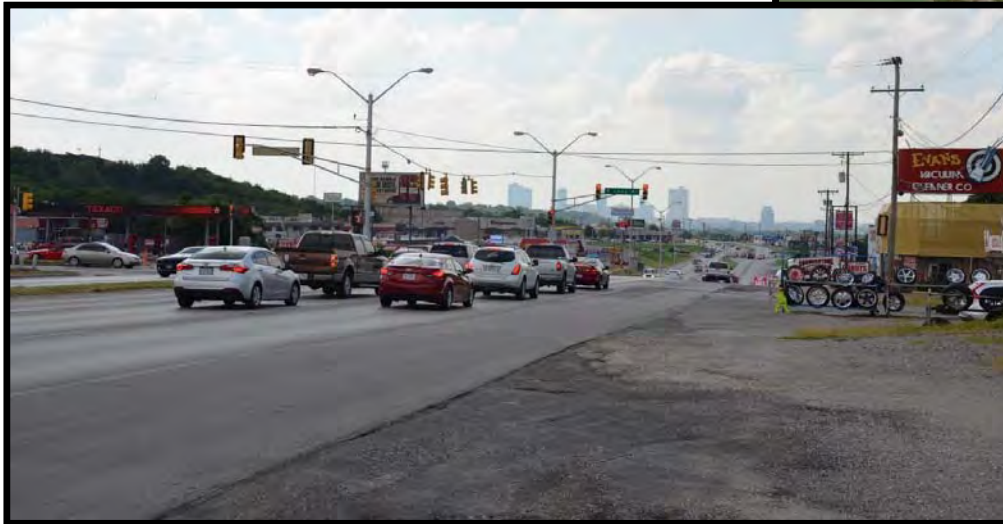
Dan Kessler
Assistant Director of Transportation
North Central Texas Council of Governments

Project Limits

From: IH 820

To: Belknap Street

Length: 6 Miles



Current Infrastructure



Current Infrastructure



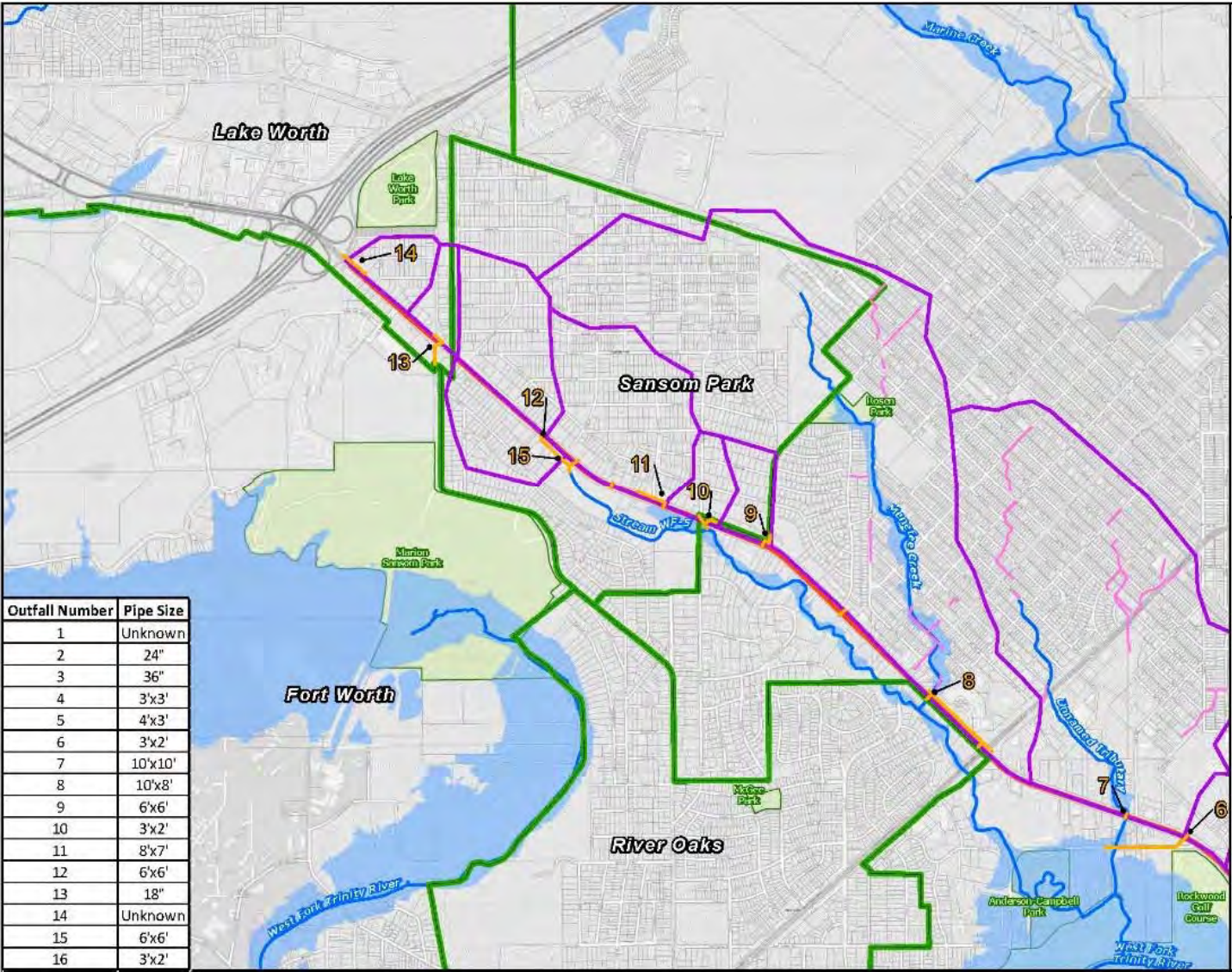
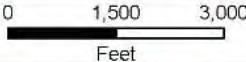
Existing Infrastructure SH 199 Exhibit 1-1

State Highway 199
Corridor Master Plan

Legend

- Project Limits
- SH 199 Drainage Systems
- Off Site Drainage Systems
- Stream Centerline
- Drainage Areas
- FEMA 100yr Floodplain
- Panther Island Bypass Channel
- Parks
- Bridges
- City Limits
- Outfall Location

Key Map



Outfall Number	Pipe Size
1	Unknown
2	24"
3	36"
4	3'x3'
5	4'x3'
6	3'x2'
7	10'x10'
8	10'x8'
9	6'x6'
10	3'x2'
11	8'x7'
12	6'x6'
13	18"
14	Unknown
15	6'x6'
16	3'x2'

Parcel Data Source: Tarrant Appraisal District Parcels 2015 Date: 1/18/2017
Floodplain Data Source: FEMA Flood Zones 2016

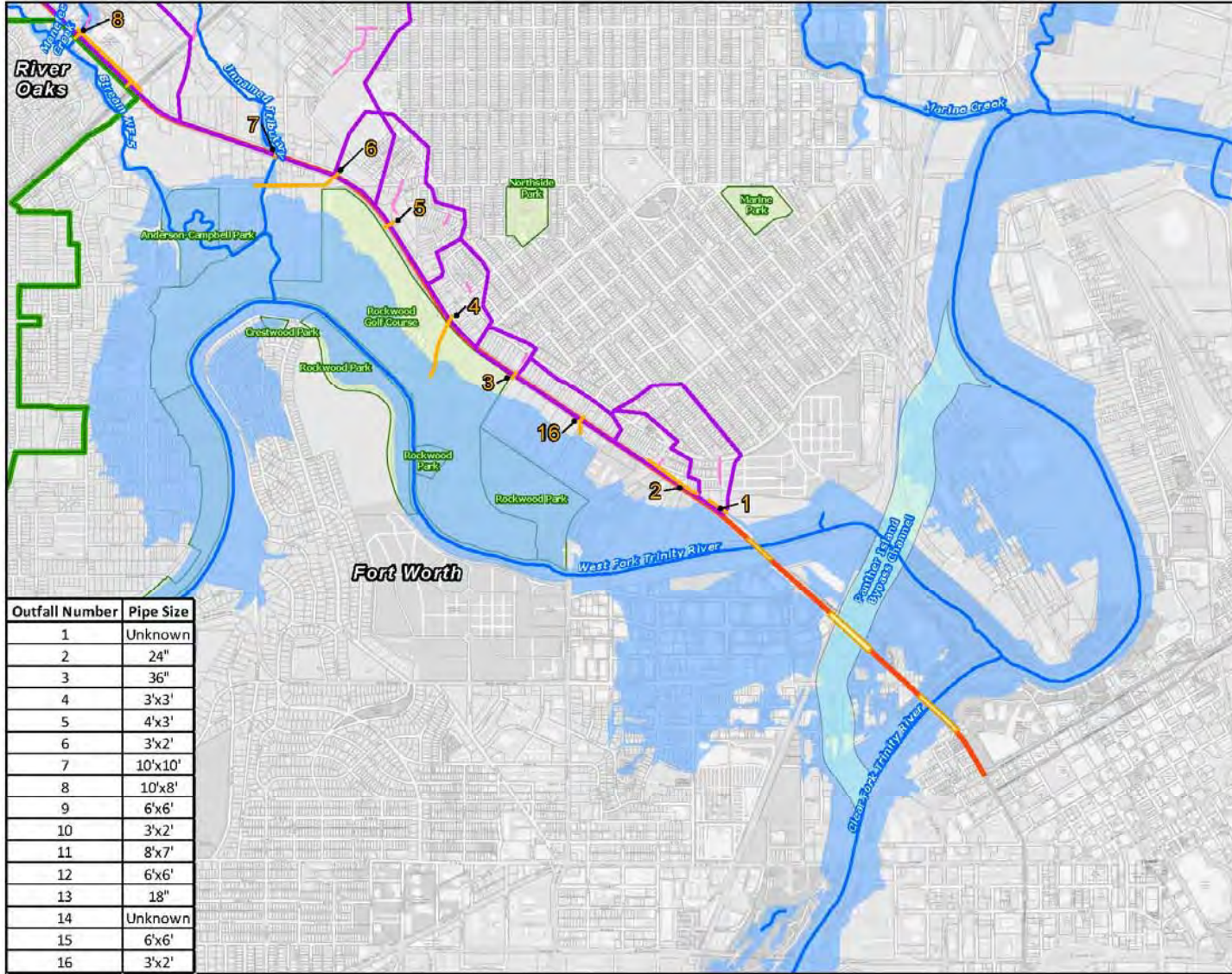
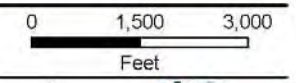
Existing Infrastructure SH 199 Exhibit 1-2

State Highway 199 Corridor Master Plan

Legend

- Project Limits
- SH 199 Drainage Systems
- Off Site Drainage Systems
- Stream Centerline
- Drainage Areas
- FEMA 100yr Floodplain
- Panther Island Bypass Channel
- Parks
- Bridges
- City Limits
- Outfall Location

Key Map



Outfall Number	Pipe Size
1	Unknown
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4	3'x3'
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Parcel Data Source: Tarrant Appraisal District Parcels 2016 Date: 1/18/2017
Floodplain Data Source: FEMA Flood Zones 2016

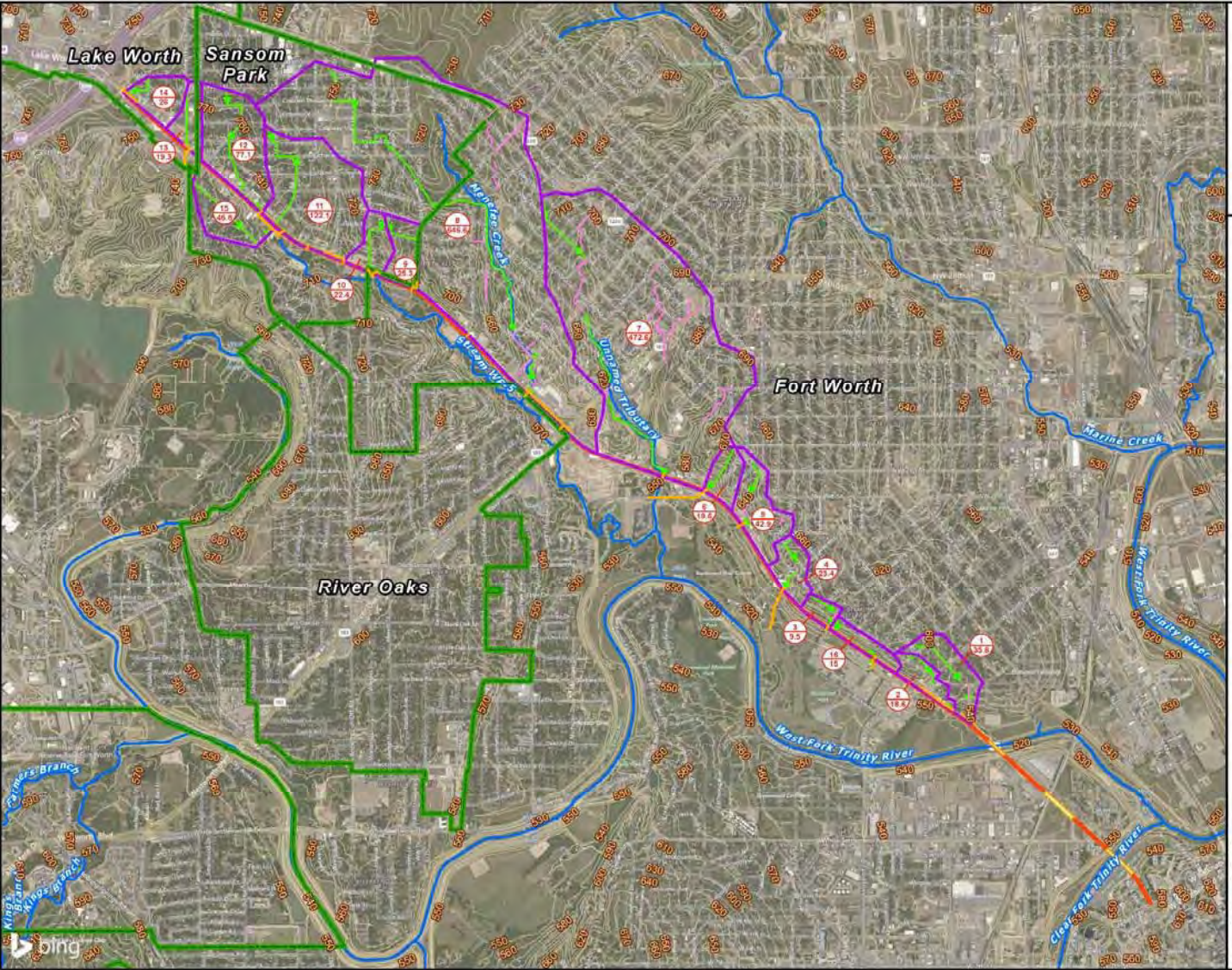
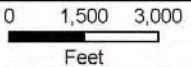
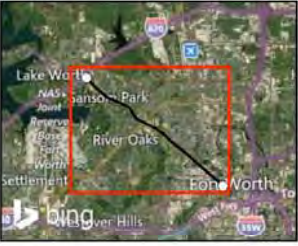
Drainage Area Map SH 199 Exhibit 2

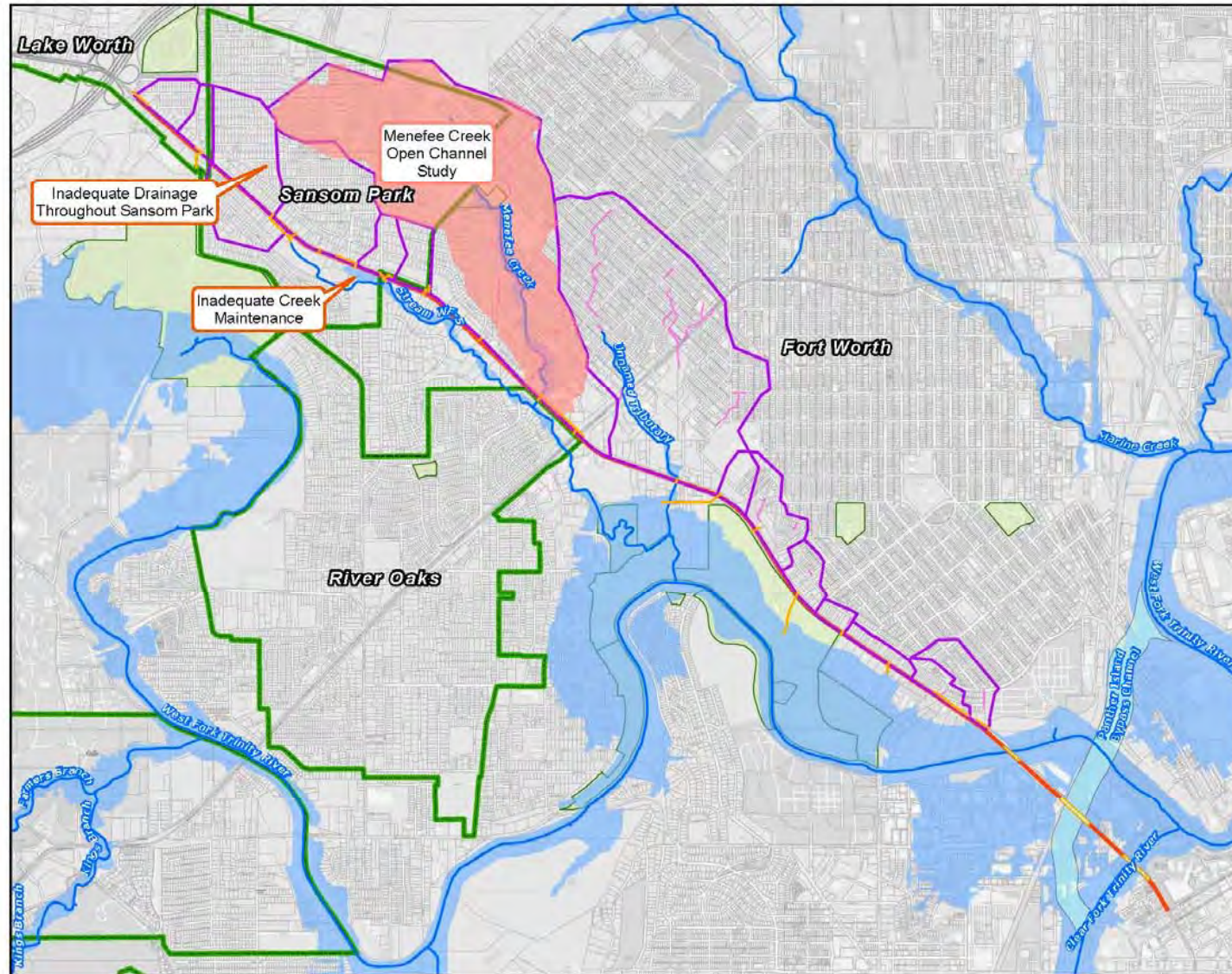
State Highway 199
Corridor Master Plan

Legend

-  Project Limits
-  SH 199 Drainage System
-  Off Site Drainage Systems
-  Stream Centerline
-  Drainage Areas
-  Bridges
-  City Limits
-  Flowpath
-  10-ft Contour
-  Subbasin Name
Area (acres)

Key Map





Known Issues SH 199 Exhibit 3

State Highway 199
Corridor Master Plan

Legend

- Project Limits
- SH 199 Drainage System
- Off Site Drainage Systems
- Stream Centerline
- Drainage Areas
- FEMA 100yr Floodplain
- Panther Island Bypass Channel
- Parks
- Bridges
- City Limits

Key Map



0 1,500 3,000

Feet








Parcel Data Source: Tarrant Appraisal District Parcels 2015 Date: 1/18/2017
Floodplain Data Source: FEMA Flood Zones 2016

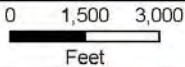
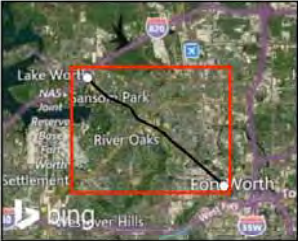
Existing Land Use SH 199 Exhibit 4

State Highway 199
Corridor Master Plan

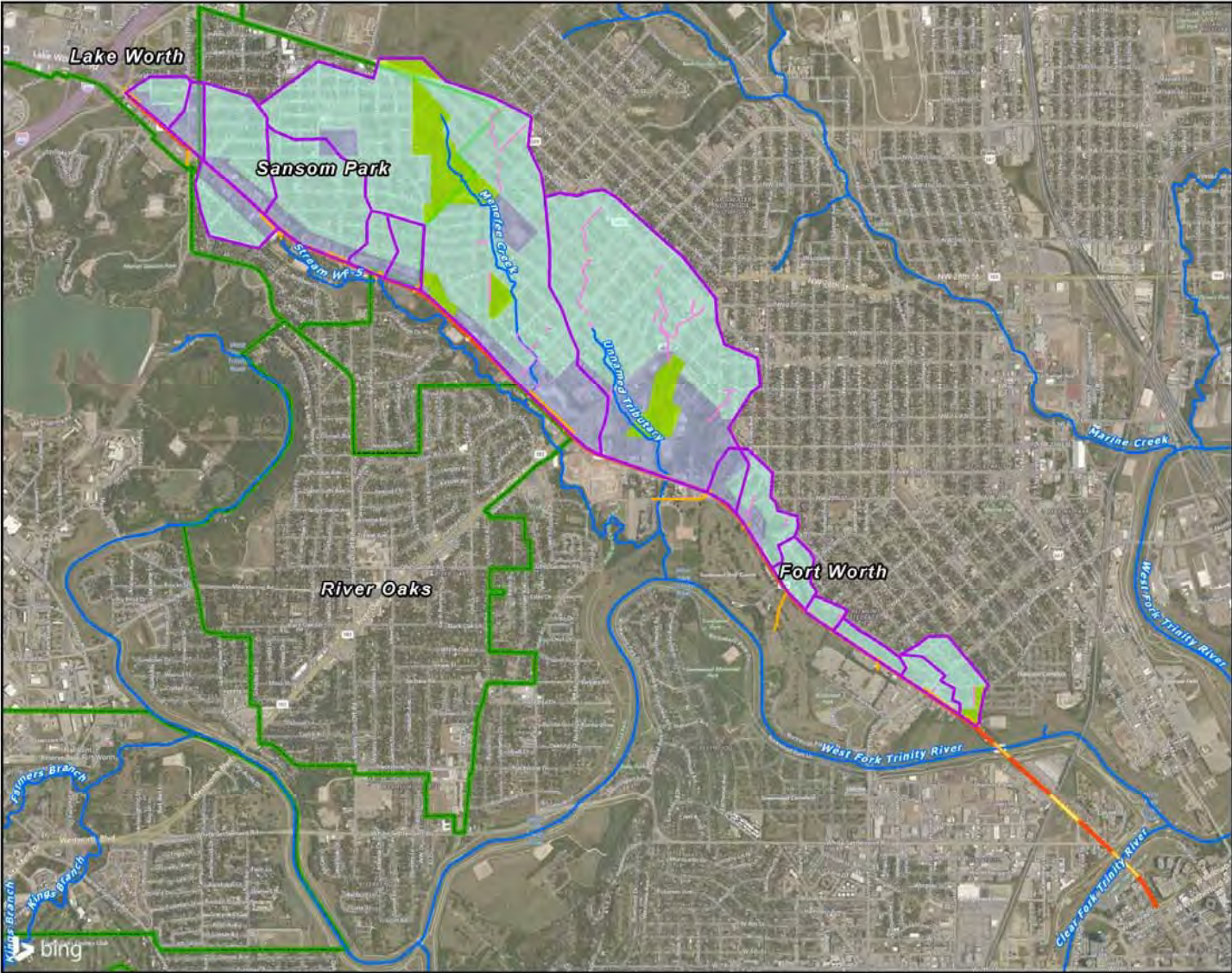
Legend

-  Project Limits
-  SH 199 Drainage System
-  Off Site Drainage Systems
-  Stream Centerline
-  Drainage Areas
-  Bridges
-  City Limits
- Land Use**
-  Commercial
-  Medium Density Residential
-  Park

Key Map



Date: 1/16/2017



MTP Policy Bundle Voluntary Measures

Action Type	Program Area	Policy Name	Policy	Agencies to Adopt or Implement					
				Cities	Counties	TxDOT	NTTA	Transit Authorities	ISDs
Governing Body Approval	Roadways	Urban Thoroughfare Revitalization	Implement land-use and transportation programs and policies to revitalize and redevelop aging infrastructure (at least 20+ years old) to provide context sensitive solutions for urban thoroughfares on the state roadway systems and other important community roadways that have significant development of commercial, retail, and other uses.	X	X	X			
Governing Body Approval	Environmental	Stormwater Management	Implement sustainable stormwater practices for transportation improvements and site development to promote improved water quality, flood control, and reduced run-off effects.	X	X	X	X	X	X
Governing Body Approval	Air Quality	Clean Construction	Encourage use of lower-emission construction equipment on transportation projects which are awarded federal funding by the RTC and conduct comparison studies to compare regular contracts.	X	X	X	X	X	X
Governing Body Approval	Transit	Transit Funding: Level 1	Allocate local funds to support public transit (e.g. participate as a member of a transit authority, contract for transit service, build transit-oriented developments).	X	X			X	
Ordinance	Air Quality	Idling Restrictions	Implement and enforce Locally Enforced Motor Vehicle Idling Limitations, consistent with RTC Resolution R08-03, which limits the idling of certain vehicles to five minutes or less and provides for enforcement mechanisms.	X	X				X
Ordinance	Freight	Freight-Oriented Development	Enhance freight-oriented land-use sustainability by requiring local governments to adopt compatible zoning requirements to property adjacent to freight-oriented development land uses.	X					
Ordinance	Aviation	Unmanned Aircraft Systems	Implement operational restrictions and other requirements of Unmanned Aircraft Systems around regionally significant aviation facilities.	X	X				
Election	Transit	Transit Funding: Level 2	Participate in some form of membership with a transportation authority that results in rail transportation investments and more efficient land-use development.	X	X			X	
Total				20	17	12	7	10	7
Need 50% of Eligible Policies				10	8	6	3	5	3

Joint Staff Coordination: Regional Transportation Council staff and local agency staff work together to implement and encourage within the region. Governing Body Approval: Resolution, Court Order, Minute Order or other instrument reflecting governing body approval. Ordinance: Ordinance or other locally enforceable rule or law. Election: Requires an election in order to implement.

Legislation and Tools for Counties

John Ivey, PE, CFM

Legislation Enabling Counties to Manage Floodplain Development

- The State specifically address the NFIP in the Texas Water Code under Section 16 Subchapter I. Flood Insurance

§ 16.312. PURPOSE. The State of Texas recognizes the personal hardships and economic distress caused by flood disasters since it has become uneconomic for the private insurance industry alone to make flood insurance available to those in need of such protection on reasonable terms and conditions. Recognizing the burden of the nation's resources, congress enacted the National Flood Insurance Act of 1968, as amended (42 U.S.C. Sections 4001 through 4127), whereby flood insurance can be made available through coordinated efforts of the federal government and the private insurance industry, by pooling risks, and the positive cooperation of state and local government. The purpose of this subchapter is to evidence a **positive interest in securing flood insurance coverage under this federal program and to so procure for those citizens of Texas desiring to participate and in promoting the public interest by providing appropriate protection against the perils of flood losses and in encouraging sound land use by minimizing exposure of property to flood losses.**

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977.

Legislation Enabling Counties to Manage Floodplain Development

- Additionally, The Texas Water Code states:
- To be eligible to participate the political subdivision must be able to qualify under the requirement of 44 CFR, Subchapter B – Insurance and Hazard Mitigation criteria.

§ 16.3145. NATIONAL FLOOD INSURANCE PROGRAM ORDERS OR ORDINANCES.

The **governing body of each city and county** shall adopt ordinances or orders, as appropriate, necessary for the city or county to be **eligible** to participate in the National Flood Insurance Program.

44 CFR 59.2 (b) **To qualify** for the sale of federally-subsidized flood insurance a community must adopt and submit to the Federal Insurance Administrator. as part of its application, flood plain management regulations, satisfying at a minimum the criteria set forth at part 60 of this subchapter, designed to reduce or avoid future flood, mudslide (i.e., mudflow) or flood-related erosion damages. **These regulations must include effective enforcement provisions.**

Legislation Enabling Counties to Manage Floodplain Development

- The Texas Water Code goes on say:

§ 16.315. POLITICAL SUBDIVISIONS; COMPLIANCE WITH FEDERAL REQUIREMENTS. **All political subdivisions are hereby authorized to take all necessary and reasonable actions to comply with the requirements and criteria of the National Flood Insurance Program, including but not limited to:**

- (1) making appropriate land use adjustments to constrict the development of land which is exposed to flood damage and minimize damage caused by flood losses;
- (2) guiding the development of proposed future construction, where practicable, away from a location which is threatened by flood hazards;
- (3) assisting in minimizing damage caused by floods;
- (4) authorizing and engaging in continuing studies of flood hazards in order to facilitate a constant reappraisal of the flood insurance program and its effect on land use requirements;
- (5) engaging in floodplain management and adopting and enforcing permanent land use and control measures consistent with the criteria established under the National Flood Insurance Act;**
- (6) declaring property, when such is the case, to be in violation of local laws, regulations, or ordinances which are intended to discourage or otherwise restrict land development or occupancy in flood-prone areas and notifying the director, or whomever the director designates, of such property;**
- (7) consulting with, giving information to, and entering into agreements with the Federal Emergency Management Agency for the purpose of:
 - (A) identifying and publishing information with respect to all flood areas, including coastal areas; and
 - (B) establishing flood-risk zones in all such areas and making estimates with respect to the rates of probable flood-caused loss for the various flood-risk zones for each of these areas;

Legislation Enabling Counties to Manage Floodplain Development

- The Texas Water Code goes on say (continued):

§ 16.315. POLITICAL SUBDIVISIONS; COMPLIANCE WITH FEDERAL REQUIREMENTS. All political subdivisions are hereby authorized to take all necessary and reasonable actions to comply with the requirements and criteria of the National Flood Insurance Program, including but not limited to: **(Continued)**

(8) cooperating with the director's studies and investigations with respect to the adequacy of local measures in flood-prone areas as to land management and use, flood control, flood zoning, and flood damage prevention;

(9) taking steps, using regional, watershed, and multi-objective approaches, to improve the long-range management and use of flood-prone areas;

(10) purchasing, leasing, and receiving property from the director when such property is owned by the federal government and lies within the boundaries of the political subdivision pursuant to agreements with the Federal Emergency Management Agency or other appropriate legal representative of the United States Government;

(11) requesting aid pursuant to the entire authorization from the commission;

(12) satisfying criteria adopted and promulgated by the commission pursuant to the National Flood Insurance Program;

(13) adopting permanent land use and control measures with enforcement provisions which are consistent with the criteria for land management and use adopted by the director;

(14) adopting more comprehensive floodplain management rules that the political subdivision determines are necessary for planning and appropriate to protect public health and safety;

(15) participating in floodplain management and mitigation initiatives such as the National Flood Insurance Program's Community Rating System, Project Impact, or other initiatives developed by federal, state, or local government; and

(16) collecting reasonable fees to cover the cost of administering a local floodplain management program.

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1985, 69th Leg., ch. 795, § 1.051, eff. Sept. 1, 1985; Acts 2001, 77th Leg., ch. 258, § 2, eff. Sept. 1, 2001.

Legislation Enabling Counties to Manage Floodplain Development

- The Texas Water Code defines political subdivision to include Counties:

Sec. 16.313. DEFINITIONS. In this subchapter:
(1) "Political subdivision" means any political subdivision or body politic and corporate of the State of Texas **and includes any county**, river authority, conservation and reclamation district, water control and improvement district, water improvement district, water control and preservation district, fresh water supply district, irrigation district, and any type of district heretofore or hereafter created or organized or authorized to be created or organized pursuant to the provisions of Article XVI, Section 59 or Article III, Section 52 of the Constitution of the State of Texas; "political subdivision" also means any interstate compact commission to which the State of Texas is a party, municipal corporation, or city whether operating under the Home Rule Amendment of the Constitution or under the General Law.

Legislation Enabling Counties to Manage Floodplain Development

- The Texas Water Code additionally makes a statement in regards to “Qualification”:

§ 16.319. QUALIFICATION. Political subdivisions wishing to qualify under the National Flood Insurance Program shall have the authority to do so by complying with the directions of the Federal Emergency Management Agency and by:

- (1) evidencing to the director a positive interest in securing flood insurance coverage under the National Flood Insurance Program; and
- (2) giving to the director **satisfactory assurance that measures will have been adopted for the political subdivision which measures will be consistent with the comprehensive criteria for land management and use developed by the Federal Emergency Management Agency.**

Amended by Acts 1977, 65th Leg., p. 2207, ch. 870, § 1, eff. Sept. 1, 1977; Acts 1977, 65th Leg., 1st C.S., p. 58, ch. 4, § 3, eff. Sept. 1, 1977; Acts 2001, 77th Leg., ch. 258, § 4, eff. Sept. 1, 2001.

Legislation Enabling Counties to Manage Floodplain Development

- To address the question of actual enforcement ability, the level of penalty is defined in Texas Water Code Chapter 16, Subchapter I, Sec. 16.322-16.323:

Sec. 16.322. CIVIL PENALTY. A person who violates this subchapter or a rule adopted or order issued under this subchapter is subject to a civil penalty of not more than \$100 for each act of violation and for each day of violation.

Sec. 16.3221. CRIMINAL PENALTY.

- (a) A person commits an offense if the person violates this subchapter.
- (b) An offense under this section is a Class C misdemeanor.
- (c) Each violation of this subchapter and each day of a continuing violation is a separate offense.

Sec. 16.323. ENFORCEMENT BY POLITICAL SUBDIVISION.

(a) If it appears that a person has violated, is violating, or is threatening to violate this subchapter or a rule adopted or order issued under this subchapter, a political subdivision may institute a civil suit in the appropriate court for:

- (1) injunctive relief to restrain the person from continuing the violation or threat of violation, including an order directing the person to remove illegal improvements and restore preexisting conditions;
- (2) the assessment and recovery of the civil penalty provided by Section 16.322; or
- (3) both the injunctive relief and the civil penalty.

(b) On application for injunctive relief and a finding that a person has violated, is violating, or is threatening to violate this subchapter or a rule adopted or order issued under this subchapter, the court shall grant the injunctive relief that the facts warrant.

Legislation Enabling Counties to Manage Floodplain Development

- The Texas Government Code, Chapter 240, Subchapter Z, Sec. 240.901 and 240.905 reinforces the Texas Water Code by directly noting the Trinity River Basin.

Sec. 240.905. LAND USE REGULATION FOR FLOOD CONTROL IN TRINITY RIVER BASIN.

(a) The commissioners court of a county located below the dam of Lake Livingston with all or part of its area within the 100-year floodplain of the Trinity River basin as described by county maps developed according to Federal Emergency Management Agency requirements may adopt and enforce rules that regulate the future construction of residences and the laying out of residential lots or the development of subdivisions in that portion of the county located in the 100-year floodplain of the Trinity River basin.

(b) Before the commissioners court may adopt and enforce the rules described in Subsection (a) of this section the commissioners court must make a determination that the rules are necessary to protect the health and safety of the public by reducing the damage caused by flooding in the 100-year floodplain.

(c) The rules described in Subsection (a) of this section apply only to development and construction commenced after the effective date of this section for:

- (1) the flood-proofing of structures constructed or placed in the floodplain;
- (2) the type of structures which may be constructed or placed in the floodplain;
- (3) the minimum elevation of structures constructed or placed in the floodplain; and
- (4) specification for drainage of residential lots or subdivisions to be laid out in the floodplain.

(d) The commissioners court may not regulate new manufactured or industrialized housing constructed to preemptive state or federal building standards for siting or zoning purposes in any manner that is different from regulation of site-built housing.

Summary of Legislative Authority

Can a Texas county legally enforce floodplain management and adopt higher standards?

- YES! The Texas Water Code was amended in 2001 by SB 936 (77R)
- Sec. 16.315. All political subdivisions are hereby authorized to take all necessary and reasonable actions to comply with the requirements and criteria of the National Flood Insurance Program

Summary of Legislative Authority

Texas Senate Bill 936 amends the Texas Water Code:

- Authorizes political subdivisions to adopt more comprehensive floodplain management rules that the political subdivision determines are necessary for planning and appropriate to protect public health and safety
- Authorizes participation in floodplain management and mitigation initiatives such as FEMA's Community Rating System (CRS) Program
- Allows collection of reasonable fees to cover the cost of administering a local floodplain management program
- Allows steps, using regional, watershed, and multi-objective approaches, to improve the long-range management and use of flood-prone areas
- enforce these standards by injunctive relief and civil penalty for violations (each day of a continuing violation is a separate offense)
- Passed - 77th Legislature 2001

TFMA's Goal for Promoting Higher Standards

- Reduce the risk of loss of life and property damage from floods
- Encourage wise floodplain development
- Reduce annual flood claims
- Reduce the number of Repetitive Loss (RL) and Severe Repetitive Loss (SRL) properties
- Encourage higher floodplain standards

FEMA Recommends Freeboard

- Freeboard is a factor of safety usually expressed in feet above a flood level for purposes of floodplain management.
- "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.
- Source: www.fema.gov

Mandatory Freeboard

Federal Flood Risk Reduction = BFE +1'

- EO 13632 (2012) created the Federal Interagency Hurricane Sandy Rebuilding Task Force (Sandy Task Force)
- “Sandy Task Force” reevaluated the 1% chance (100-year) flood standard
- In April 2013, the Sandy Task Force announced a new Federal Flood Risk Reduction which requires elevation or other flood-proofing to +1' above the best available and most recent base flood elevation and applied that standard to all Federal disaster recovery investments in Sandy-affected communities.

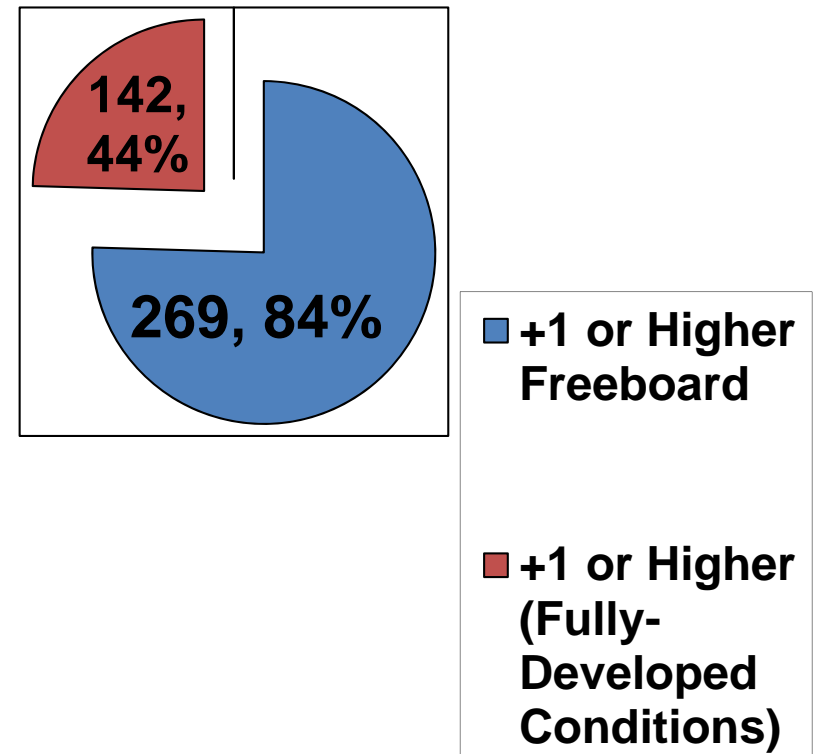
Freeboard is included in the 2015 International Residential Code

Section R322.2.1 Elevation requirements.

- Buildings and structures in flood hazard areas, including flood hazard areas designated as Coastal A Zones, shall have the lowest floors elevated to or above the base flood elevation **plus 1 foot** (305 mm), or the design flood elevation, whichever is higher.

TFMA Higher Standards (Freeboard Surveys) 2004-2017

- In 2016, 250 cities and 70 counties participated in the Higher Standards Survey
- 269 require +1' to +4' Freeboard
- 263 require stormwater detention
- 263 require the developer to conduct a study to identify the BFE and Floodway in Zone A
- 115 require Freeboard in Zone X



Example: Bastrop County 2016 TFMA Higher Standards Award

- New development must be elevated a minimum of **+2' above BFE** based on both current and fully developed watershed conditions.
- Developer must conduct a study, based on fully developed watershed conditions, and determine BFE in Zone A;
- On-site compensatory storage required along with floodway setback and mitigation of downstream impacts
- County enforces "cumulative damage over the life of the structure" threshold for substantial damage.
- Elevation Certificates are required prior to framing and when construction is completed.
- One acre minimum lot size with buildable area outside SFHA
- Floodplain must be preserved as open space, drainage easement or other defined area that limits impact
- Drainage study required to define detention needed to prevent adverse impact and mitigate downstream impacts
- Bastrop County is CRS Class 8.
- LFA is a CFM and County has 4 CFM's on staff.

Impact Fee

- "Impact fee" means a charge or assessment imposed by a political subdivision against new development in order to generate revenue for funding or recouping the costs of capital improvements or facility expansions necessitated by and attributable to the new development.

Capital Improvements Plan (CIP)

- "Capital improvements plan" means a plan required by this chapter that identifies capital improvements or facility expansions for which impact fees may be assessed.

[Added by Acts 1989, 71st Leg., ch. 1, Sec. 82(a), eff. Aug. 28, 1989. Amended by Acts 1989, 71st Leg., ch. 566, Sec. 1(e), eff. Aug. 28, 1989; Acts 2001, 77th Leg., ch. 345, Sec. 1, eff. Sept. 1, 2001.]

Capital Improvement

- "Capital improvement" means any of the following facilities that have a life expectancy of three or more years and are owned and operated by or on behalf of a political subdivision:
- (A) water supply, treatment, and distribution facilities; wastewater collection and treatment facilities; and storm water, drainage, and flood control facilities; whether or not they are located within the service area....

Sec. 395.079. Impact Fee for Storm Water, Drainage and Flood Control In Populous County

Sec. 395.079 authorizes counties to impose impact fees only if they meet “total county population” requirements.

- (a) Any county that has a population of **3.3 million or more** or that borders a county with a population of 3.3 million or more, and any district or authority created under Article XVI, Section 59, of the Texas Constitution within any such county that is authorized to provide storm water, drainage, and flood control improvements necessary to accommodate new development.

[Added by Acts 1989, 71st Leg., ch. 1, Sec. 82(a), eff. Aug. 28, 1989. Amended by Acts 2001, 77th Leg., ch. 669, Sec. 107, eff. Sept. 1, 2001.]

Only one Texas County (Harris County) meets the total county population requirement.

[Reference - <http://www.statutes.legis.state.tx.us/Docs/LG/htm/LG.395.htm>]

Harris County Stormwater Quality Management

- The Commissioners Court of Harris County, Texas adopts these Regulations in its capacity as the governing body of Harris County and the Harris County Flood Control District. The authority of Harris County to adopt these Regulations and the contents hereof is derived from Texas Local Government Code, Section 422, as amended, and these Regulations may be amended at any time by a majority of Commissioners Court as approved by the appropriate federal authorities.

[Source: www.hcfcd.org]

Harris County Stormwater Regulations

- The purpose of these Regulations is to provide land use controls necessary to comply with Harris County's NPDES or TPDES stormwater permit, to protect human life and health and to avoid increasing pollutant levels associated with storm water.
- All new development and significant redevelopment within the unincorporated areas of Harris County, Texas without first securing a SWQ Permit, or submitting an Industrial Activity Certification in accordance with Part B, Section 1.05 is prohibited

[Reference-<http://www.eng.hctx.net/permits/Stormwater-Code/Stormwater/Welcome-to-Stormwater-Quality>]

Bexar County NPDES Impact Fees

- Texas Local Government Code, Section 423.002(a)(5), authorizes a county to take certain action to comply with the requirements of the stormwater permitting program under the national pollutant discharge elimination system (Section 402, Federal Water Pollution Control Act – 33 U.S.C. Section 1342)
- Section 423 Applies to:
 - a county with a population of 2.8 million or more;
 - a district or authority created under Section 59, Article XVI, Texas Constitution, that:
 - has boundaries coterminous with a county described by subdivision and
 - is authorized to provide stormwater drainage and flood control facilities; **or**
 - a county with population of more than 1.3 million* for which the primary source of drinking water is an underground aquifer.

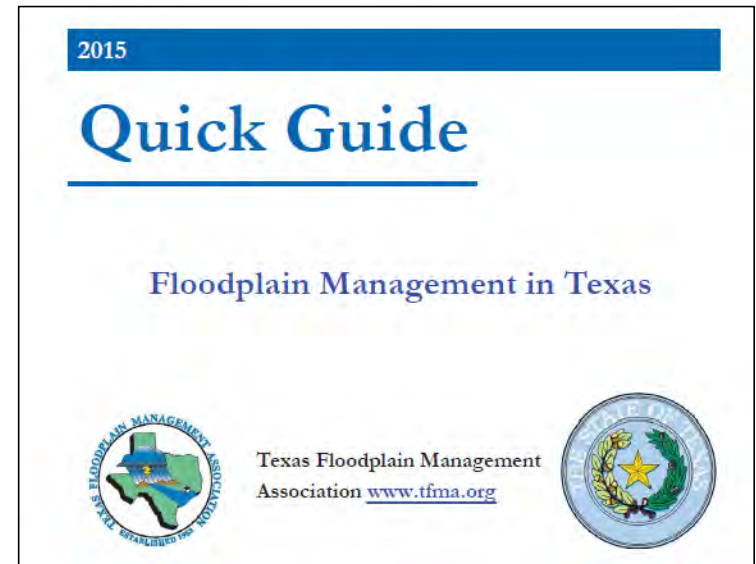
*2000 Bexar County Population = 1,392,917

Federal Stormwater Program Cost for Bexar County, Texas

Unincorporated Area		Square Footage		Annual Collection Rate	
Bexar County		Lo	High	w/Maintenance Program	
Residential					
Tier 1	RT1	0	4,999	\$	9.95
Tier 2	RT2	5,000	+	\$	13.14
Multifamily					
Tier 1	MT1	0	21,999	\$	22.22
Tier 2	MT2	22,000	43,999	\$	69.20
Tier 3	MT3	44,000	131,999	\$	209.85
Tier 4	MT4	132,000	+	\$	998.56
Commercial/General					
Tier 1	CT1	0	21,999	\$	56.62
Tier 2	CT2	22,000	43,999	\$	154.90
Tier 3	CT3	44,000	86,999	\$	277.60
Tier 4	CT4	87,000	131,999	\$	478.46
Tier 5	CT5	132,000	+	\$	1,057.09
Site Development Permit Fee				(One Time Only)	
Site Disturbance		Greater than 1 acre		\$	500.00

Other Tools for Floodplain Managers

- TFMA Quick Guide:
http://www.twdb.texas.gov/flood/resources/doc/Texas_Quick_Guide.pdf
- TFMA Higher Standards Guide (2016)
- ASFPM Higher Standards Guide (2013):
www.floods.org/ace-files/documentlibrary/committees/3-13_Higher_Standards_in_Floodplain_Management2.pdf



Summary

- As demonstrated ... enforcement of NFIP standards are minimum requirements and adopting higher standards is a **proactive way to minimize flood risks!**
- Due to the complexity and diversity in hydrologic and hydraulic problems and methodologies, available software, and the numerous decisions that have to be made, **elevating new construction only to the BFE may not be sufficient to prevent future flood damages.**
- It is our hope that this presentation provides food for thought for elected officials, floodplain managers and other professionals who develop and enforce Flood Damage Prevention Ordinances and Court Orders that **regulate development within the community.**
- It is hoped that this presentation will encourage elected officials, floodplain managers, permit officials and others to **openly discuss how to mitigate flood risks** by utilizing studies, mapping, regulations and floodplain permitting decisions that impact development in and near the floodplain.