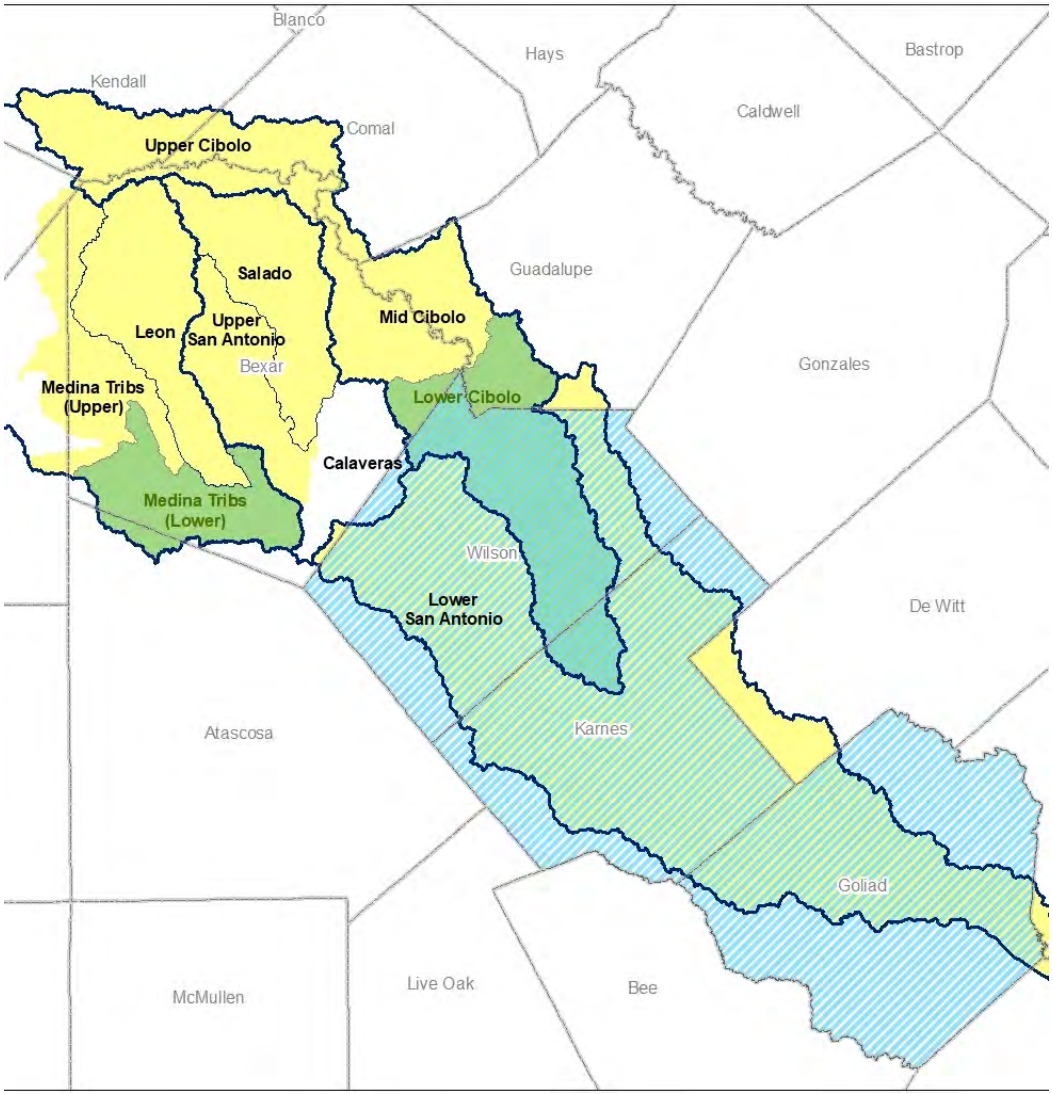
SAN ANTONIO RIVER AUTHORITY

San Antonio River Basin Floodplain Mapping Updates

December 16, 2022

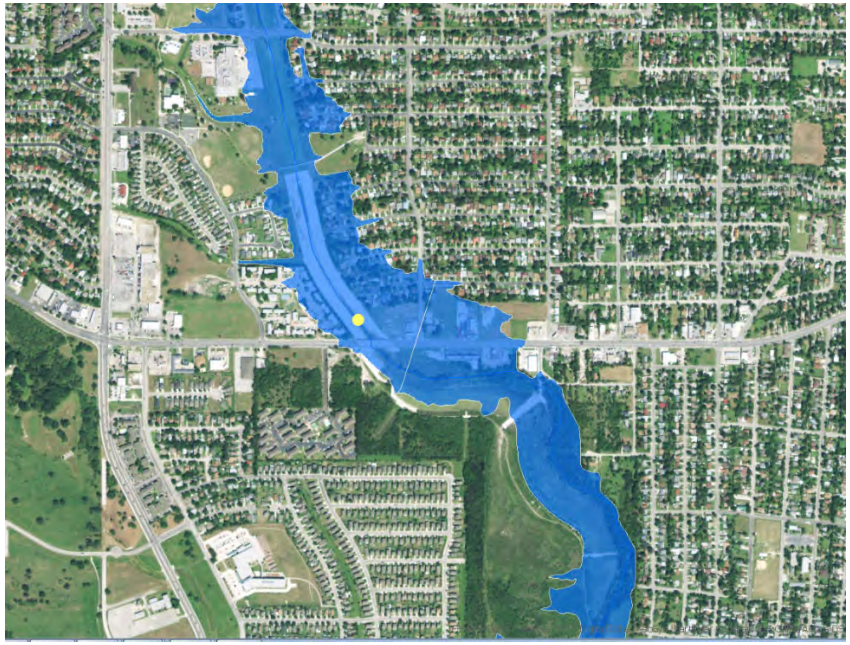
Floodplain Study Areas

Study Area	Draft Floodplains For Review
Upper Cibolo	Current rollout
Mid Cibolo	
Leon, Salado, and Upper San Antonio	
Medina Tribs (Upper)	
Lower San Antonio (1st set)	
Lower Cibolo	End of 2022/Early 2023
Medina Tribs (Lower)	
Lower San Antonio (remaining sets)	End of 2023



Floodplains vs Flood Risk

Regulatory Products



Flood Risk Products

Percent Chance Grids

Annual

30-year

Atlas 14, Volume 11

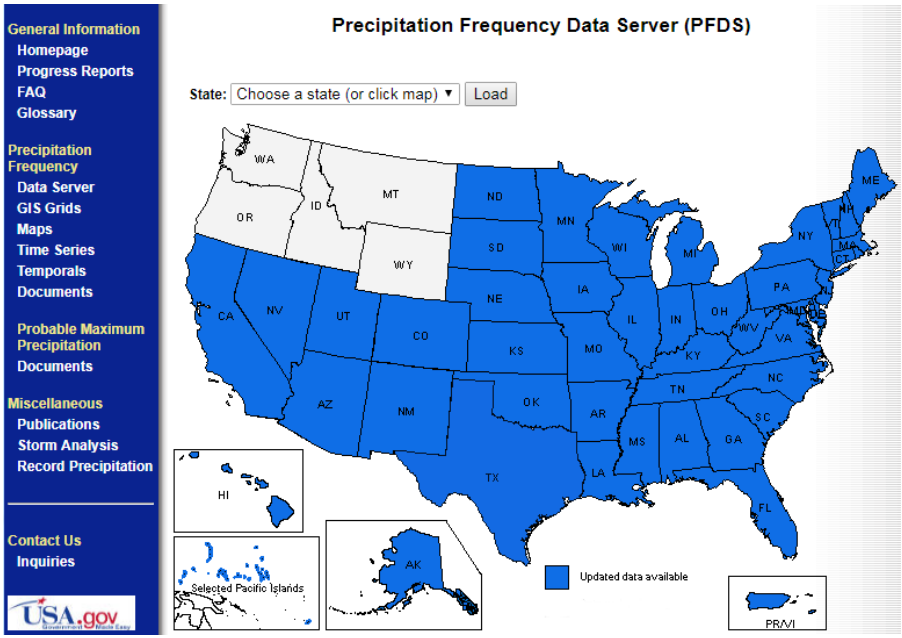
Published by National Oceanic & Atmospheric Administration (NOAA) September 2018

Study of rainfall frequency and intensity

Data from 3,900 rain gauges throughout Texas

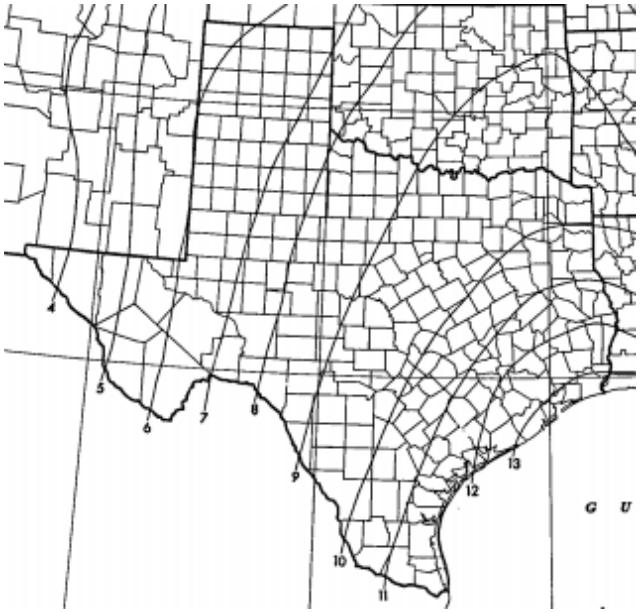
Early-to-mid 1900s through 2017

Considered best available data

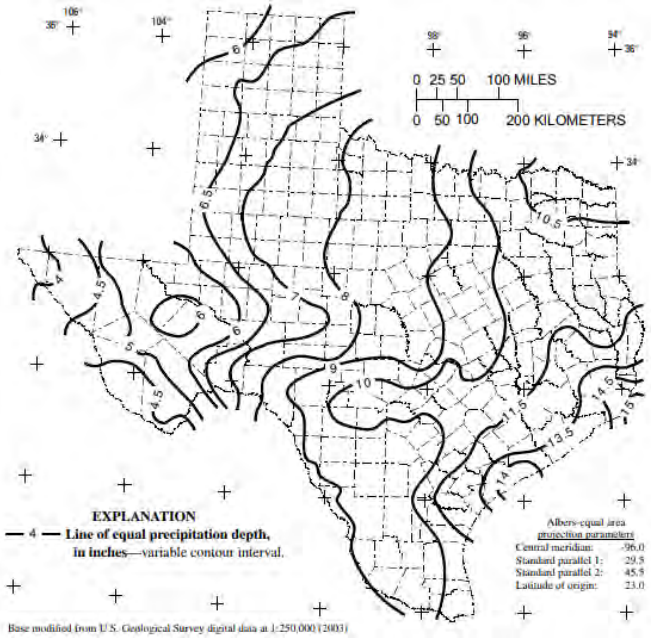


Previous Rainfall Data

Pre-2009

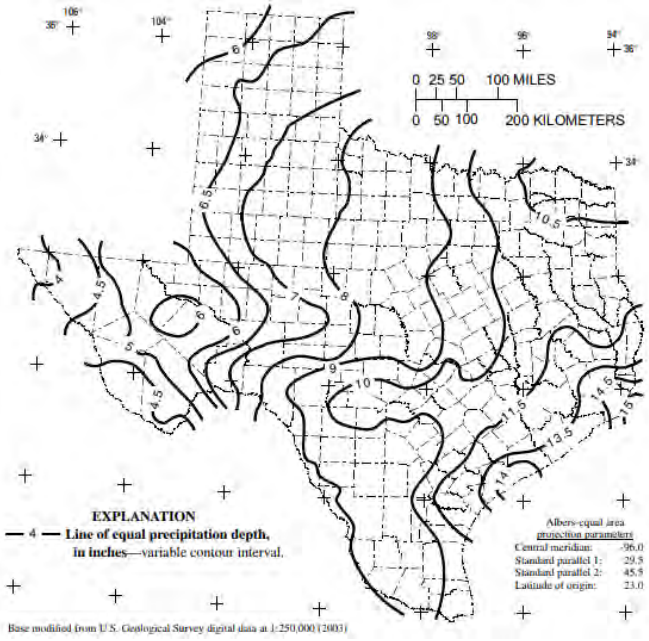


2009 to Present

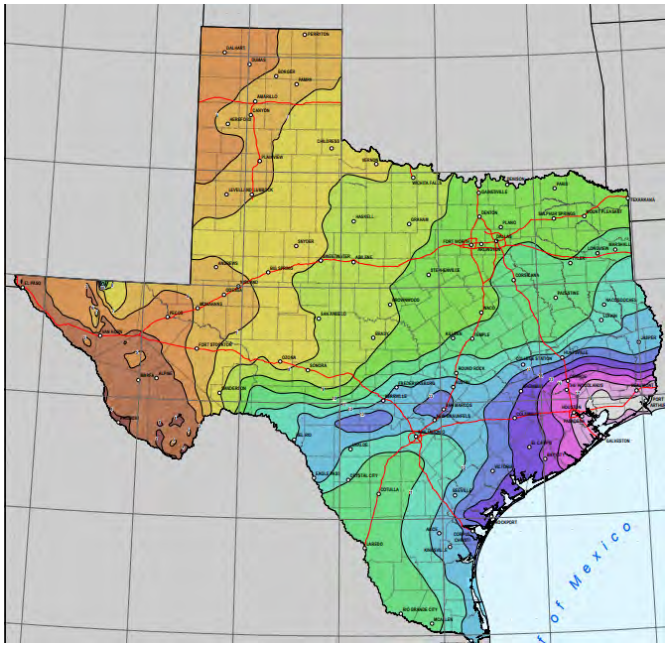


Rainfall Data Comparison

2009 to Present

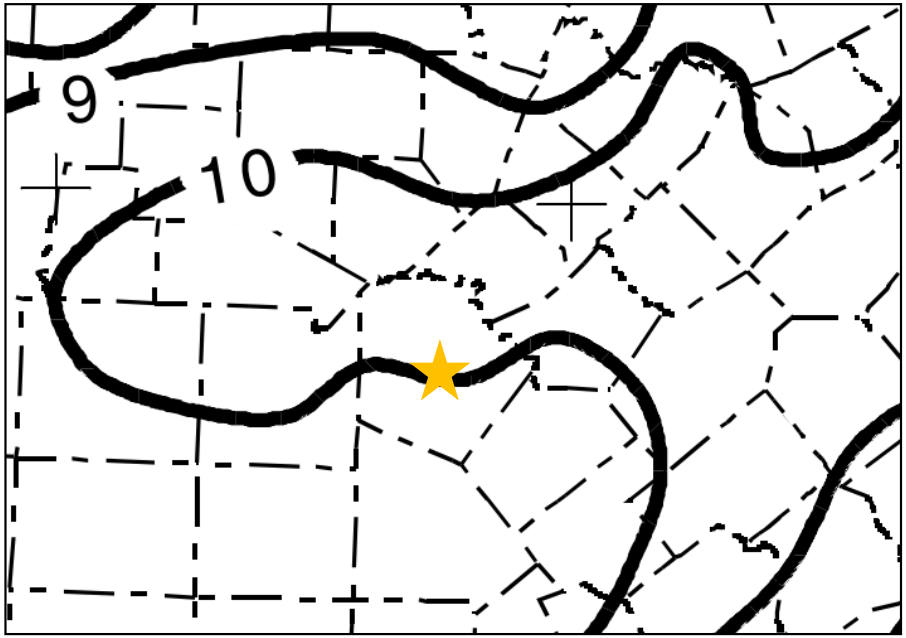


Atlas 14, Volume 11

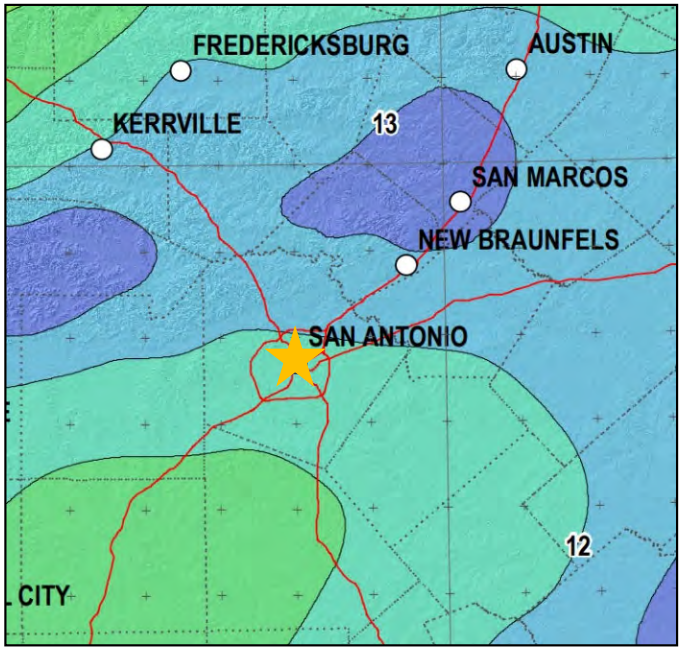


Closer Comparison: Upper Basin

2009 to Present

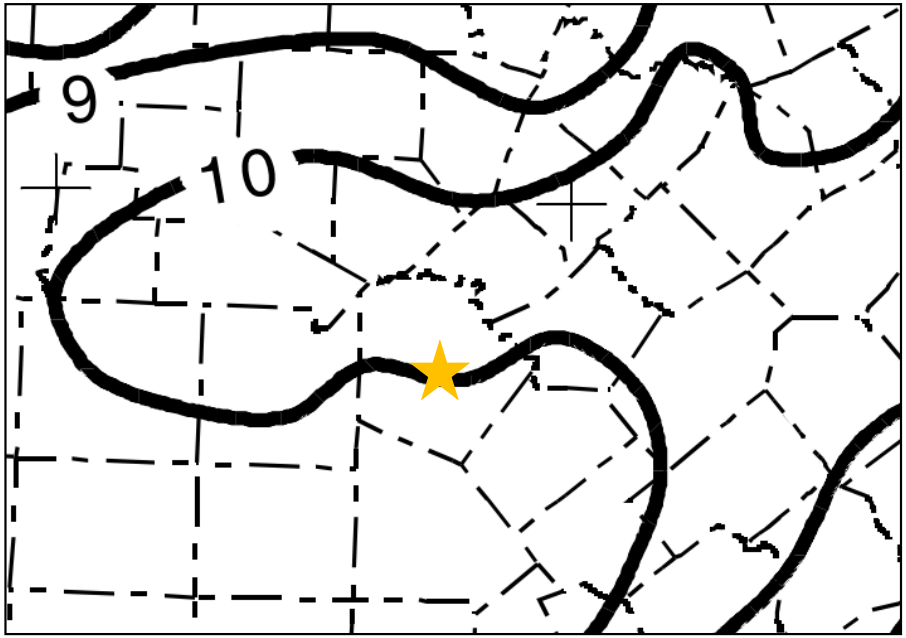


Atlas 14, Volume 11

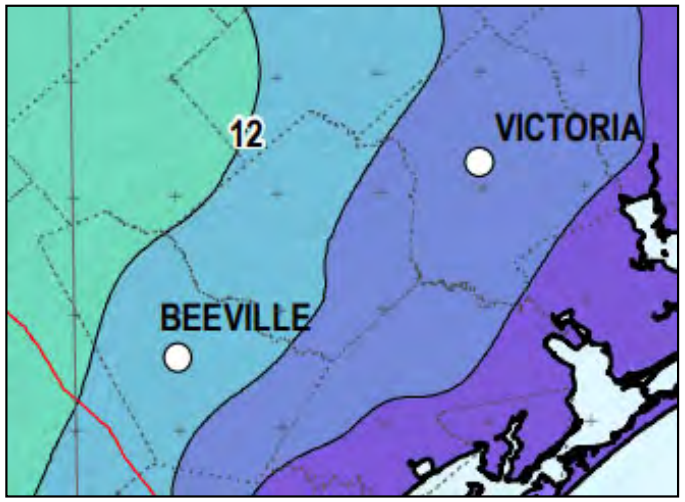


Closer Comparison: Lower Basin

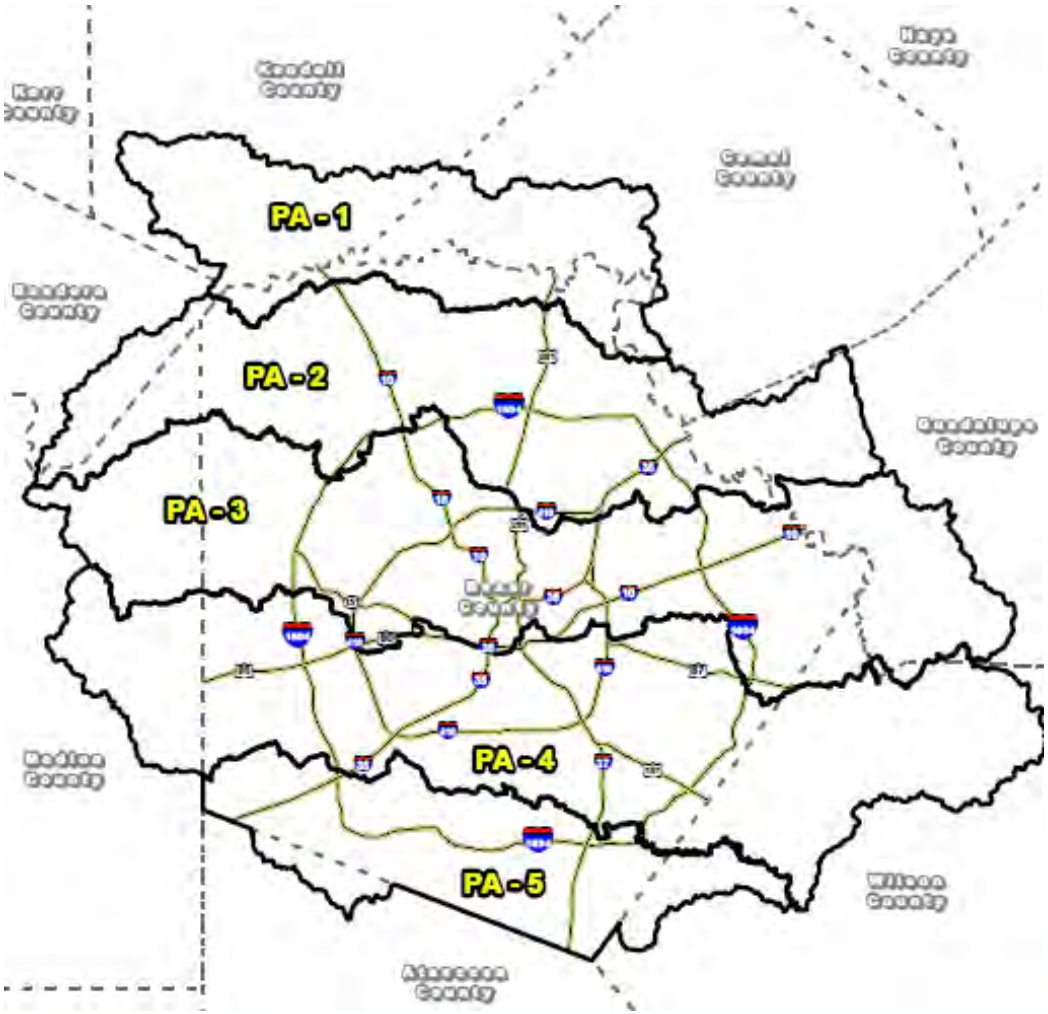
2009 to Present



Atlas 14, Volume 11



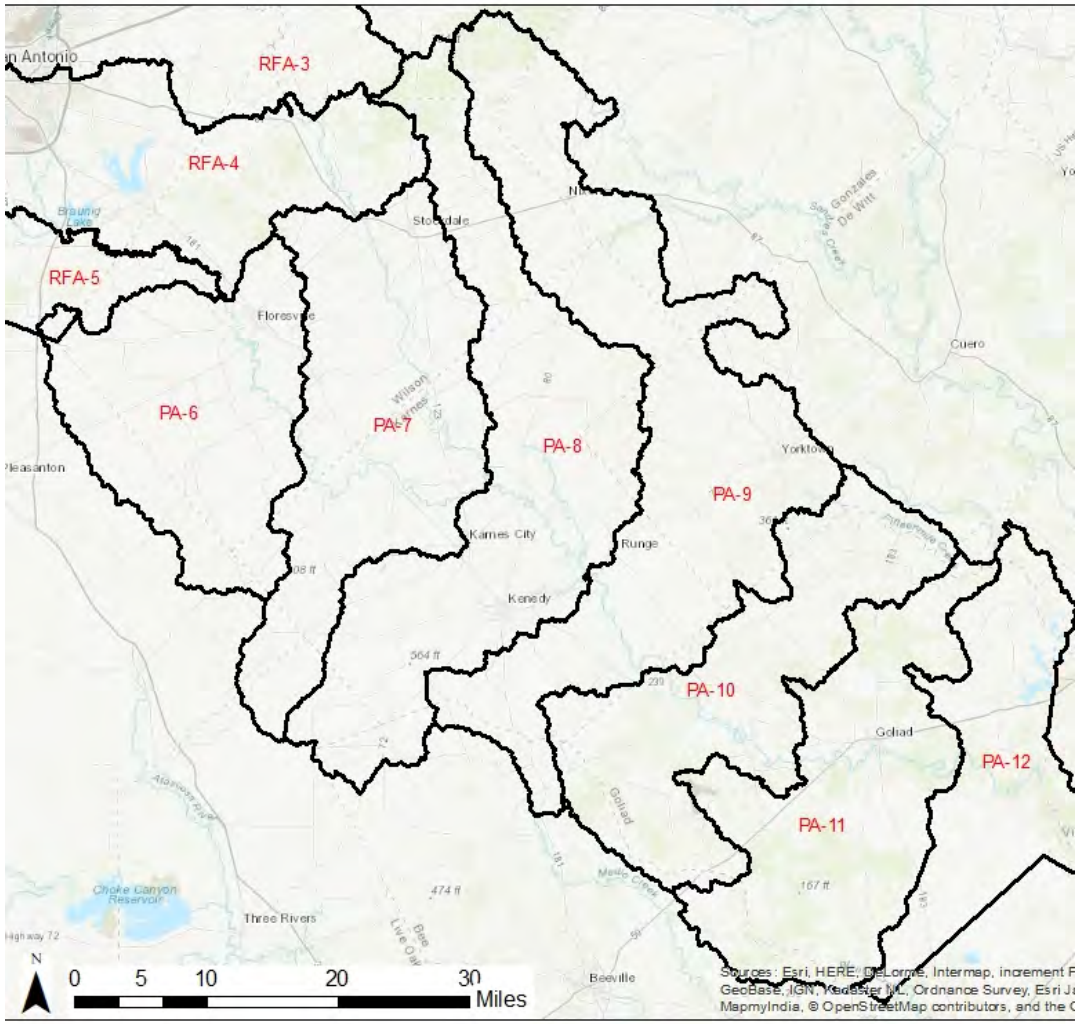
Rainfall Depths: Bexar County



Precipitation Area	Atlas 14 100-Year Design Depth
PA-1	12.87”
PA-2	12.49”
PA-3	11.97”
PA-4	11.50”
PA-5	11.15”

Rainfall Depths: Wilson, Karnes, and Goliad Counties

Precipitation Areas	1% Design Depth
RFA - 3	11.97”
RFA - 4	11.50”
RFA - 5	11.15”
PA - 6	11.16”
PA - 7	11.42”
PA - 8	11.62”
PA - 9	11.90”
PA - 10	12.37”
PA - 11	12.88”
PA - 12	13.17”

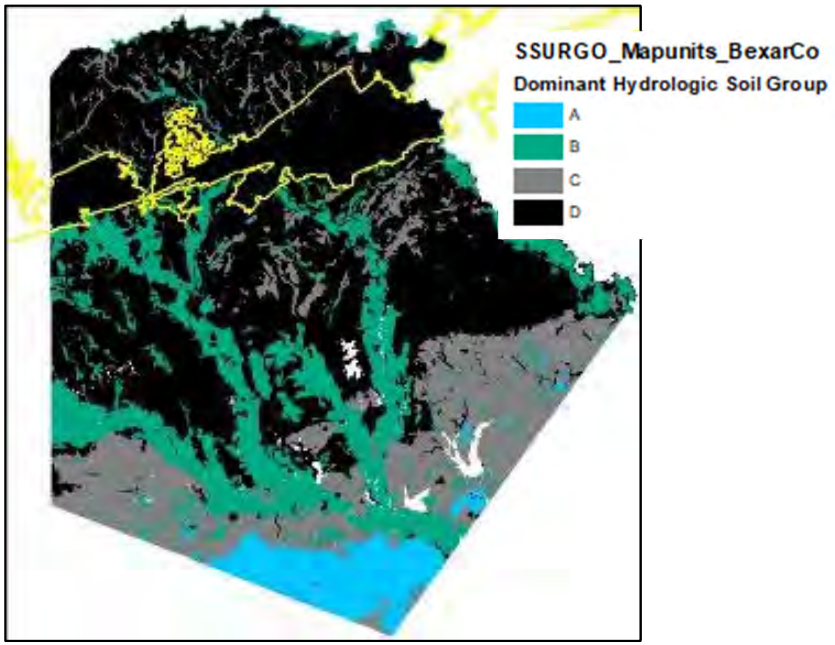


Committed to Safe, Clean, Enjoyable Creeks and Rivers.

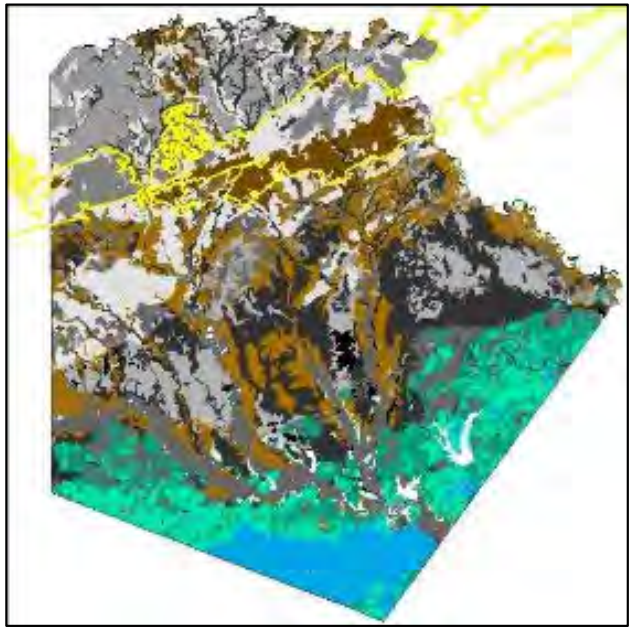
11

Loss Method

Curve Number:
Hydrologic Soil Group



Green and Ampt:
Soil Texture Class



Infiltration vs Runoff

Figures from

EM 1110-2-1417

Flood-Runoff Analysis

(1994)

EM 1110-2-1417
31 Aug 94

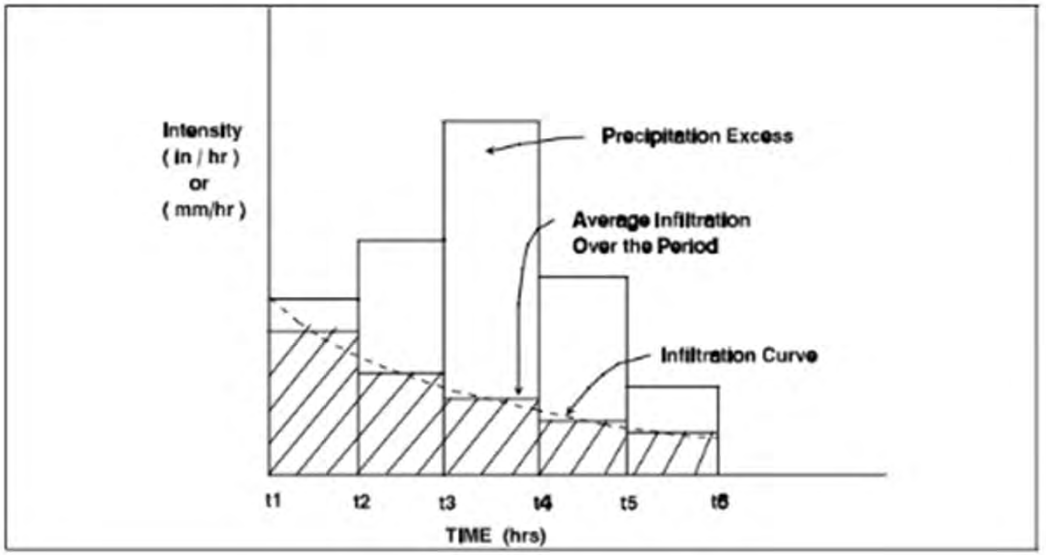


Figure 6-1. Loss rate, rainfall excess hyetograph

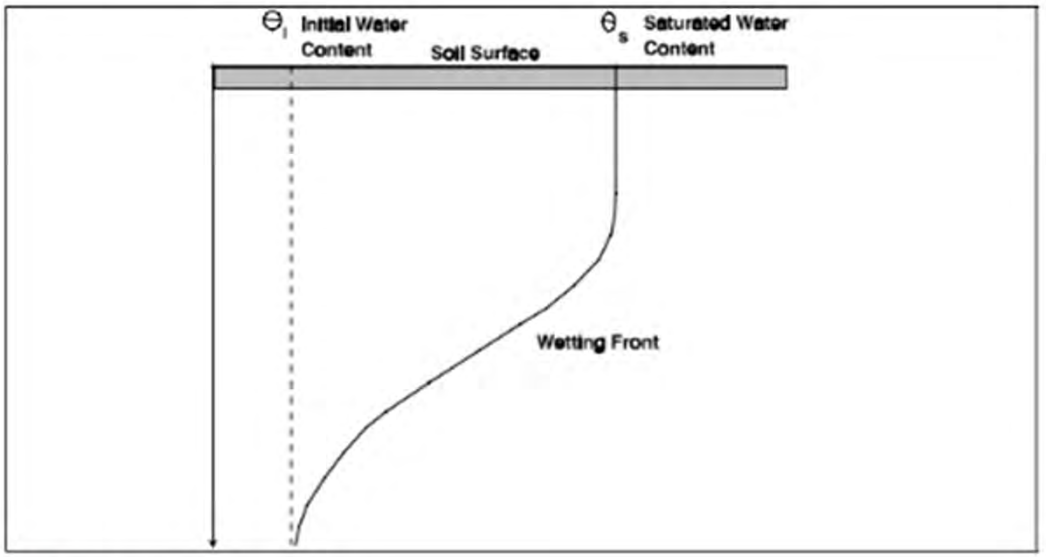
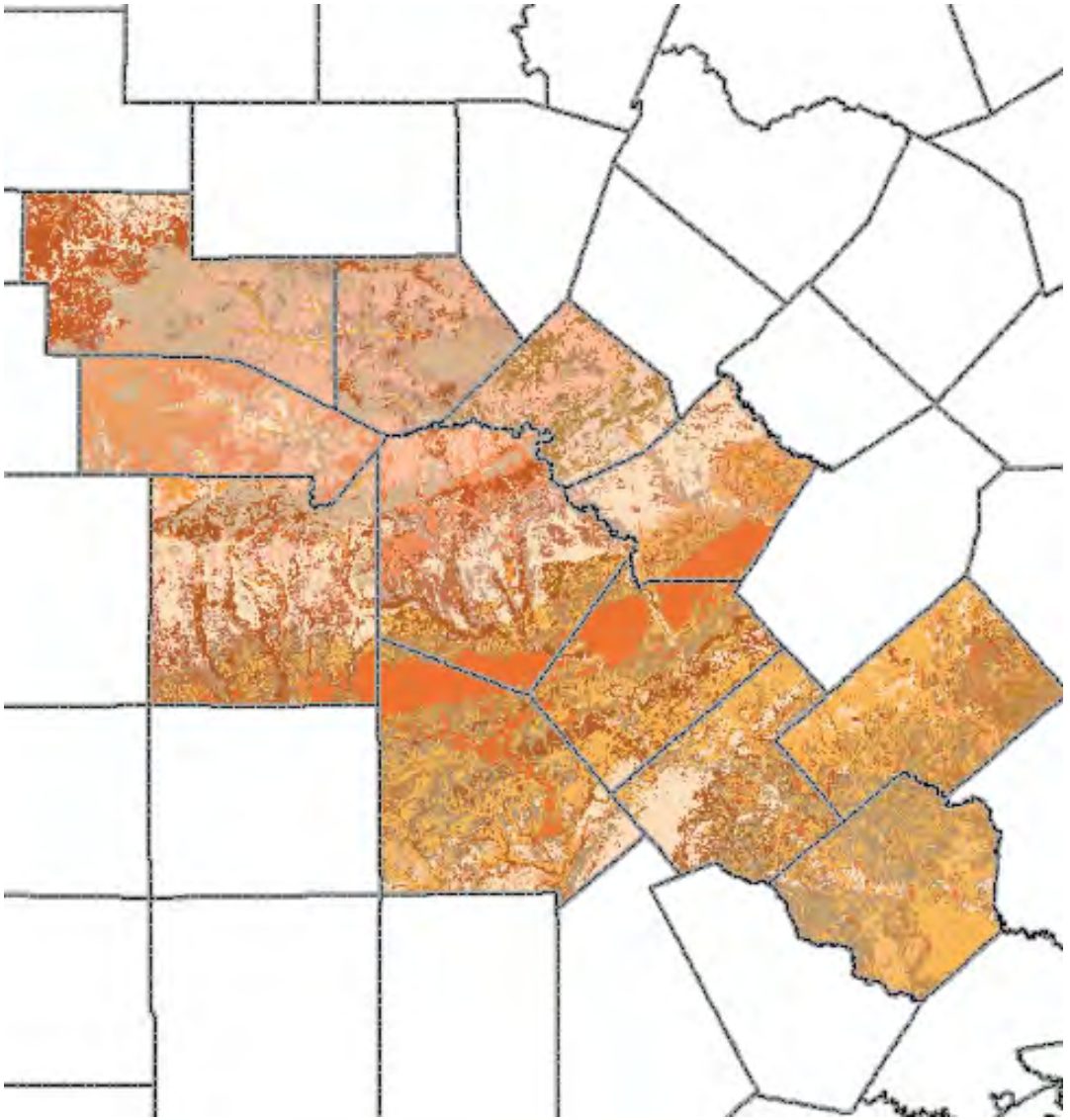


Figure 6-2. Wetting front in ideal soil

Soils Data

Soil texture classification from SSURGO

- 26 classes
- Lots of data in database
- Various depths available. Usually 0-6” used.



Green and Ampt Loss Parameters

From HMS Tech Reference (converted to inches), based on Rawls et al, 1982

By soil texture class.

11 classes

Texture Class	Porosity in/in	Hydraulic Conductivity in/hr	Wetting Front Suction in
Sand	0.437	8.27	4.17
Loamy sand	0.437	2.41	5.59
Sandy loam	0.453	1.02	8.74
Loam	0.463	0.52	12.40
Silt loam	0.501	0.27	15.91
Sandy clay loam	0.398	0.17	17.68
Clay loam	0.464	0.09	17.56
Silty clay loam	0.471	0.06	22.87
Sandy clay	0.43	0.05	25.04
Silty clay	0.479	0.04	25.47
Clay	0.475	0.02	28.11

Directly Connected Impervious Cover

To provide an initial estimate for DCIA for use in HMS (for Green and Ampt Loss calculations), guidance from ***Estimating Change in Impervious Area (IA) and Directly Connected Impervious Areas (DCIA) for Massachusetts Small MS4 Permit*** (USEPA, April 2014) was referenced. This guidance estimates DCIA using empirical formulas as a function of total impervious area for five basic watershed types. These five watershed types are associated with a grouping of land use types. Each watershed type uses formulas developed by Sutherland (2000). **Table 2** provides the five watershed types and assigned category, the associated land use for each, and the equation used to estimate DCIA.

Table 2: Directly Connect Impervious Cover Estimation Equations

Watershed Selection Criteria	Associated Land Use Categories	Sutherland Equation (where IA (%)>1)	Assigned Category
Mostly Disconnected: Small percentage of urban storm area is storm sewered or 70% or more infiltrate/disconnected	Agricultural; Forested	$DCIA = 0.01(IA)^2$	1
Somewhat Disconnected: 50% not storm sewered but open section roads, grassy swales, rooftops not directly connected, some infiltration	Low density residential	$DCIA = 0.04(IA)^{1.7}$	2
Average: Mostly storm sewered with curb and gutter, rooftops not directly connected	Commercial, Industrial, Institutional, Open land, and Medium density residential	$DCIA = 0.1(IA)^{1.5}$	3
Highly connected: Matches average with rooftops are directly connected	High density residential	$DCIA = 0.4(IA)^{1.2}$	4
Totally connected: 100% storm sewered with all IA connected	-	DCIA = IA	5

May 2013 – Upper SA

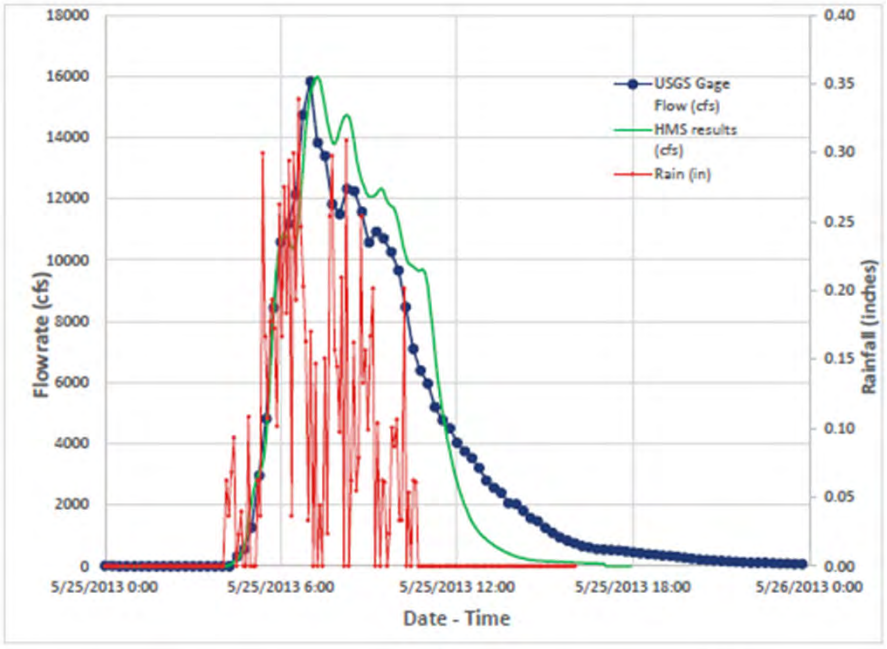


Figure 38: May 2013 Storm HMS Junction Discharge (cfs) vs. USGS Gage Discharge (cfs) for Olmos Ck at Dresden, TX gage (J-OLM-016)

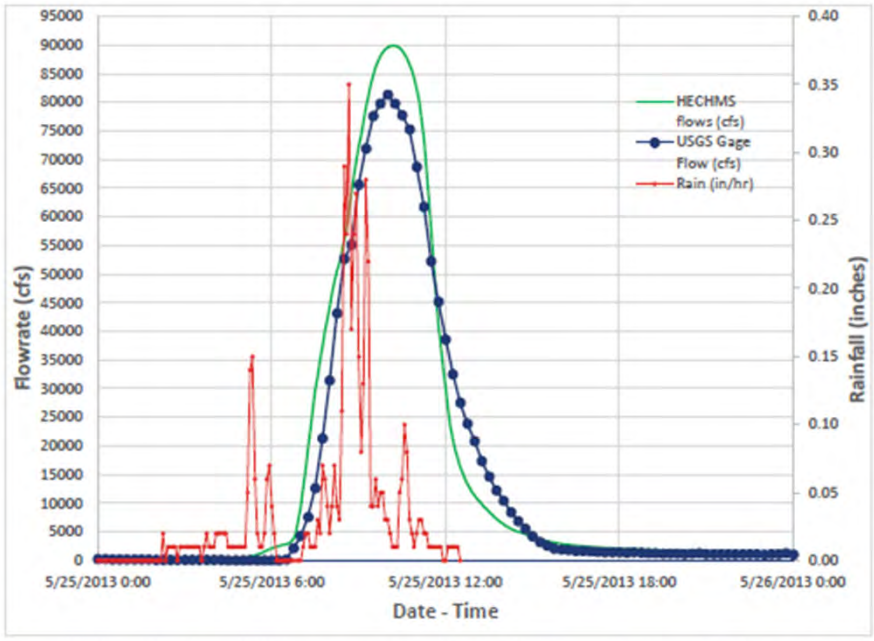


Figure 40: May 2013 Storm HMS Junction Discharge (cfs) vs. USGS Gage Discharge (cfs) for San Antonio River at Loop 410 Gage (J-SAR-020)

AECOM/Halff, *Upper San Antonio River Watershed – Hydrologic Report*, November 2021

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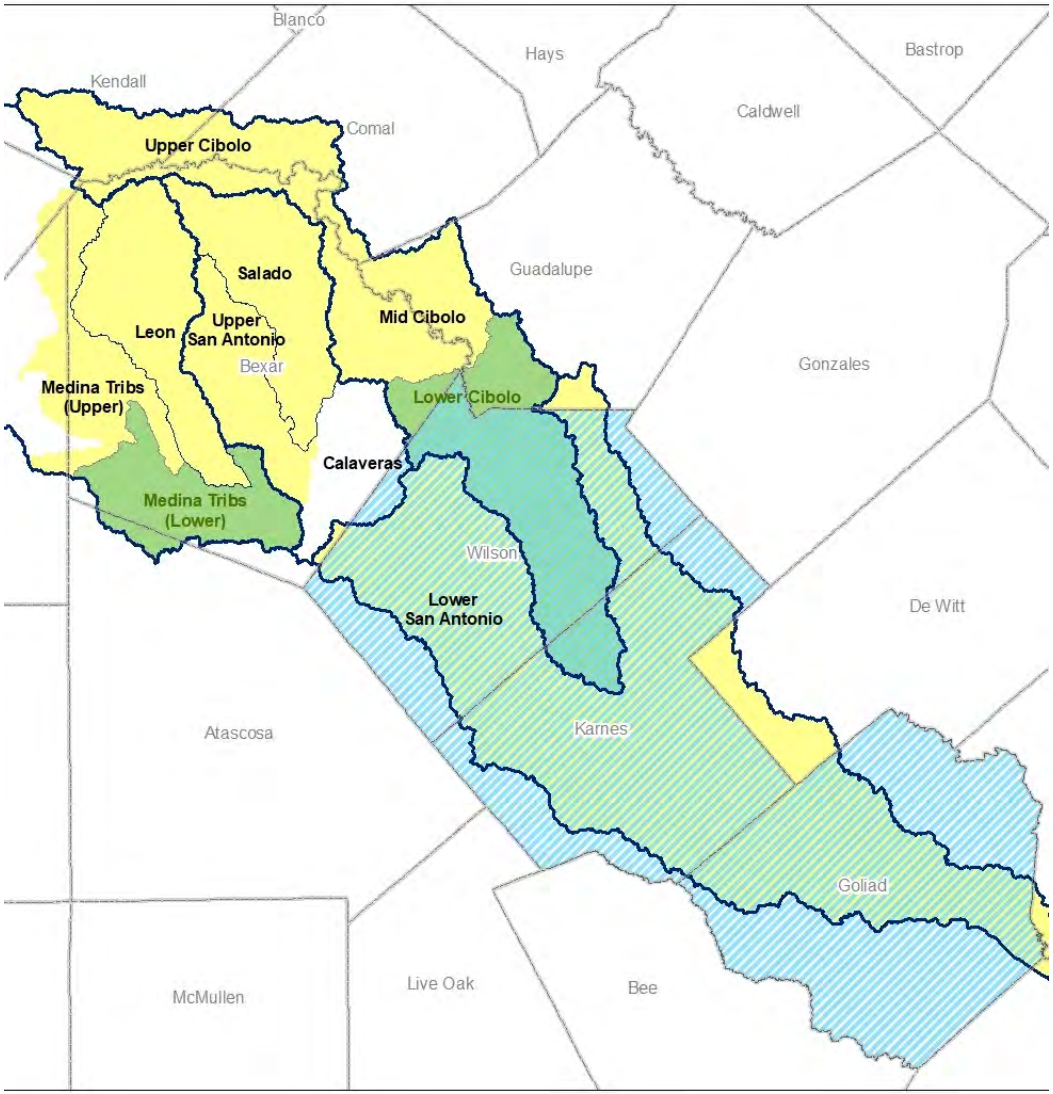
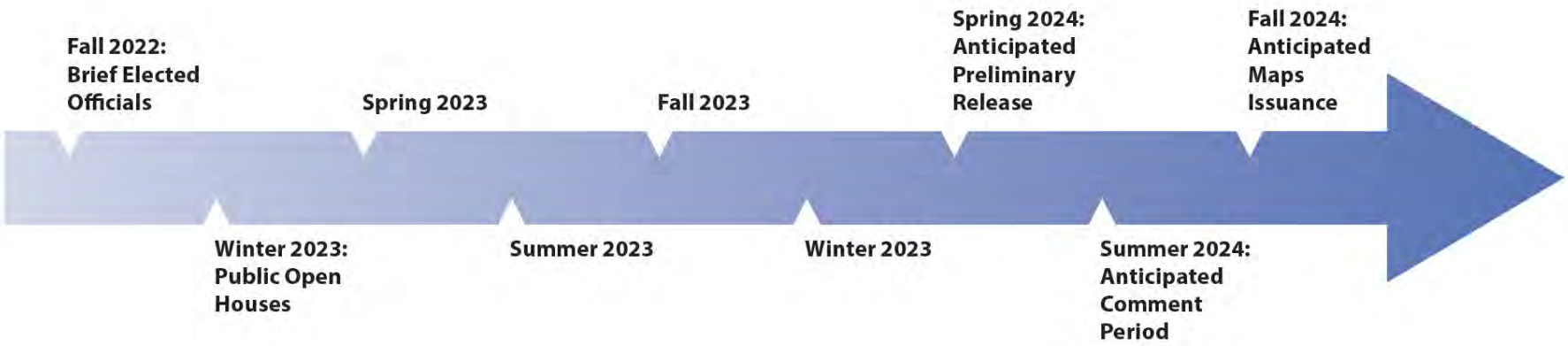


Draft Floodplain Rollout
Bexar County



Thank you

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