

Another Colorado: Austin and the River

Kevin M. Anderson, Ph.D.
Austin Water – Center for Environmental Research



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Which River is Which?

“Another Colorado” Jimmie Dale Gilmore

Down by the banks of the Colorado

My true love and I one night did lie

And we laughed and played and made fun

Of the entire world spinning 'round the sun

Down by the banks of the Colorado

There is another Colorado

Wise men have told me, wise women too

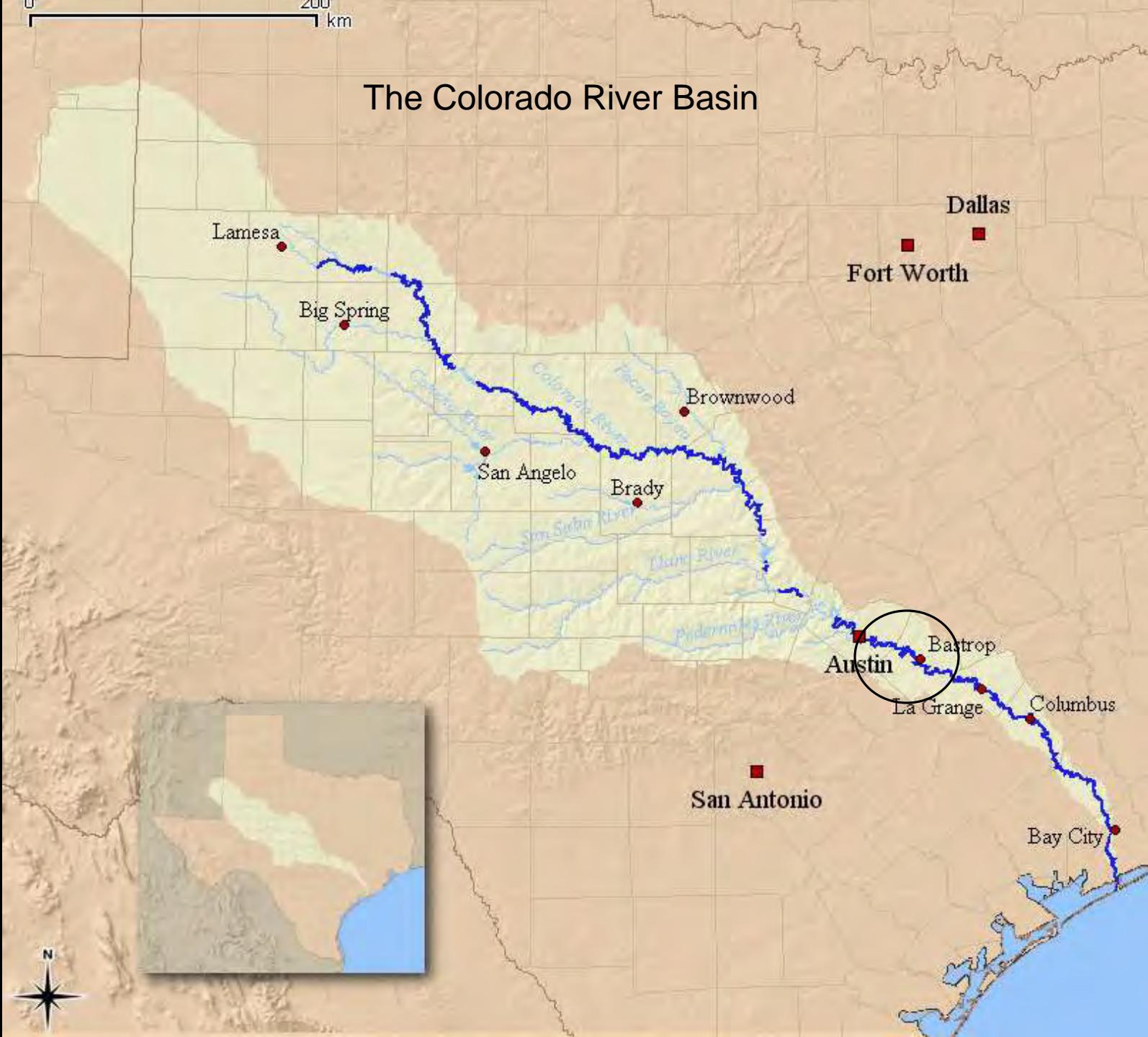
That I may find sweet El Dorado

Down by the banks of one sweet Colorado



0
200 km

The Colorado River Basin



Prehuman Natural History of the River

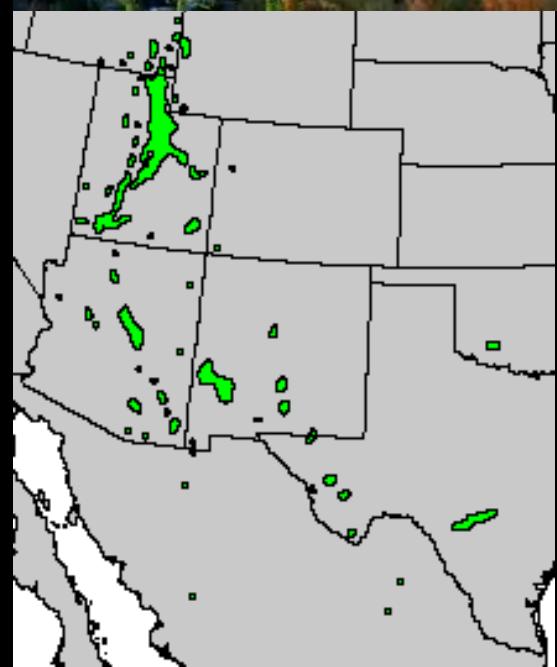


Which Natural History?

At the peak of glacial expansion, vegetation and climate of Texas were much different than today. As glaciers developed the climate of Texas became cooler and moisture effectiveness was greater which resulted in the presence of plant species that today typically occur in more mesic or cooler environments.

For example, the current distribution of many eastern forest species that extend into central and West Texas, such as bald cypress (*Taxodium disticum*), Chinkapin oak (*Quercus muehlenbergii*), redbud (*Cercis canadensis*) and many others, may have occurred during these more favorable glacial conditions.

Bigtooth maple (*Acer grandidentatum*), madrone (*Arbutus xalapensis*) and other species that still exist in central Texas, may be persisting today on favorable sites but were more widespread during the glacial periods.

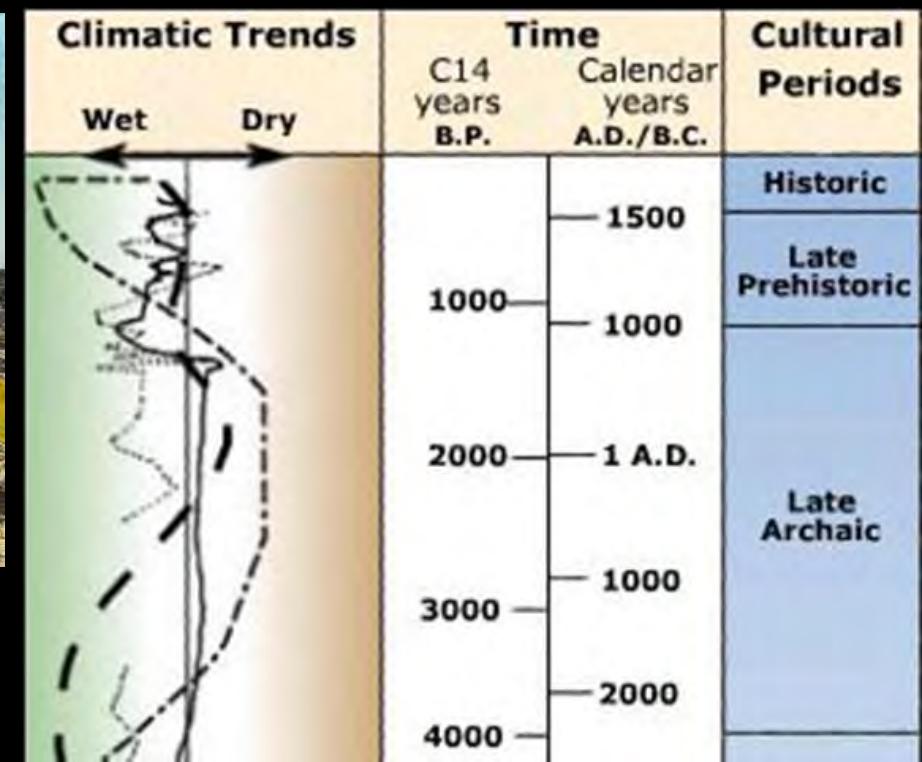


Recent Climate Change

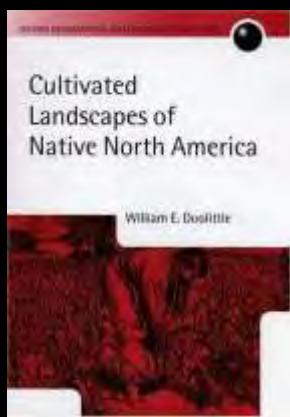
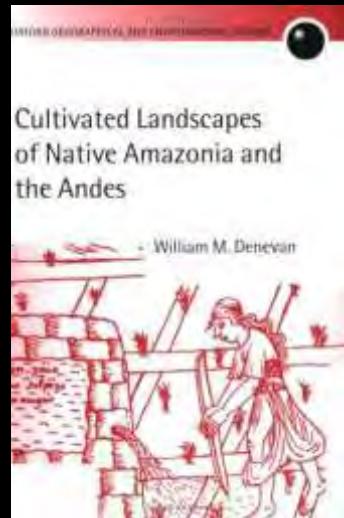
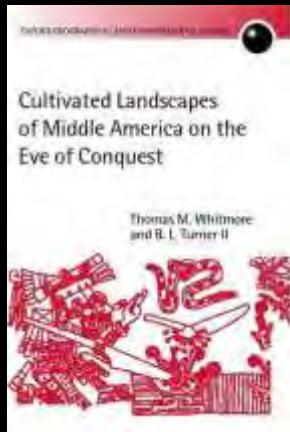
Over the past 10,000 years most of the state of Texas has generally become progressively warmer and drier with, of course, various fluctuations through time. During the most recent 1000 years there are some climatic variations that may be noteworthy relative to vegetation.

Beginning about 1000 years ago the earth's temperature became warmer up until about 600 years ago. This Medieval Warm Period is characterized by retreating mountain glaciers, and documented shifts in vegetation distributions in various parts of the world.

From 600 to 150 years ago the earth experienced a cooling period known as the Little Ice Age. Many of the changes observed in the previous warm period were reversed. From about 1850 to the present the earth has been in a warming mode.



Cultivated Landscapes of the Americas – The Myth of Pristine Nature



The Pristine Myth: The Landscape of the Americas in 1492

William M. Denevan

Department of Geography, University of Wisconsin, Madison, WI 53706

Abstract. The myth persists that in 1492 the Americas were a sparsely populated wilderness, "a world of barely perceptible human disturbance." There is substantial evidence, however, that the Native American landscape of the early sixteenth century was a humanized landscape almost everywhere. Populations were large. Forest composition had been modified, grasslands had been created, wildlife disrupted, and erosion was severe in places. Earthworks, roads, fields, and settlements were ubiquitous. With Indian depopulation in the wake of Old World disease, the environment recovered in many areas. A good argument can be made that the human presence was less visible in 1750 than it was in 1492.

Key Words: Pristine myth, 1492, Columbus, Native American settlement and demography, prehistoric New World, vegetation change, earthworks.

"This is the first primal . . ."

Ergo: A Tale of Acaia
(Longfellow, 1845).

WHAT was the New World like at the time of Columbus?—"Geography as it was," in the words of Carl Sauer (1971, xi). The Admiral himself spoke of a "Terrestrial Paradise," beautiful and green and fertile, teeming with birds, with naked people living there whom he called "Indians." But was the landscape encountered in the sixteenth century primarily pristine, virgin, a wilderness, nearly empty of people, or was it a humanized landscape, with the imprint of native Americans being dramatic and persistent? The former still seems to be the more common view, but the latter may be more accurate.

The pristine view is to a large extent an invention of nineteenth-century romanticist and

primitivist writers such as W.H. Hudson, Cooper, Thoreau, Longfellow, and Parkman, and painters such as Catlin and Church.¹ The wilderness image has since become part of the American heritage, associated "with a heroic pioneer past in need of preservation" (Pyne 1982, 17; also see Bowdier 1992, 22). The pristine view was restated clearly in 1956 by John Balloch in his book *The Eyes of Discovery*:

There were not really very many of these redmen . . . the land seemed empty to invaders who came from settled Europe . . . that ancient, primeval, undisturbed wilderness . . . the streams simply teeming with fish . . . so much game . . . that one hunter counted a thousand animals near a single salt lick . . . the virgin wilderness of Kentucky . . . the greatest glory of primitive America (13, 20, 203, 214, 403).

But then he mentions that Indian "prairie fires . . . cause the often-mentioned oak openings . . . Great fields of corn spread in all directions . . . the Barrens . . . without forest," and that "Early Ohio settlers found that they could drive about through the forests with sleds and horses" (31, 304, 306, 374). A contradiction!

In the ensuing forty years, scholarship has shown that Indian populations in the Americas were substantial, that the forests had indeed been altered, that landscape change was commonplace. This message, however, seems not to have reached the public through texts, essays, or talks by both academics and popularizers who have a responsibility to know better.²

Kirkpatrick Sale in 1990, in his widely reported *Conquest of Paradise*, maintains that it was the Europeans who transformed nature, following a pattern set by Columbus. Although Sale's book has some merit and he is aware of large Indian numbers and their impacts, nonetheless champions the widely-held dichotomy of the benign Indian landscape and

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Humanized Landscape – Buttermilk Creek Complex 15,000 years old

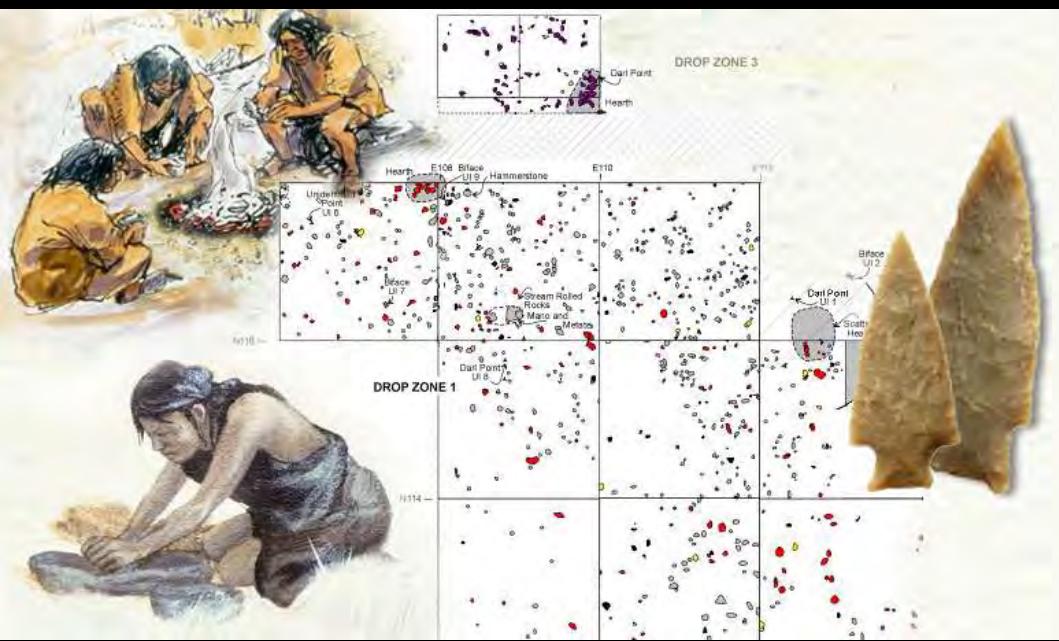


The McKinney Roughs site – 100BC – 1000AD

Discovered during archeological survey prior to the construction of a resort hotel complex, the McKinney Roughs site has proved to be an important, stratified Transitional Archaic site.

Prehistoric living surfaces were preserved almost as they were left by campers one to two thousand years ago, providing a "snapshot" of prehistoric lifeways along the Colorado River.

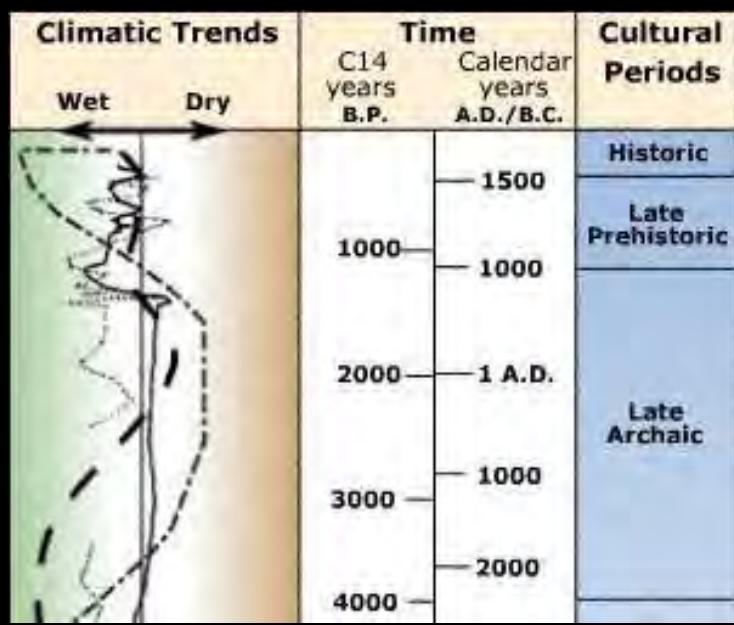
Occupation of the McKinney Roughs site occurred during a period of widespread change in the region. During this time, climatic conditions became more mesic (wetter), following centuries of dryness.

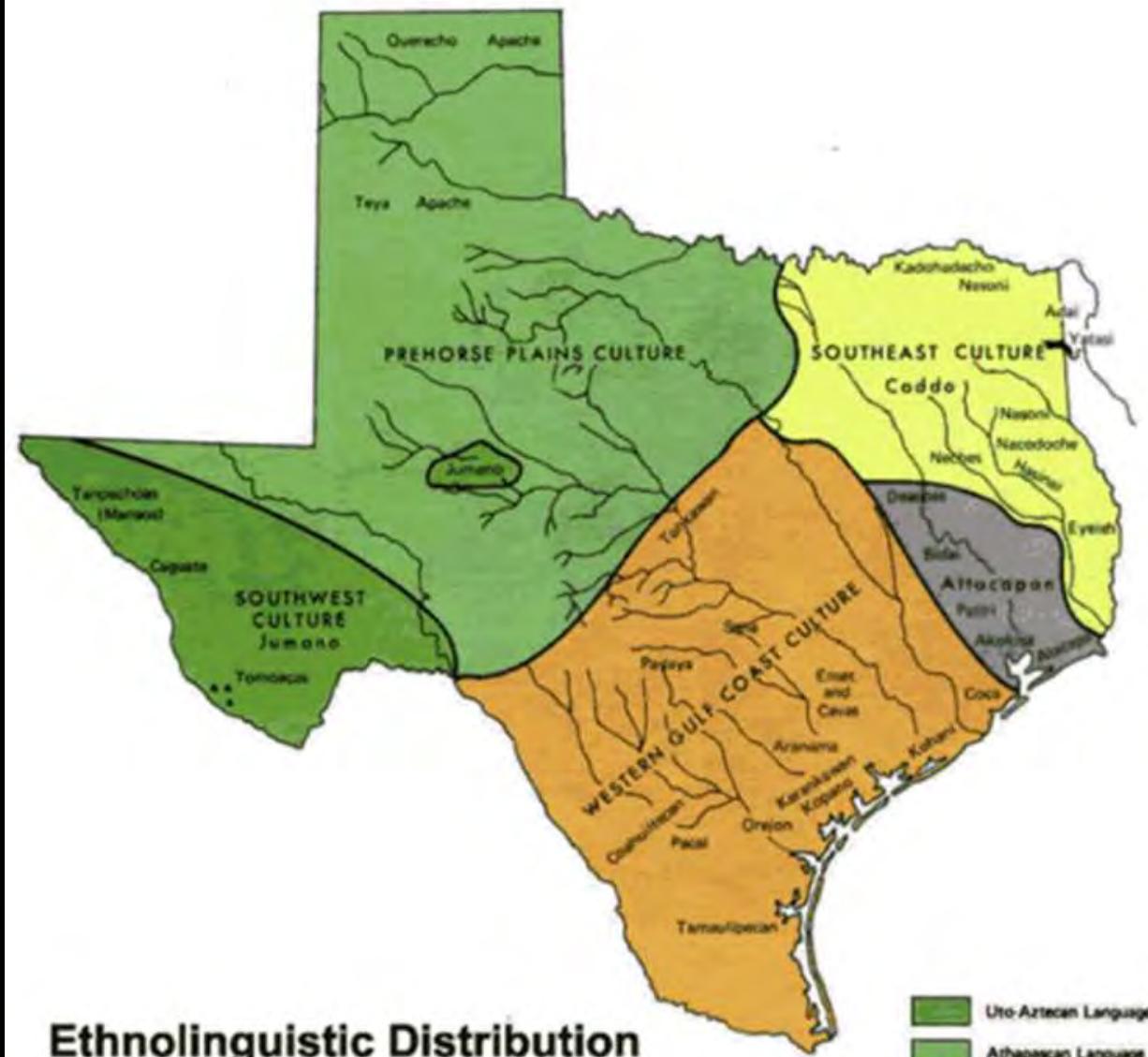




TEXAS BEYOND HISTORY

THE VIRTUAL MUSEUM OF TEXAS' CULTURAL HERITAGE

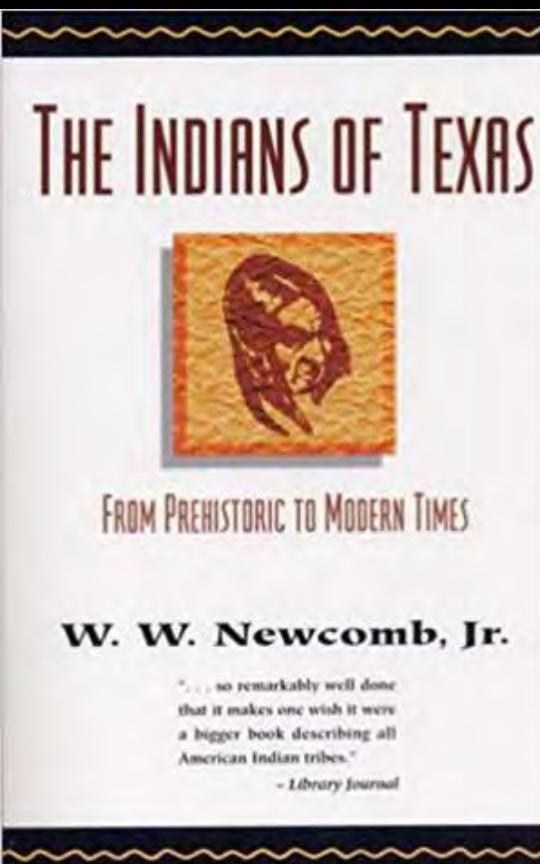




**Ethnolinguistic Distribution
of Native Texas Tribes in
1500**

Source: Lydia L. M. Skewes, *An Ethnohistorical Survey of Texas Indians*, Texas Historical Survey Committee, Office of the State Archeologist, Report No. 22, Austin, 1972.

- [Green Box] Uto-Aztecan Language
- [Light Green Box] Athapaskan Language
- [Yellow Box] Caddoan Language
- [Orange Box] Coahuiltecan Language
- [Grey Box] Tunican Language



W. W. Newcomb, Jr.

"...so remarkably well done that it makes one wish it were a bigger book describing all American Indian tribes."

— Library Journal

Spanish Exploration



The Overlooked Entrada: The Espinosa-Olivares-Aguirre Expedition of 1709

By Anibal Gonzalez – Sayersville Historical Association Bulletin

In April 1709, two Franciscan priests and 15 soldiers came from the Rio Grande all the way to the Colorado looking for a delegation of Tejas Indians they never found...it is probable that they camped not far above the Hornsby Bend of the Colorado in Eastern Travis County.

"We came to the river, which has a guard on either side of luxuriant trees, nut trees [nogales], ash trees, poplars [cottonwood], elms, willows, mulberries, and wild grapevines much taller and thicker than those in Castile. It has sand banks which mark how high it rises, a quarter of a league wide. The water is of the best we have found."

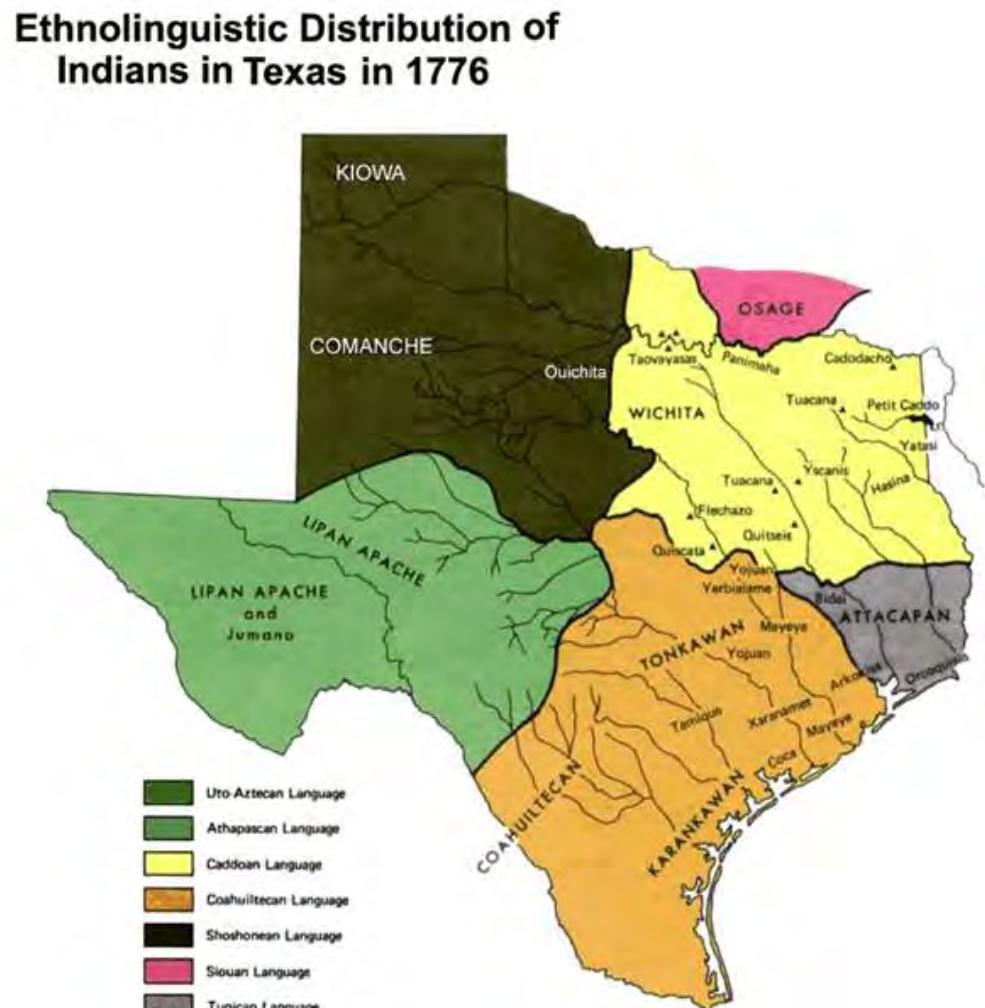
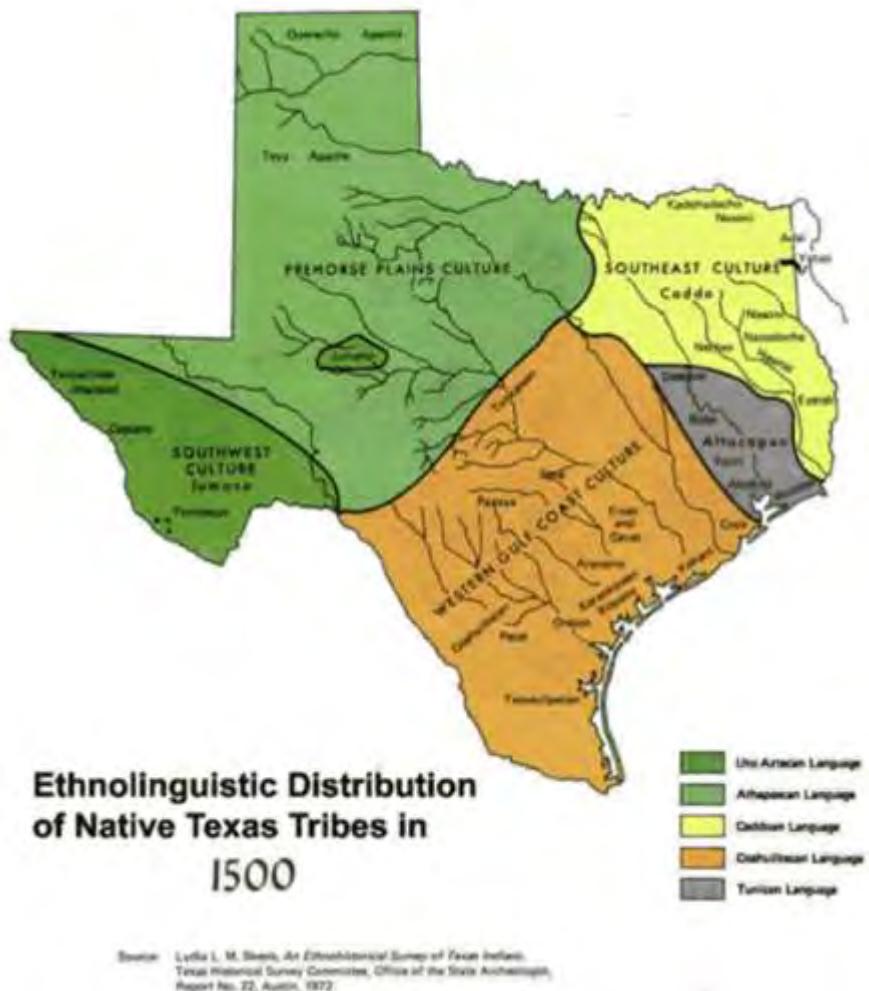
Difficulty traveling downriver because "the monte that offered itself to our sight was so much that we could not penetrate it."

Followed buffalo trails along the upland post oaks.

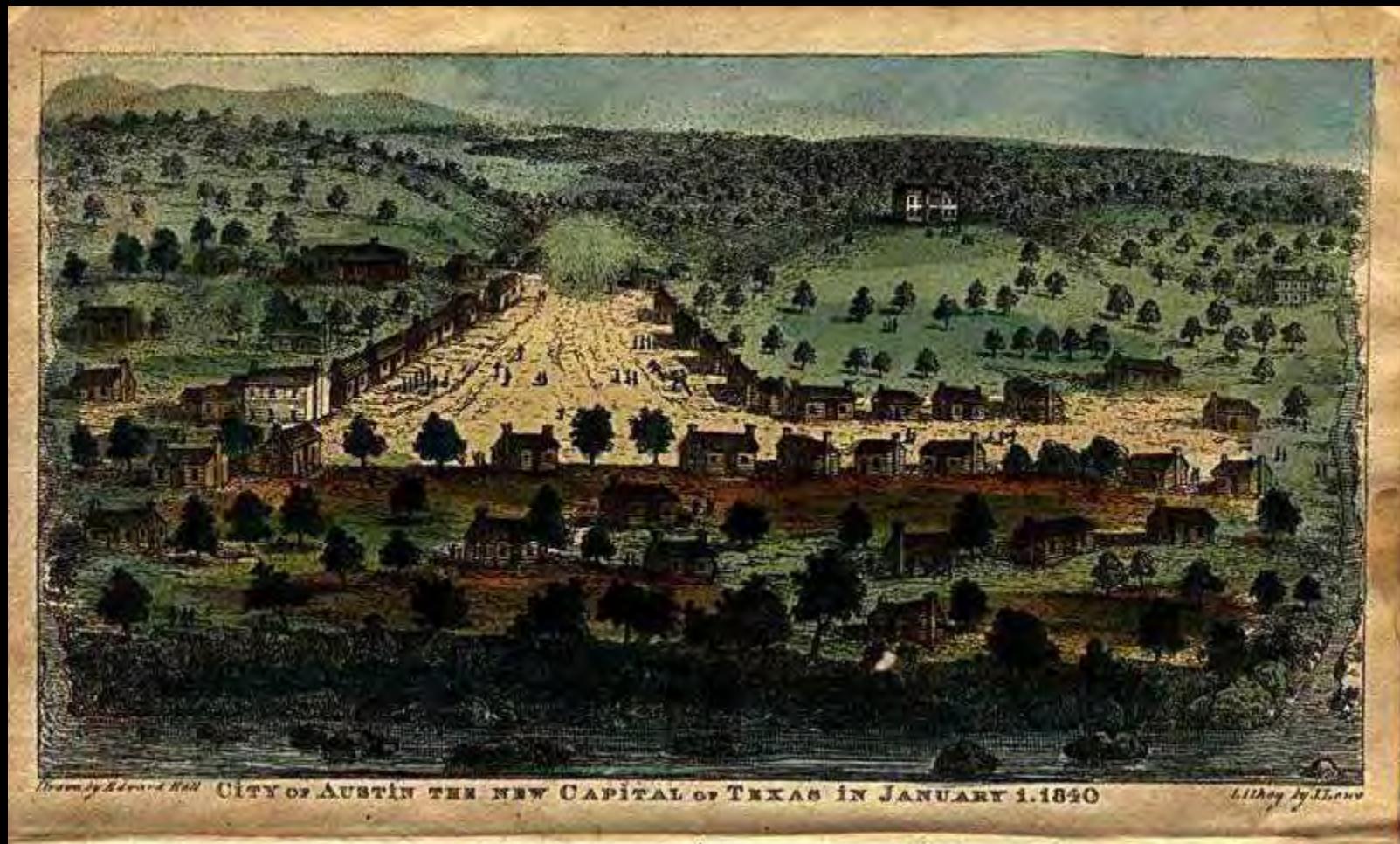




1500-1700s



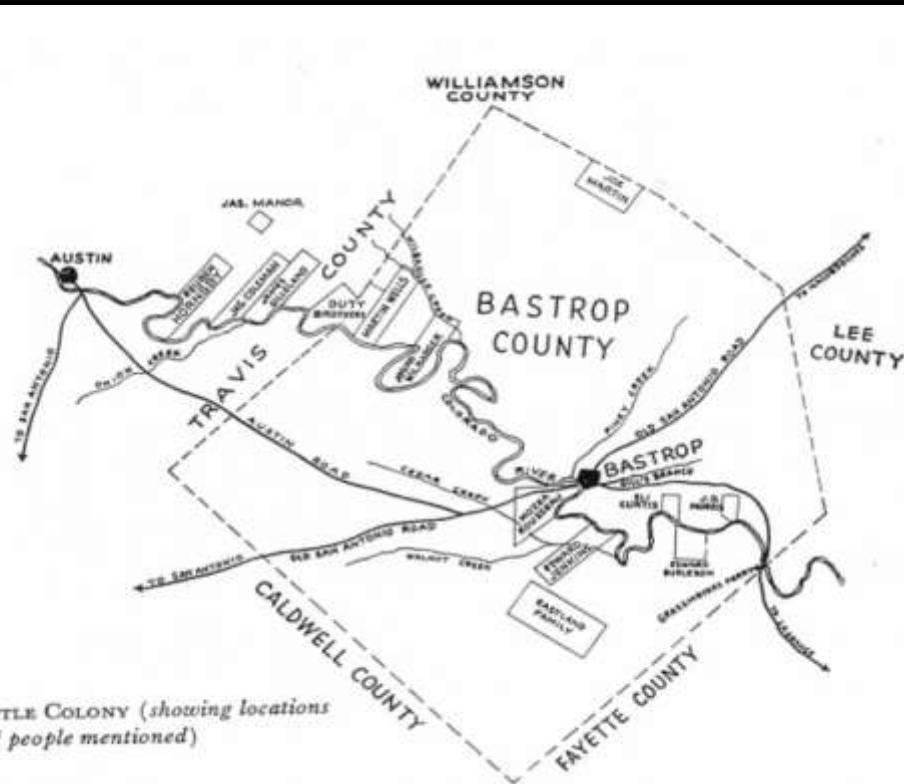
Early Anglo-American Settlement



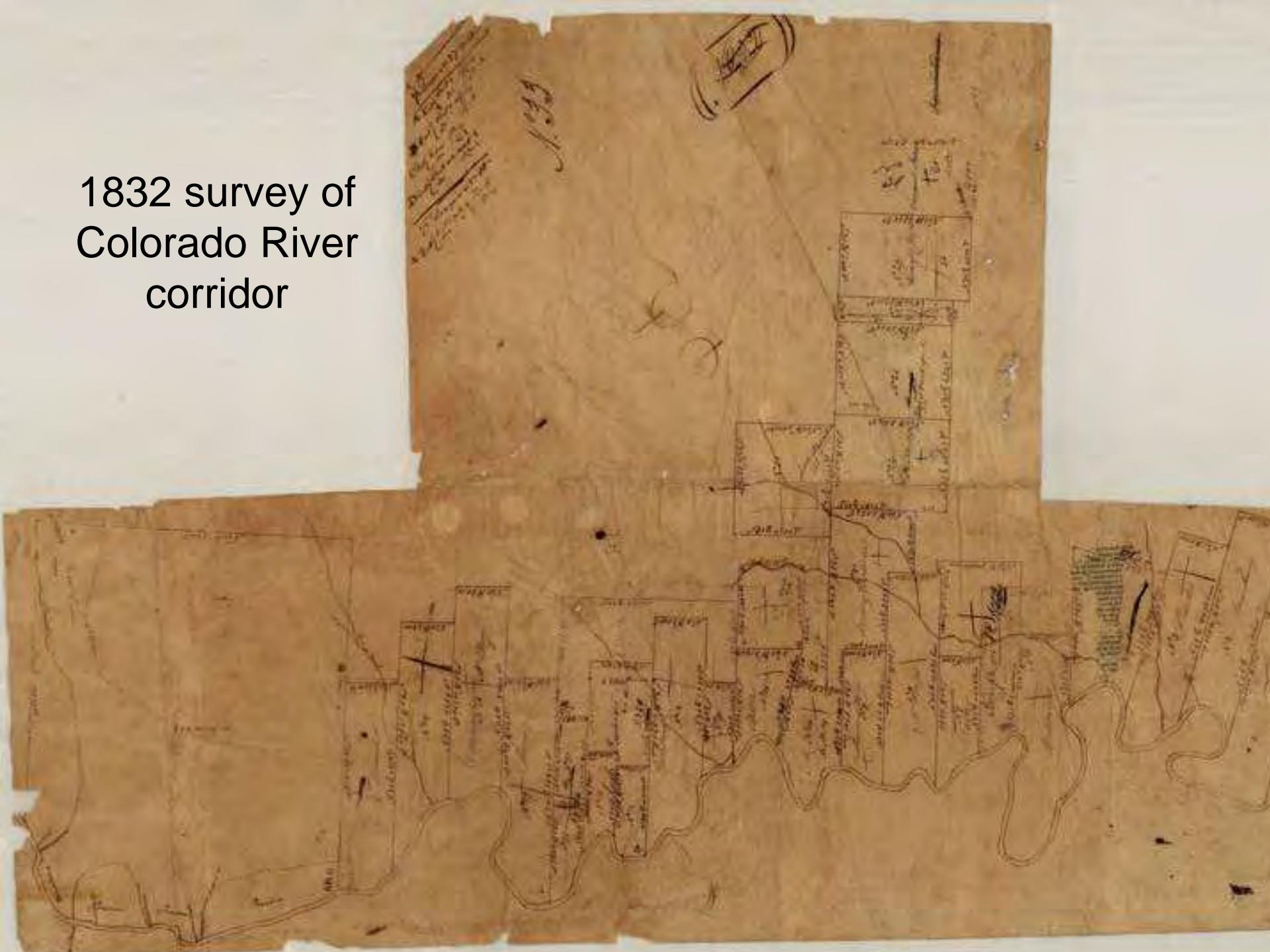
Stephen F. Austin describing the Colorado River near Bastrop 1821

"Tuesday, August 7 [1821]. Came to the Colorado River – poor, gravelly ridges and near the river heavy pine timber, grapes in immense quantities on low vines, red, large, and well flavored, good for Red wine. The Colorado River is sometimes less than the Brazos, banks very high – generally clear of overflow – bottom and banks gravelly, water very clear and well tasted, current brisk, the river very much resembles Cumberland River, except that there are no rocks and it is somewhat larger.

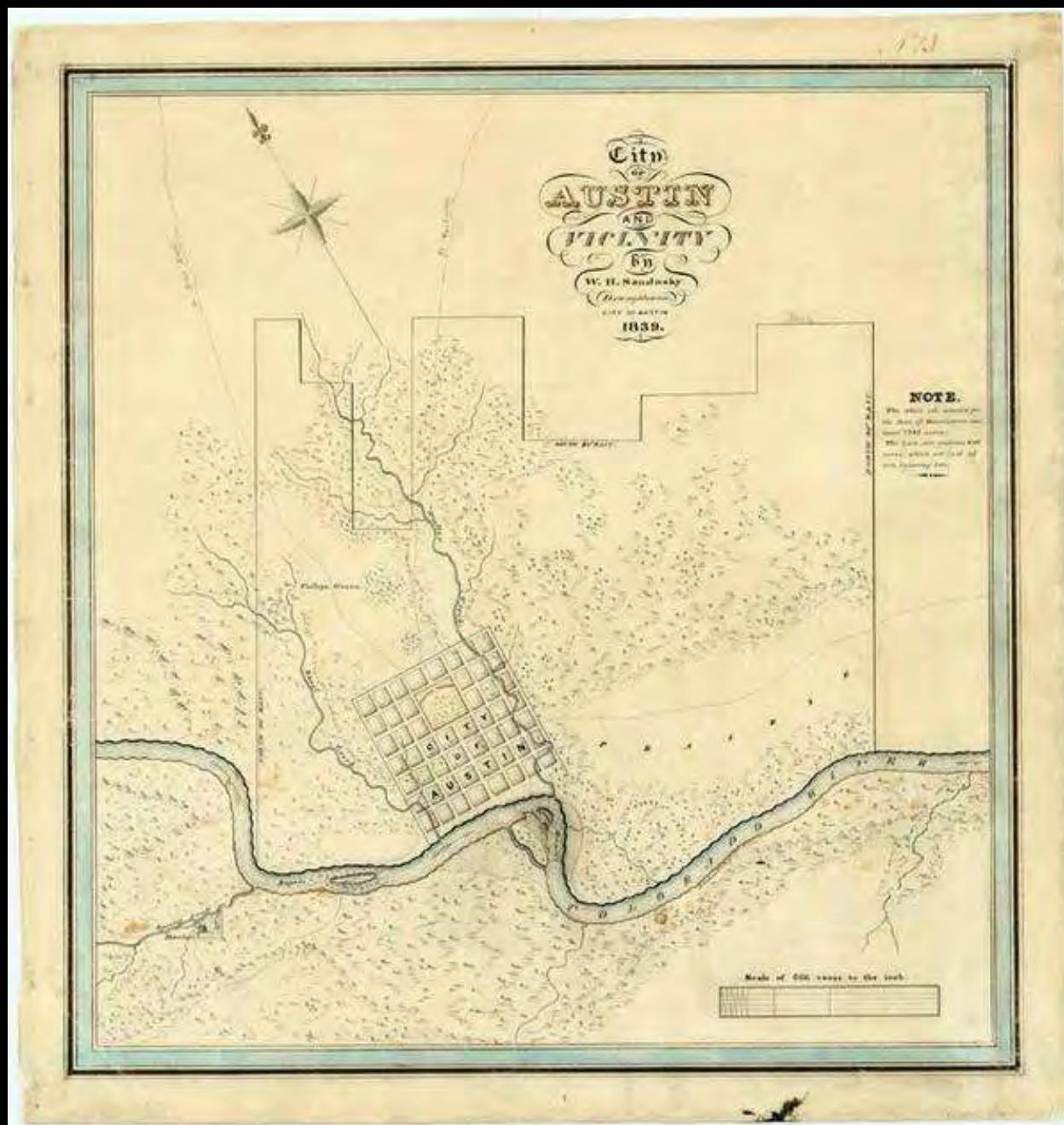
The bottomland where the road crosses is about five miles, mostly prairie, clear of overflow, land rich, timber Pecan, Ash, Oak, Cedar, abundance of fish."



1832 survey of Colorado River corridor

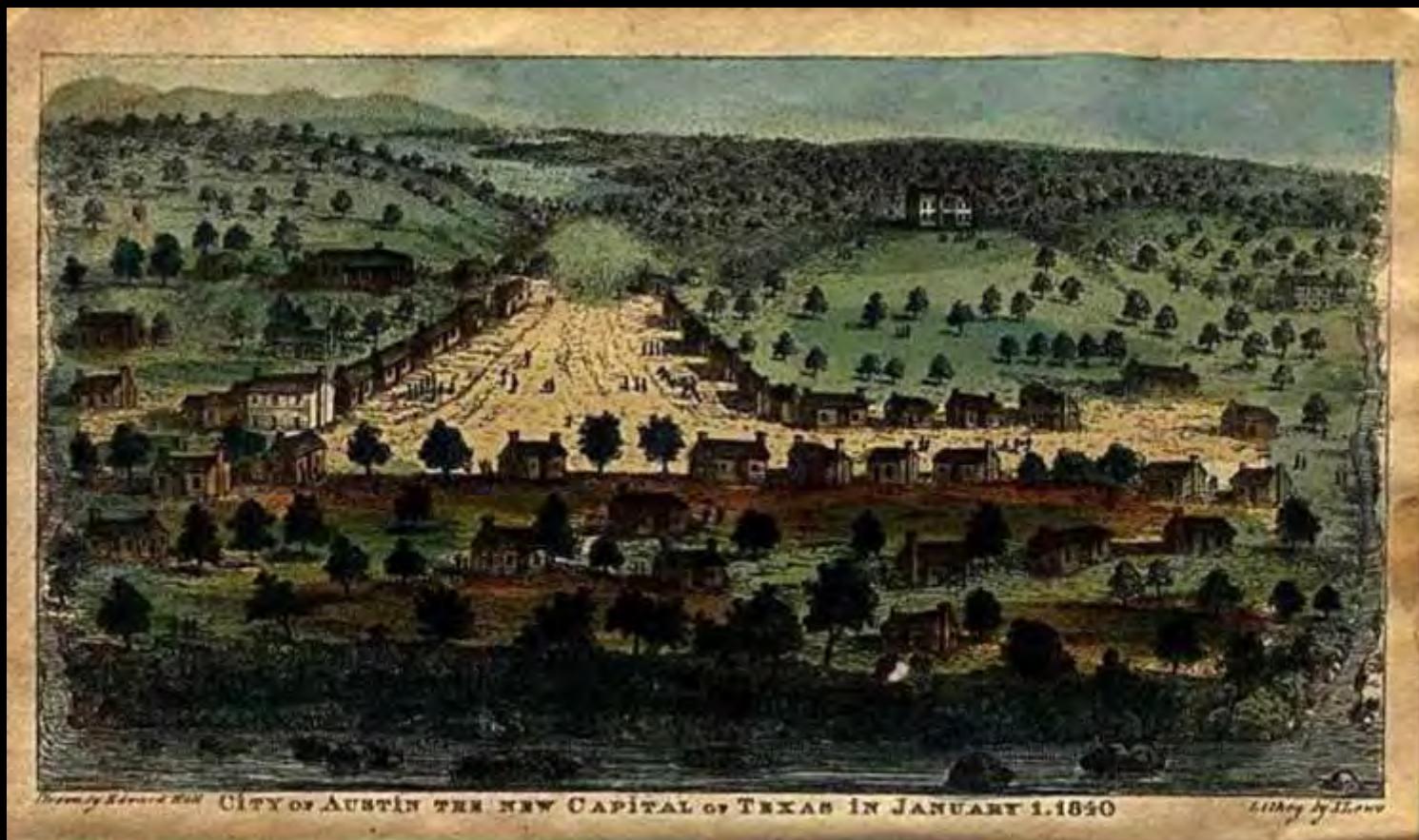


When was the City of Austin founded?



Austin 1839

The city was established by the three-year-old Republic of Texas in 1839 to serve as its permanent capital, and named in honor of the founder of Anglo-American Texas, Stephen F. Austin. A site-selection commission appointed by the Texas Congress in January 1839 chose a site on the western frontier, after viewing it at the instruction of President Mirabeau B. Lamar, a proponent of westward expansion who had visited the sparsely settled area in 1838. The commission purchased 7,735 acres along the Colorado River comprising the hamlet of Waterloo and adjacent lands.





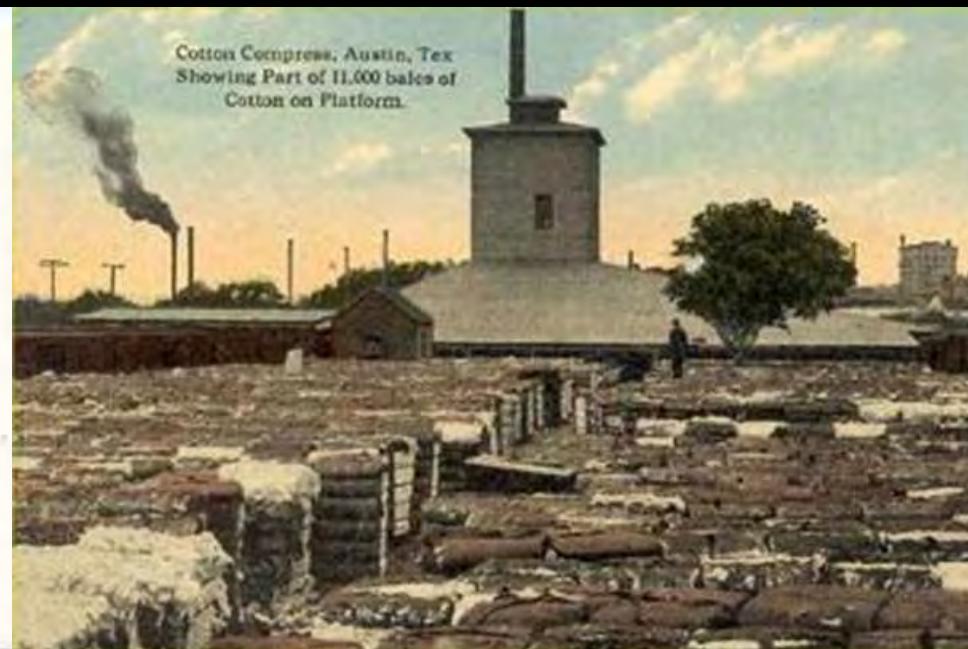
1861

"Bird's Eye View of Austin" 1890



Transformation

Agriculture – Cattle and Cotton





Cotton

Cotton was the principal field crop in the late 1880s and remained so for more than sixty years.

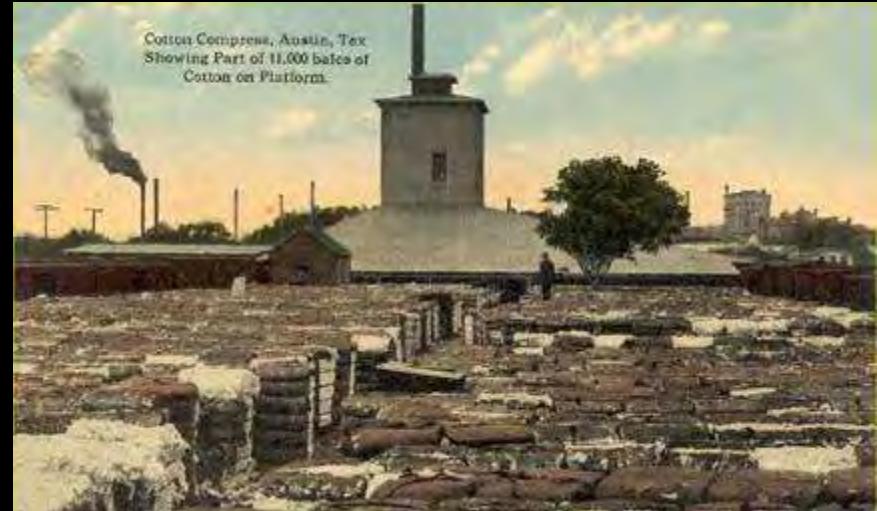
The 1890 census reported 65,000 acres—nearly 30 percent of the county's improved farmland—planted in cotton; by the turn of the century the amount of land devoted to cotton had increased to 113,300 acres, or 56 percent of the improved farmland.

However, as more marginal land was used and the soil became depleted, production levels fell; in 1930, 143,000 acres produced only 19,000 bales.

By the late 1950s cotton accounted for only 26 percent of the total cropland harvested, and by 1980 it had fallen to only 8 percent.

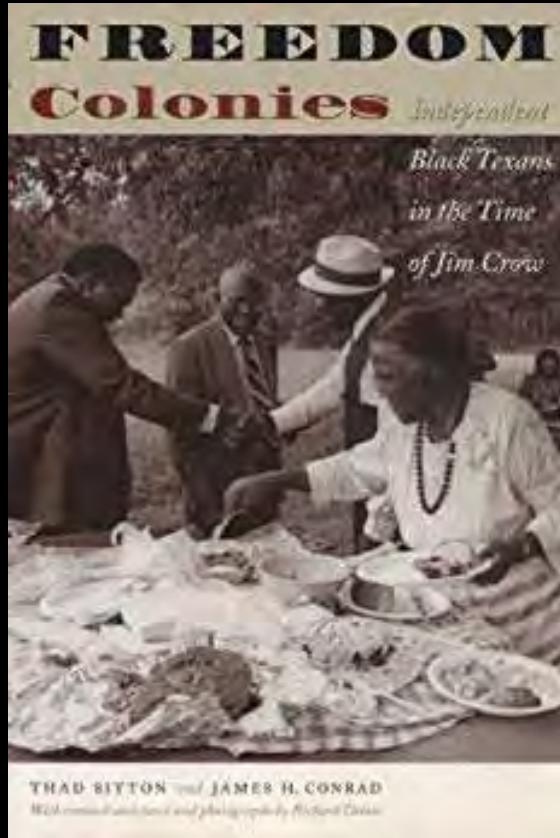


Cotton Gin, Austin, Texas.



Agriculture – Cotton and Slavery

For the cultivation of cotton, plantations were established primarily using African slaves as labor. After the Civil War, the plantation system was replaced with tenant farms and sharecropping. Improvements in technology in both the plow and ginning increased production.





THE TEXAS FREEDOM COLONIES PROJECT ATLAS & STUDY

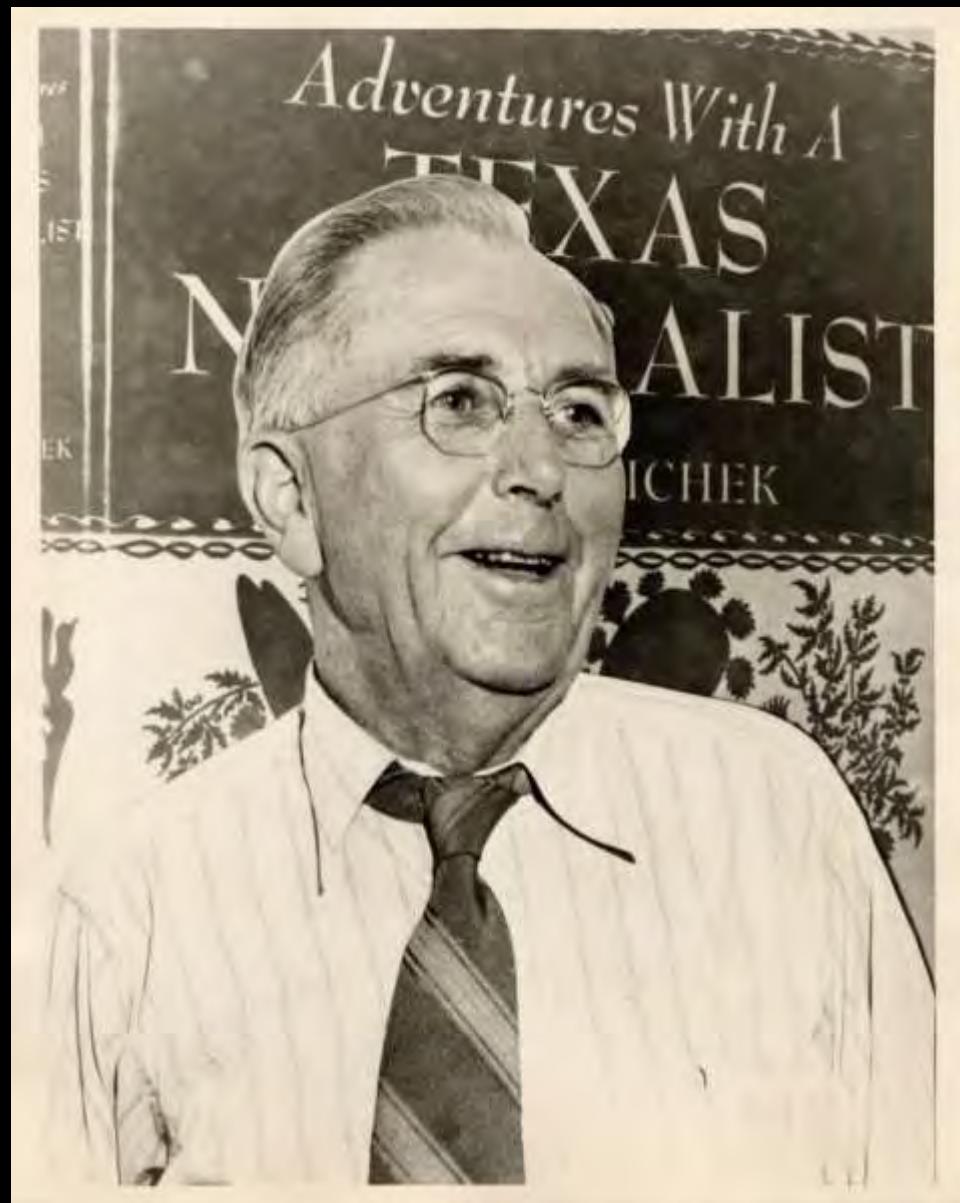
Mapping the Unmapped Black Settlements of Texas

Image courtesy: Shantleville Community Homecoming, Odum Family Photo Collection.



Texas Cultural Geography and the Colorado River

Roy Bedichek



Who was Roy Bedichek?

- Born in 1878 in a log cabin in Illinois, he moved when he was five to his father's homestead in Eddy, Texas.
- In 1897 he became a student at the University of Texas.
- In 1903 he received a B.S. degree and in 1925 an M.A.
- He was a reporter for the Fort Worth *Record* (1903-04) and taught in high schools in Houston (1904-05) and San Angelo (1905-08).
- In 1908 he homesteaded 320 acres in New Mexico.
- He served as secretary of the Deming, New Mexico, Chamber of Commerce (1908-13) and edited the Deming *Headlight* (1910-12).
- He married a student he met at U.T., Lillian Greer, in 1910. In 1914 he began working for the University Interscholastic League in the Extension Division on the Little Campus, serving as Director from 1922 to 1948.





He shared a love of Texas with two UT faculty members, **J. Frank Dobie** of the English Department, and **Walter Prescott Webb** of the History Department.

"Dobie writing of its folklore, Webb of its frontier history, and Bedichek of its birds, its animals and native plants, and of the way of life of its people"

Webb and Dobie arranged for him to spend a year before his retirement writing his first book at Webb's Friday Mountain ranch, about sixteen miles southwest of Austin.



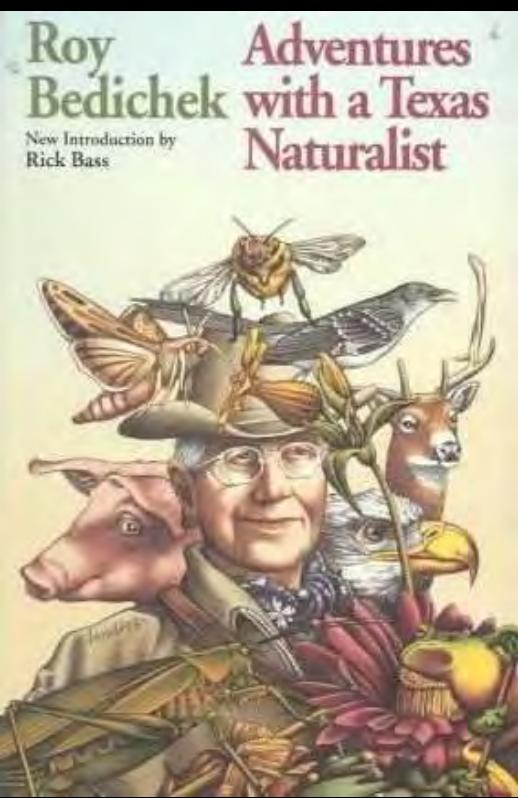
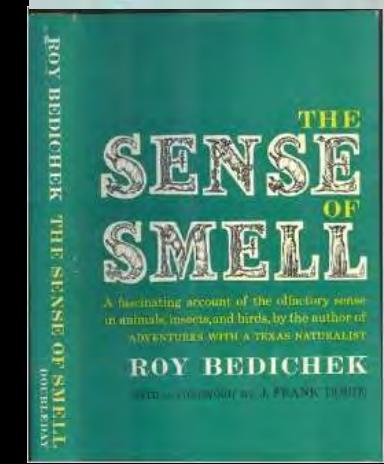
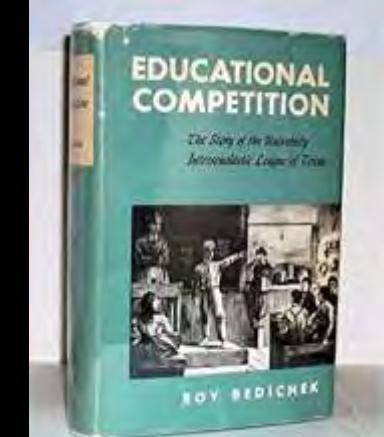
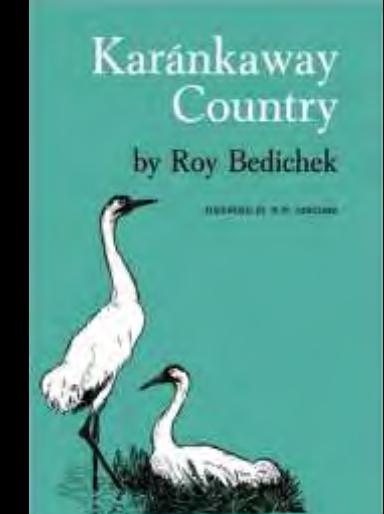
The Texas Naturalist - Roy Bedichek

Adventures with a Texas Naturalist (1947)

Karánkaway Country (1950)

Educational Competition: The Story of the University Interscholastic League of Texas (1956)

The Sense of Smell (1960)



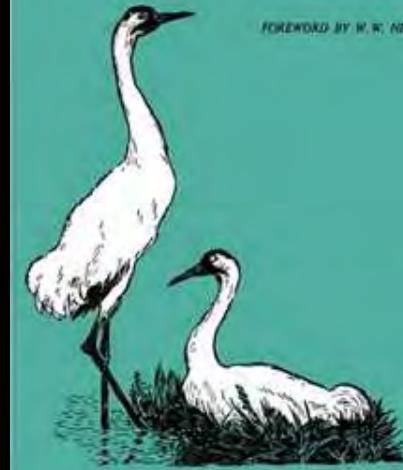
"The Karánkaways are gone. Only bitter memories of them remain. In the minds of our people they are eternally damned, largely because they refused a culture we offered...We won the material war, exterminating the enemy. We also won the war of words, that is the propaganda war, establishing them as fiends in human form and ourselves in posture of nobly extending a succoring hand which they obstinately refused."



Karánkaway Country

by Roy Bedichek

FOREWORD BY W. R. NEWCOMB

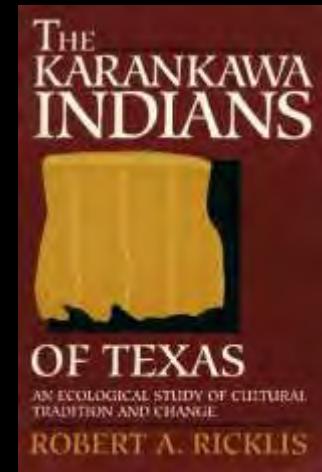


(1950)

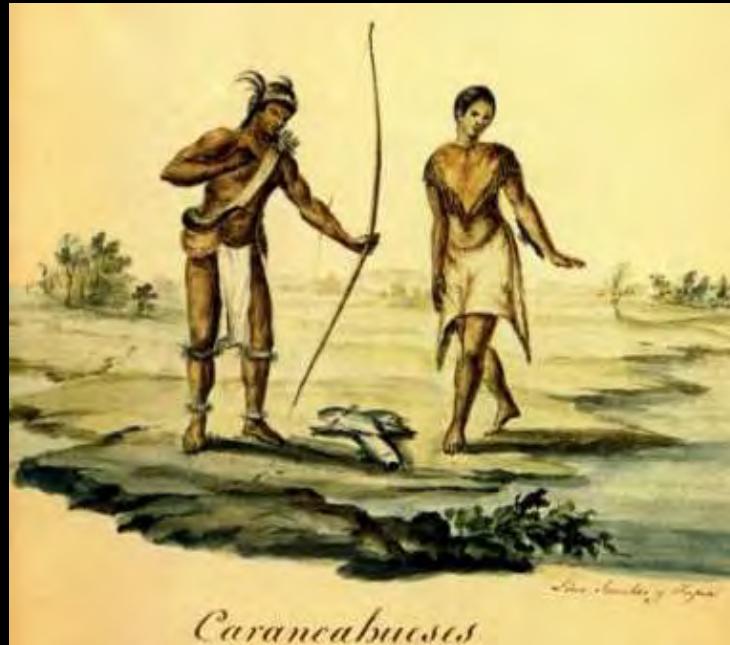
Karankawas

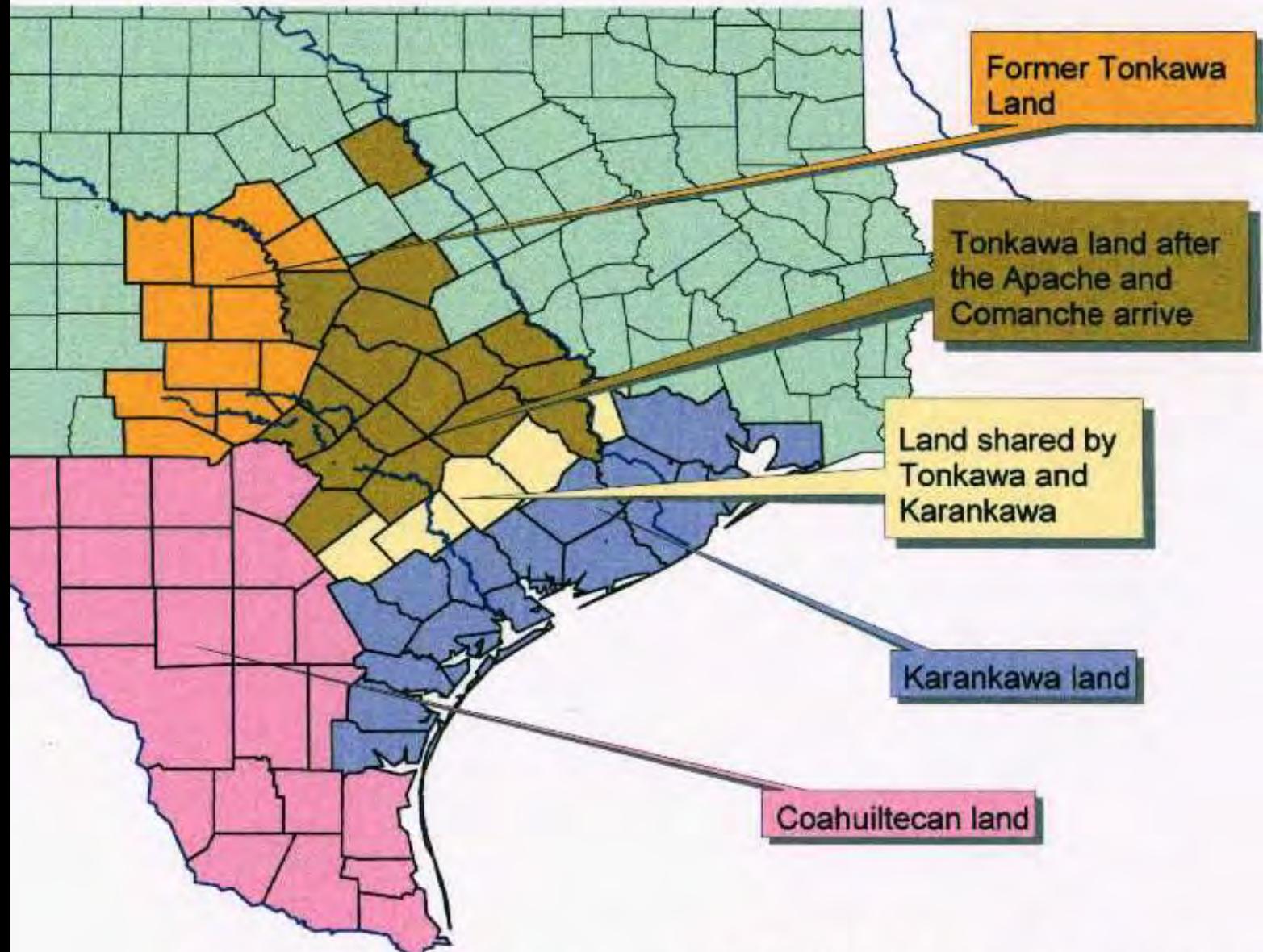
The meaning of the name *Karankawa* is not certain. It is believed to mean "dog-lovers" or "dog-helpers." That rendering seems credible, since the Karankawas had dogs, which were a fox or coyote-like species.

Indian houses were dome-shaped, pole-frame structures covered with hides or mats. Dugout canoes were made for transportation on the rivers, bays and lagoons behind the barrier islands, but were unsuited for travel in the open sea. Hunting, and even some fishing, was carried out with the bow and arrow (Newcomb 1983).



Ricklis, R. A. 1996. *The Karankawa Indians of Texas: An Ecological Study of Cultural Traditions and Change*. Austin, TX: University of Texas Press.



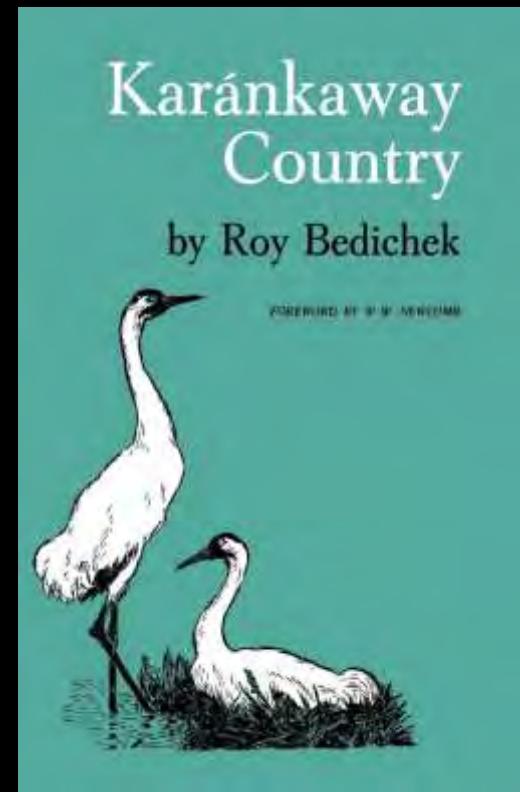


The Karánkawa Country

Karánkaway Country - Texas Rivers

“Texas has a river unity which invites unified treatment of Texas rivers”

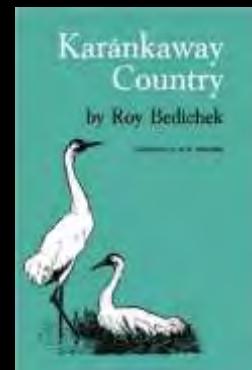
- “Rivers intrigue me. I can sit on a log and look upon a flowing stream for an hour at a time without feeling those twinges of conscience which come while idling in other environments.”
- “The river is a living organism, or at least it presents characteristics so similar to those of a living organism that to speak of it as such is more than mere metaphor.”
- “A river system is one of Nature’s units, and it must be dealt with as such if it is to be dealt with successfully for serving human needs.”



Bedichek – Environmental Transformation

"I have seen in my boyhood days the crown and upper slopes of gentle hills, on which the black soil is mixed with fragmented limestone, produce ninety bushels of oats to the acre. Now many of these slopes are all bleached out, pale as death, and really dead in so far as ability to support vegetable life is concerned.

Many old-timers have seen bale-to-the-acre land in 1883 abandoned as worthless in 1903."

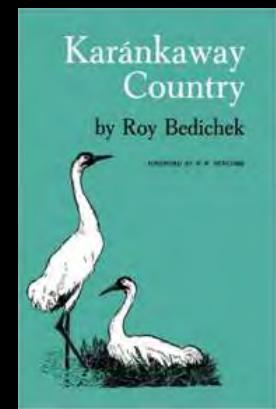


Bedichek - Colorado River Raft

As settlements of whites pushed up these rivers, particularly up the Colorado and its tributaries, slashing the timber out of the bottoms, tearing from the banks of streams the retarding vegetation Nature had placed there for a purpose, leaving in their greed from more land only a turnrow between cultivated field and river brink – as these characteristic pioneer activities got well under way, an ancient and beneficent clogging of the river in its lower course, known as the 'Colorado River Raft,' became suddenly virulent.

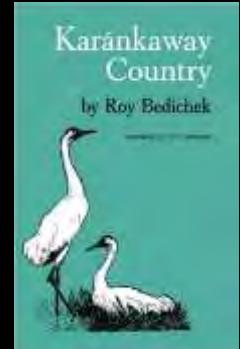
– with the cultivation of the Colorado watershed and the slashing out of the bottoms along the river, this raft grew to enormous proportions, the head of it in 1929 extended forty-five miles from the mouth.

Comer Clay, "The Colorado River Raft," *Southwestern Historical Quarterly* 52 (April 1949).



Bedichek – Texas Rivers and the Brush/Cedar Problem

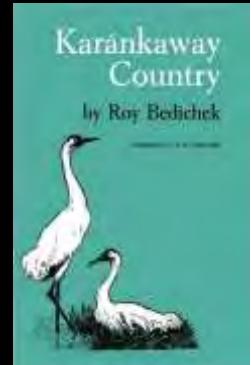
"I hear landlord and lease holder discussing brush clearance and quoting the learned bulletins of agricultural experimental stations, and when I see them readying the terrific machines for action, I can imagine the debouchment areas of the Nueces and of other Texas rivers yawning for the gargantuan mouthfuls of soil which have been detained in their place for the best part of a century by invasion of the despised brush."



Bedichek – Brush, Soil, Rivers, and Watersheds

“Ignorance of the conservation function of brush has hung like a pall of smoke over popular thinking since remotest antiquity.

Land stripped of forest or of grass seems to know that nakedness is sin. It hastily grabs up anything within reach with which to cover its shame. (Weeds, invading shrubs, vines)...



Nature abhors an organic vacuum as much as she does an inorganic one.

In spite of its cinema reputation, Texas is not tough, that is, ecologically. It is really a tender land, and cannot stand the buffetings that certain other areas of the world have endured and still support a human population in health and vigor.”



Bedichek - The Little Waters

“Under natural conditions, the whole expansive watershed was a giant sponge which was pressed by gravity ever so gently, ever so steadily, to drain its life-giving contents...

Floods came then as now – ten, fifteen inches of rainfall in a day over limited space – but the soil, well covered, took no pounding, and waterways were lined with vegetation which cushioned the assaults and tamed the rage of plunging waters. The Little Waters people simply propose to reinstate Nature’s plan in so far as it can now be re-established.”



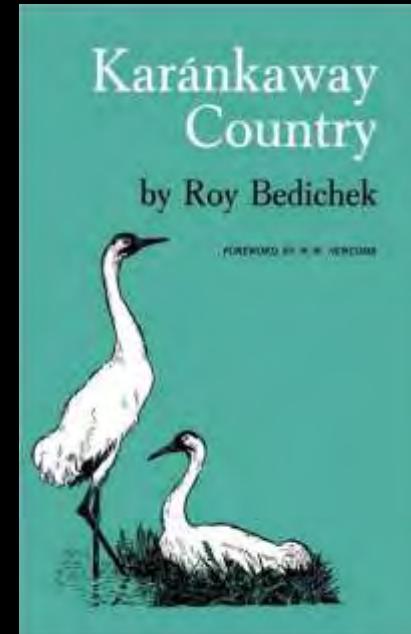
Bedichek – “The Little Waters” vs “The Big Waters”

A Hydrological Vision

“Formerly, timbered bottoms, brushy hillsides, and wide grasslands, thickly sodded, soaked up rain water like a sponge. It seeped into the subsoil and eventually filled sandy underground strata from which it found its way by devious paths into bubbling springs at lower levels, trickling off to join other trickles to form (on still lower levels) streamlets whose confluence made streams – all moving unhurried in a widespread network toward the river channel...

Nature was not interested in turning turbines or floating barges, but in producing just as much vigorous, varied, and abundant life as possible, dispersed along the way from plains to sea.

Some think this is a dream. Not so: the overwhelming proof lies in the land richness and life richness which we found here.”



Colorado River Management – The Big Waters

“It is a mistake to assume that the big dams catching water from eroded and still eroding watersheds store more than was stored in the days when natural forces detained rainfall in the highlands and let it gradually leak away.

Compared with the original uses to which rainfall on Texas watersheds was put, big dams merely salvage rather than conserve. We have relocated the reservoir and changed its character, each for the worse.”



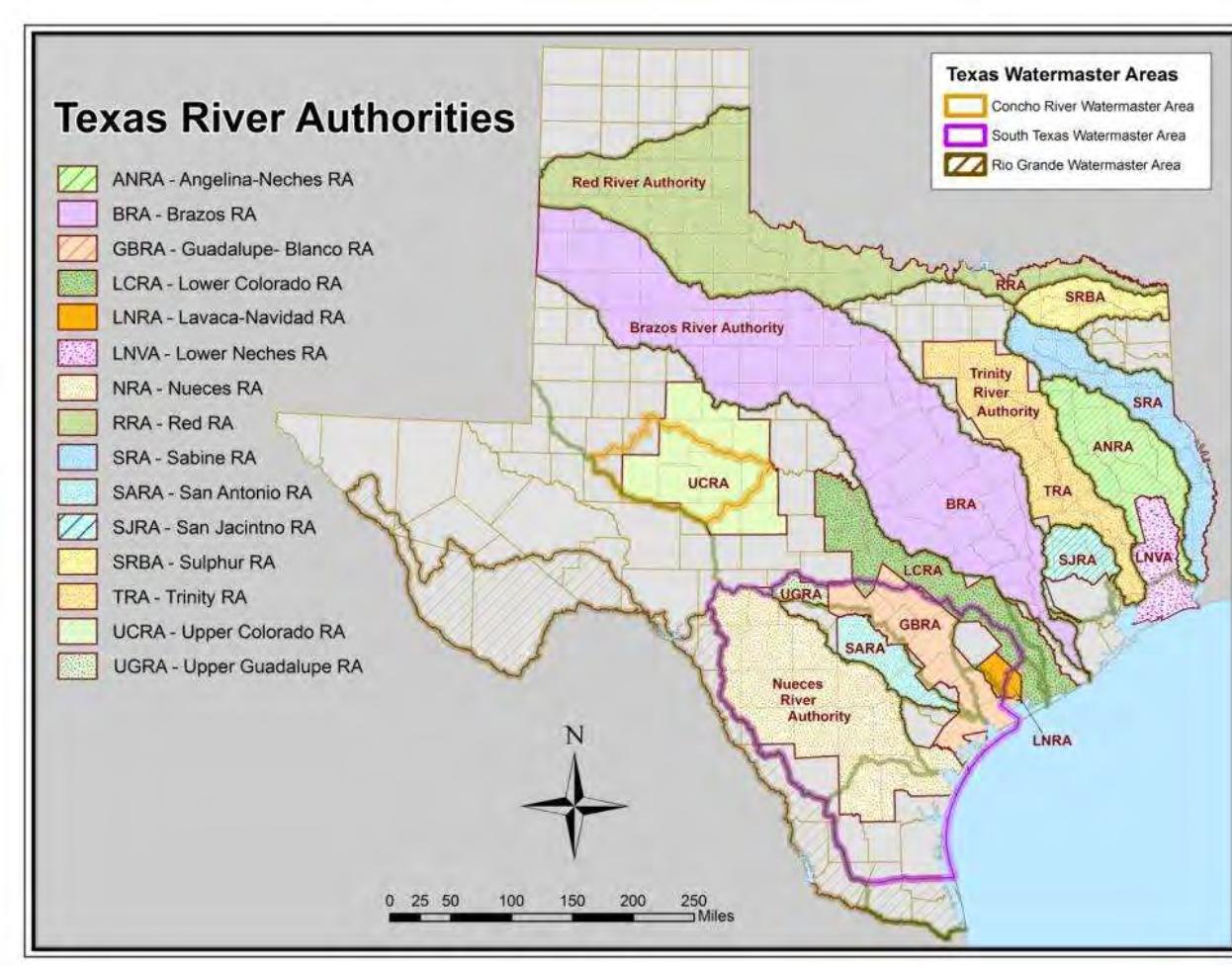
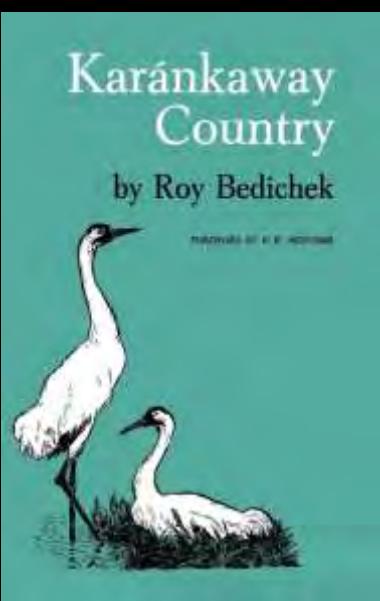
Controlling Texas Rivers

Bedichek's Warning

"A river is not a colt to be
'broken,' trained, stalled, and
depended upon thereafter to
do the will of his master.

It is eccentric, unaccountable,
either has no law of behavior
or often keeps it secret from
human investigators.

Centuries, even, do not
delimit its extremes."



Harnessing the River – Floods, Flows, and Dams

The Lower Colorado River Authority

a multipurpose public agency instituted by the Texas legislature in 1934 as a conservation and reclamation district with a statutory authority covering ten counties through which the Texas Colorado River flows. These counties extend from San Saba in Central Texas to Matagorda on the Gulf Coast.

Walter E. Long, *Flood to Faucet* (Austin: Steck, 1956)



Chain of Highland Lakes and Dams

Buchanan Dam – Constructed from 1935 – 1938

Inks Dam – Constructed from 1936 – 1938

Wirtz Dam – constructed from 1949 to 1950

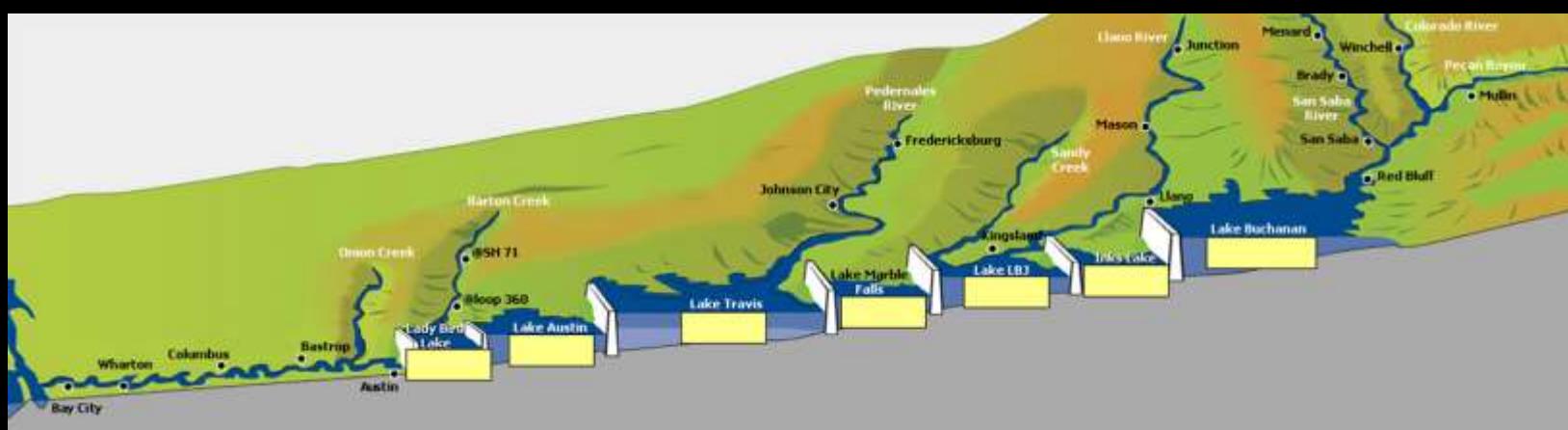
Starcke Dam – Constructed 1949 – 1951

Mansfield Dam - Constructed from 1937 – 1941

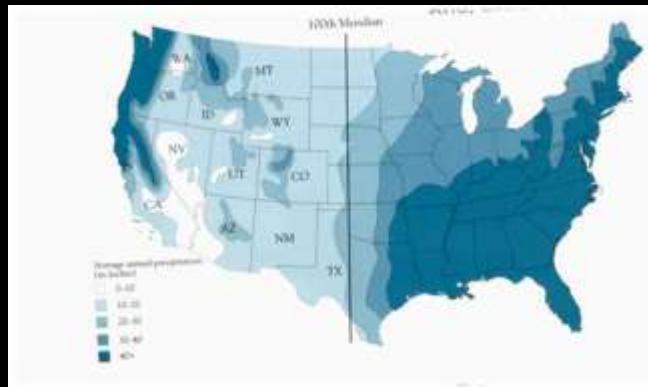
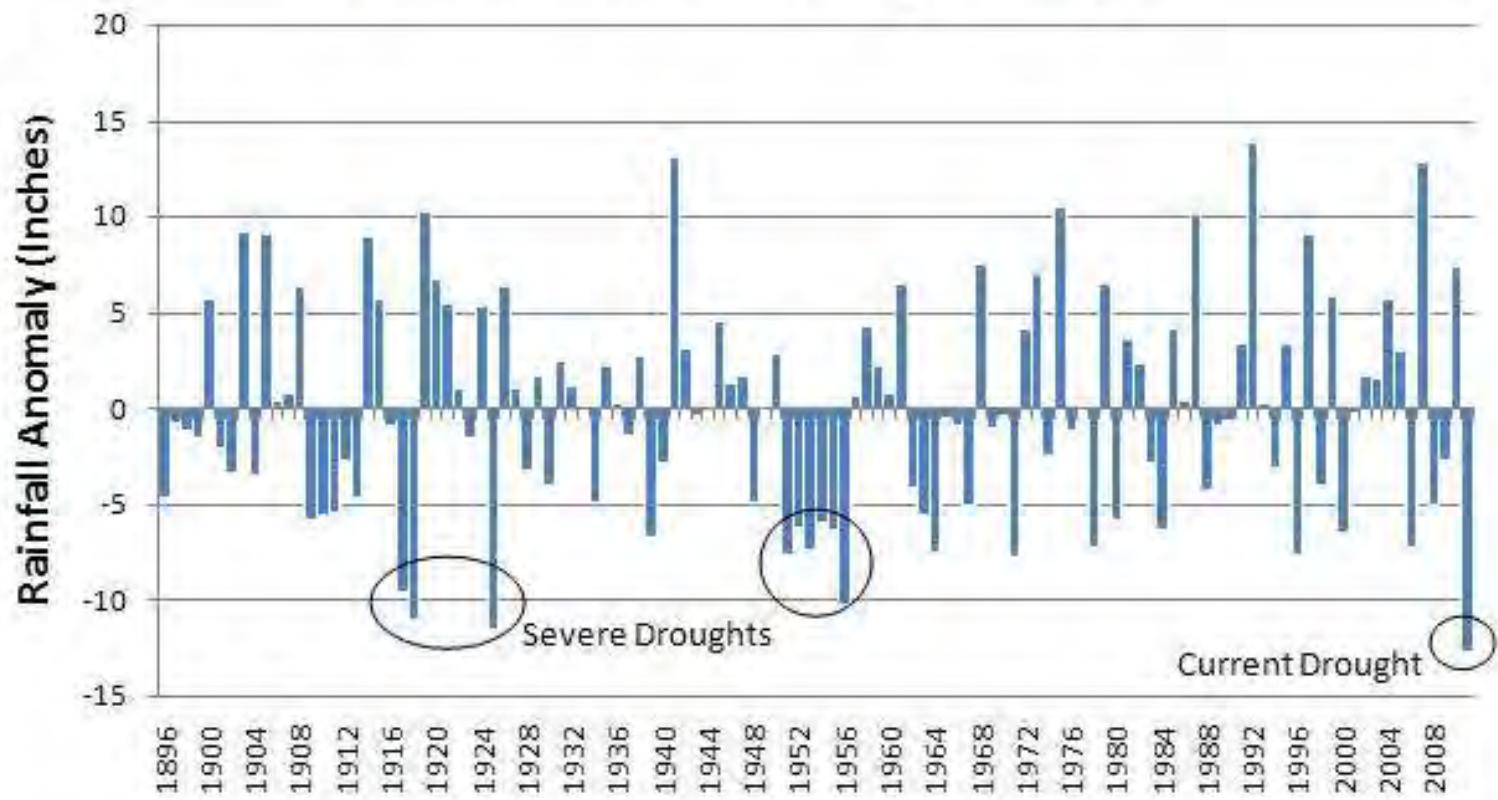
Tom Miller Dam – Constructed from 1938 – 1940

Constructed on top of the remains of two earlier structures, both called Austin Dam, built from 1890-1893 and 1909-1912, respectively. Massive floods destroyed both structures. The lake originally was called Lake McDonald.

Longhorn Dam – Constructed 1960 (owned and operated by the City of Austin)



Texas Precipitation, August-July



Historic Droughts

In 1918, the whole current of the river plowed a narrow furrow through the silt above the dam, and the channel was so narrow that it was easy to hop across it at one jump. At this time, the whole discharge of the Colorado River was only nine second-feet immediately above the dam.

University of Texas Bulletin

No. 2439: October 15, 1924

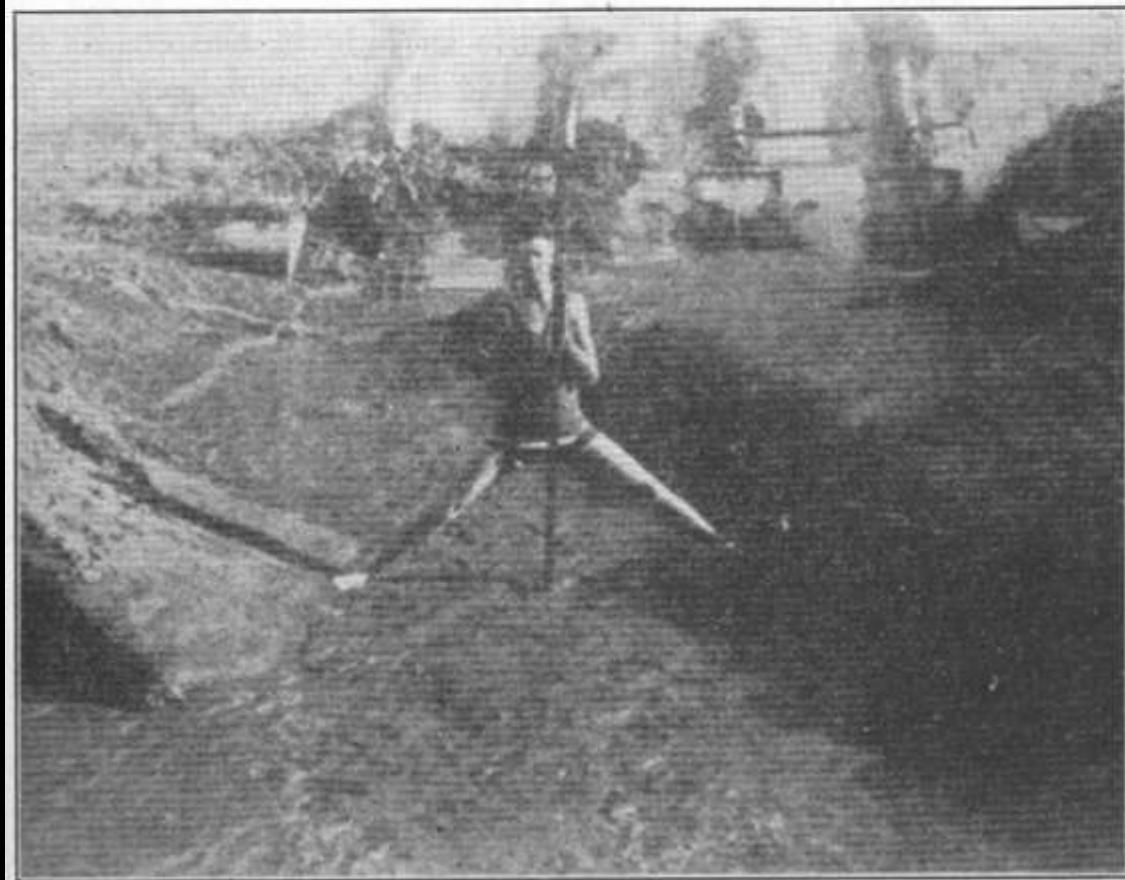
SILTING OF THE LAKE AT AUSTIN, TEXAS

By

T. U. TAYLOR

Professor of Civil Engineering

illustrates the width of the stream where the man in the bathing suit is astride the whole channel of the river, as it flowed along the narrow furrow that it had cut in the silt. The stream at this point was about four feet wide.



Major Droughts in Modern Texas

1917-1918 - Native grasses are so severely damaged that invasive species permanently take over many areas. The federal government sends 1400 boxcars to evacuate starving Texas cattle.

1925 - High temperatures and low rainfall set records for the worst one-year drought that stand for the next 86 years.

1930-1936 - Dust Bowl drought leads to staggering economic losses and displaces thousands from the land. Amarillo experiences an average of nine dust storms per month every spring.



1950-57 - Catastrophic drought lasts for years and galvanizes Texas into scientific water planning, with 1950s conditions enshrined as the “drought of record” (meaning, the worst-case scenario).

1971 - Severe drought destroys wheat and cotton crop and kills 100,000 cattle. In areas of north Texas, only a single inch of rainfall is received for the entire year. The Red River goes dry.

2010-2011 - Hottest, driest one-year period ever recorded in Texas.

Historic Floods On the Colorado

February 1843 - In the earliest flood for which there is a written account, floodwaters cause the Colorado River to crest at a stage of 36 feet at Austin.

July 1869 - In what is considered to be the worst flood on record, the Colorado crests at 51 feet at Austin and produces record crests of 60.3 feet at Bastrop, 56.7 feet at La Grange, 51.6 feet at Columbus, 51.9 feet at Wharton and 56.1 feet at Bay City. Bastrop and La Grange are inundated.

- Reports describe rainfall as incessant for 64 hours, the river at Austin more than 10 miles wide, and floating buffalo carcasses in the river (indicating that some of the floodwaters originated in the High Plains). Damage is estimated at \$3 million.



April 1900 - Flood destroyed the Austin Dam



La Grange 1913

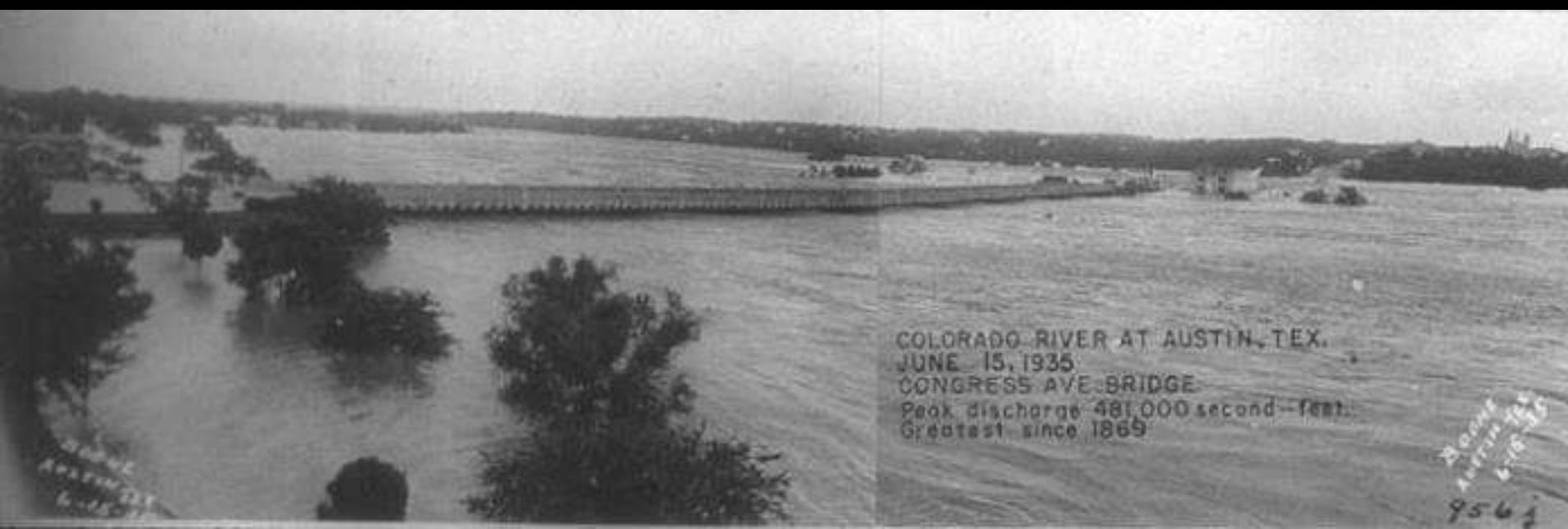


June 1913 - Flooding over parts of Uvalde County. Montell received 20.6 inches of rain in 24 hours. Flood merged the mouths of the Colorado and adjacent Brazos rivers, forming a lake 65 miles wide.

1915 - Floodwaters from storms in April and September severely damage the second Austin Dam, completed in 1912. The structure will lie unrepaired for more than two decades until it is rebuilt by LCRA in the late 1930s.



June 1935 - Floodwaters from heavy Hill Country rains cause the Colorado River in Austin to crest at 50 feet, one foot below the 1869 record. The river overwhelms the Congress Avenue Bridge, cutting Austin in half. The Llano River rises to its highest recorded stage of 41½ feet, streamflow 388,000 cfs.



COLORADO RIVER AT AUSTIN, TEX.
JUNE 15, 1935
CONGRESS AVE. BRIDGE
Peak discharge 481,000 second-feet
Greatest since 1869

9564

September 1936 - The 1936 flood was created by two major storms in summer and early fall totaling 51 inches over the watershed of the Concho River. Floodwaters from heavy rains throughout the basin pour through the Colorado River at Austin for a 20-day period, cresting at 31.4 feet. Earlier, floodwaters from a 30-inch rain on the Concho River had washed away nearly 300 buildings in San Angelo.



July 1938 - Twenty inches of rain over 12 counties pour more than 3 million acre-feet of floodwaters into newly completed Lake Buchanan.

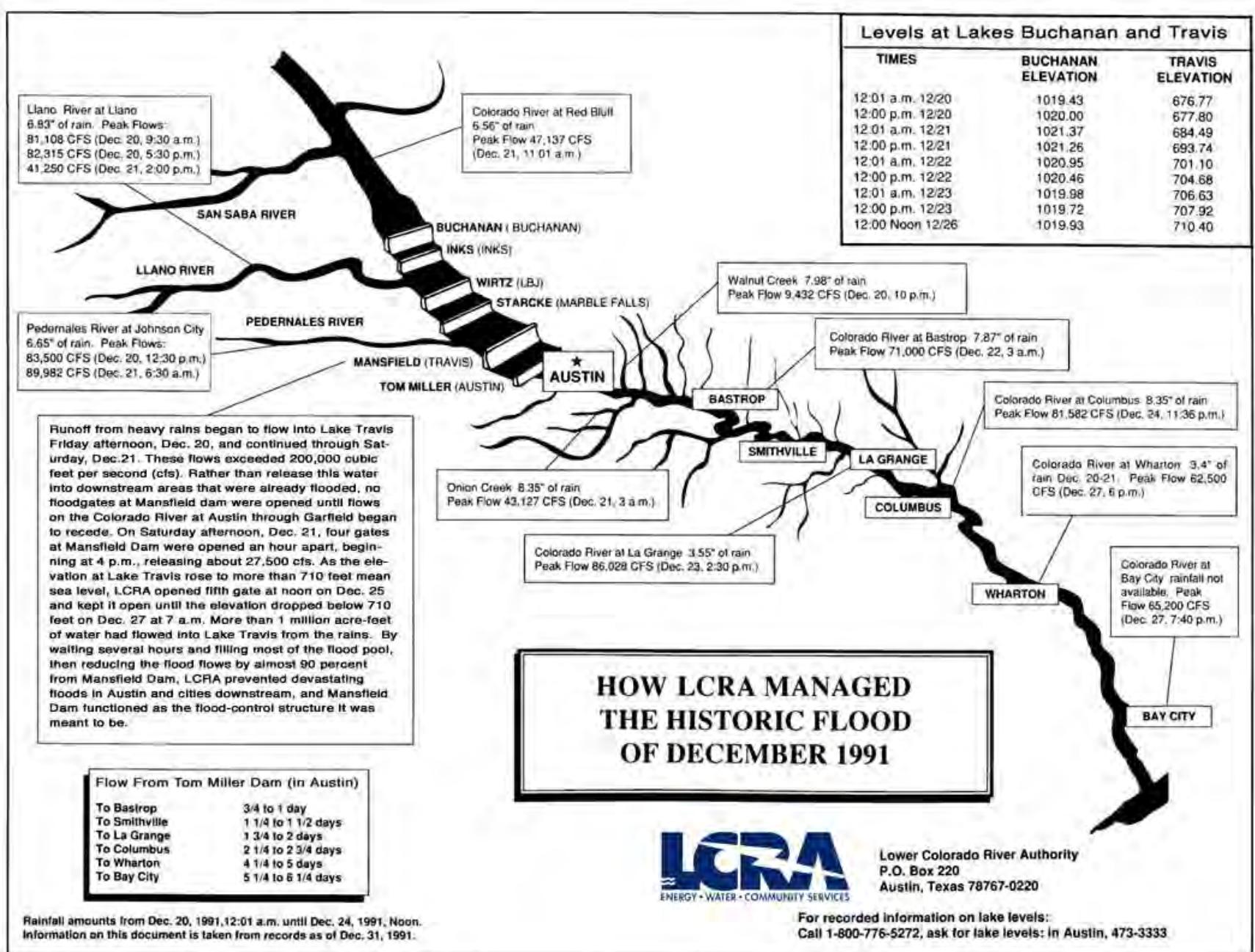
Rains of up to 25 inches over a 10-day period at the storm's center near Brady, upstream of the newly completed Buchanan Dam.

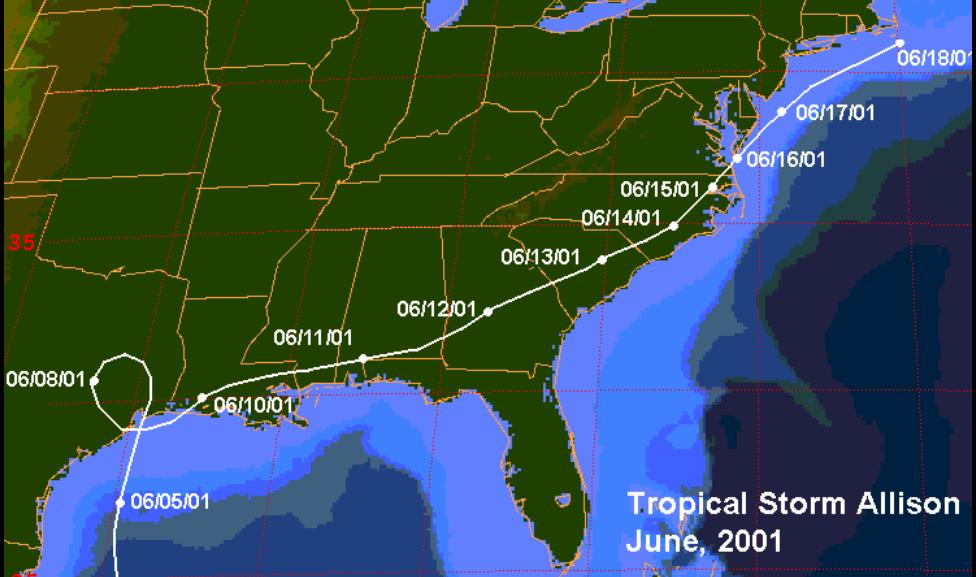
LCRA opened 22 of Buchanan's 37 floodgates (still a record) to pass through the floodwaters.

Basinwide damages totaled roughly \$39 million in today's dollars and left more than 4,000 homeless



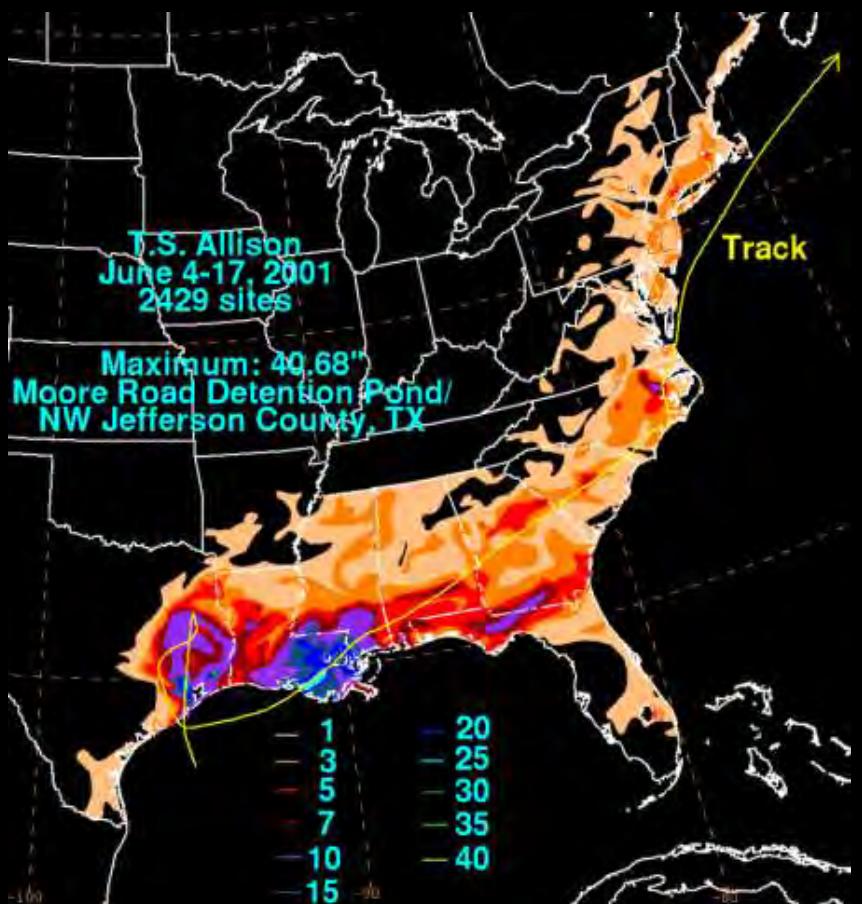
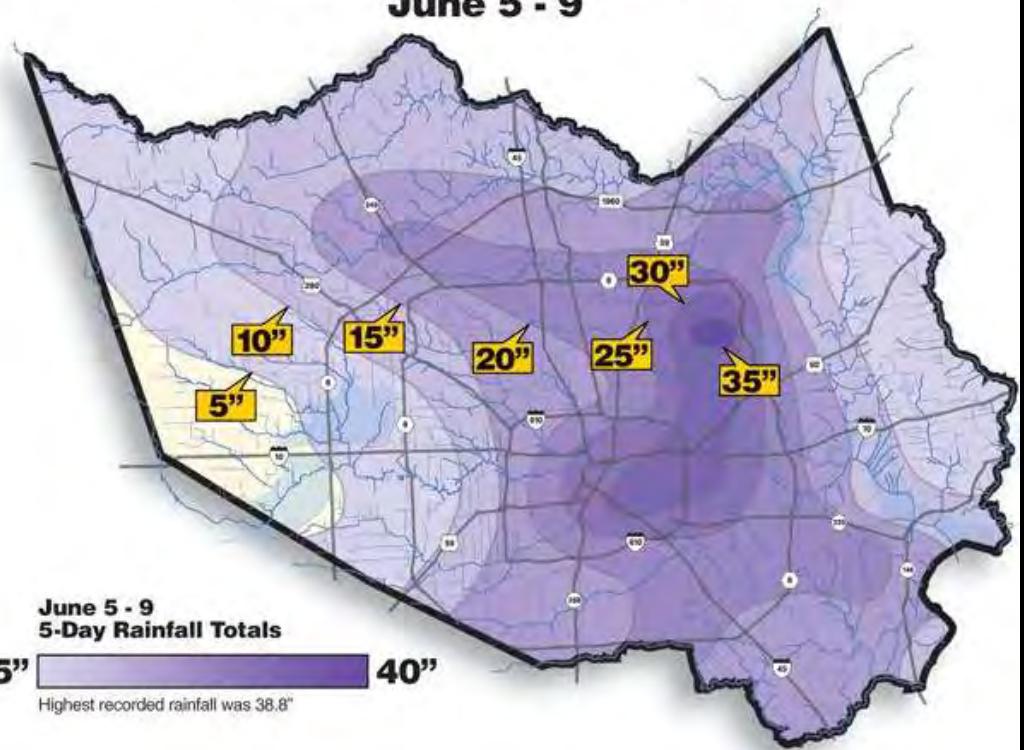
The "Christmas Flood" of 1991 pushed Lake Travis to its all-time high elevation of 710.4 feet, about 4 feet below the Mansfield Dam spillway.





Tropical Storm Allison
June 2001

5-Day Rainfall Totals June 5 - 9

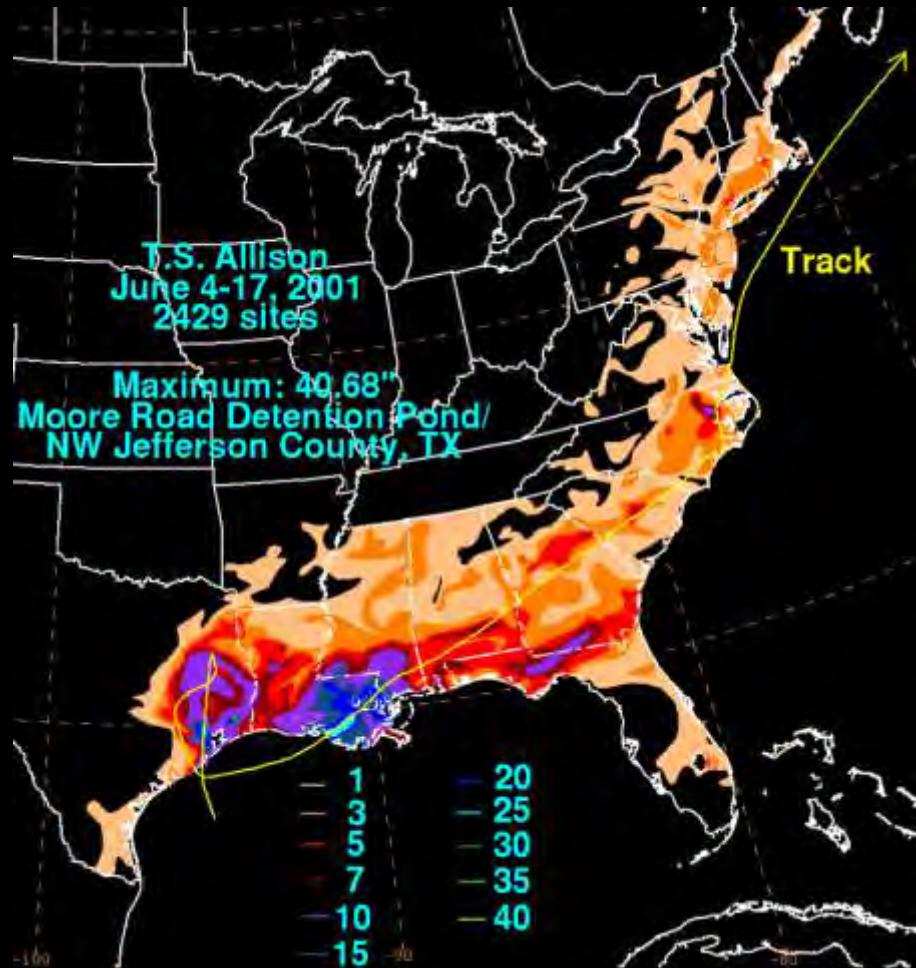


Future Floods on the Colorado River

An LCRA study estimated that a Hill Country storm like Allison would have forced LCRA to open all 24 of Mansfield Dam's floodgates – something that has never happened. (The most that have been opened at one time was six, during a 1957 flood.)

"The flood that occurred in summer 2007 was triggered by a 19-inch rain in the Marble Falls area," LCRA Chief Meteorologist Bob Rose noted.

"If that heavy a rain had fallen over a much wider area of our watershed, it could have resulted in a catastrophic flood approaching those of the 1930s. One day, such a flood will occur, and its impact will be even more devastating to a basin that is much more heavily populated and urbanized than it was seven decades ago."



HARVEY RAINFALL AUGUST 25-30, 2017

Nederland, TX	60.58"
Groves, TX	60.54"
Fannett, TX	49.25"
Beaumont, TX	49.06"
Port Arthur, TX	47.99



Observed Rainfall & Peak Gusts

Tropical Storm Harvey



Austin / San Antonio
WEATHER FORECAST OFFICE

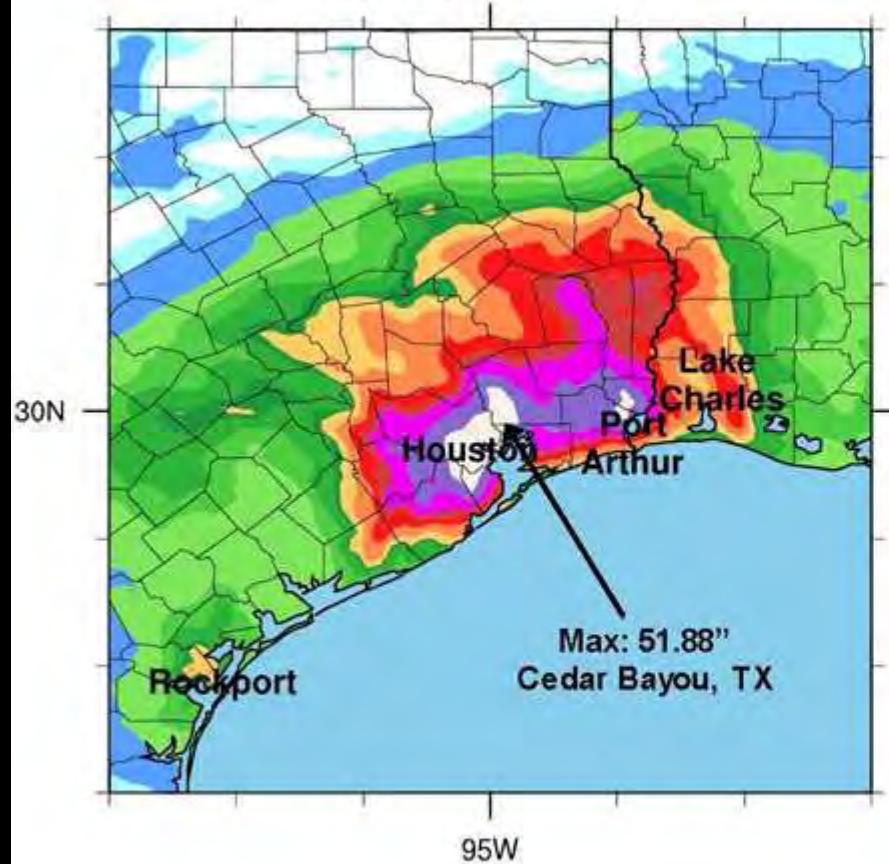
Peak Wind Gusts

New Braunfels – 58 mph
Randolph AFB – 58 mph
San Marcos – 55 mph
Austin Bergstrom – 54 mph
San Antonio Intl – 53 mph
Austin Executive - 52
Gonzales – 52 mph
Hondo – 47 mph
Pleasanton – 43 mph
La Grange – 40 mph

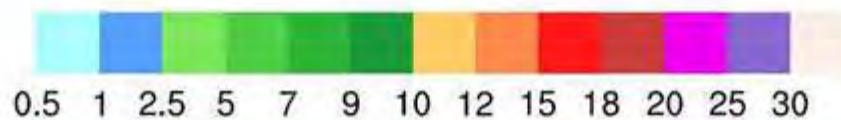
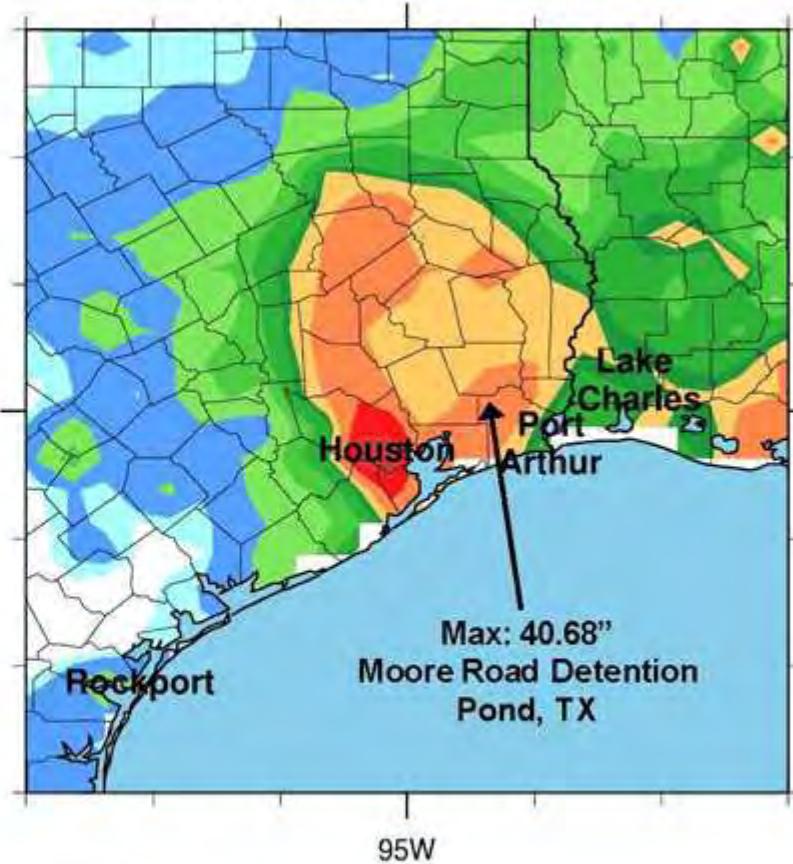
Rainfall

9 E Smithville – 29.09"	8 SW Westhoff – 12.92"
2 NE Muldoon – 26.63"	Seguin – 11.95"
1 W La Grange – 25.88"	Buda – 11.68"
Carmine – 25.17"	8 E Coupland – 10.29"
Smithville – 23.58"	Elgin – 10.16"
9 SW Gonzales – 21.37"	Austin Bergstrom – 10.07"
Rosanky – 20.55"	Kyle – 9.29"
Giddings – 15.76"	Seguin – 9.03"
Hallettsville – 19.31"	Austin Mabry – 7.94"
La Grange – 18.79"	New Braunfels – 7.03"
7 SE Dale – 16.90"	3 E La Vernia – 7.02"
1 WSW Bastrop – 16.40"	St. Hedwig – 5.67"
6 NE Lockhart – 15.80"	Randolph AFB – 4.23"
Gonzales Airport – 13.44"	San Antonio Intl – 1.94"

Harvey – 2017



Allison – 2001



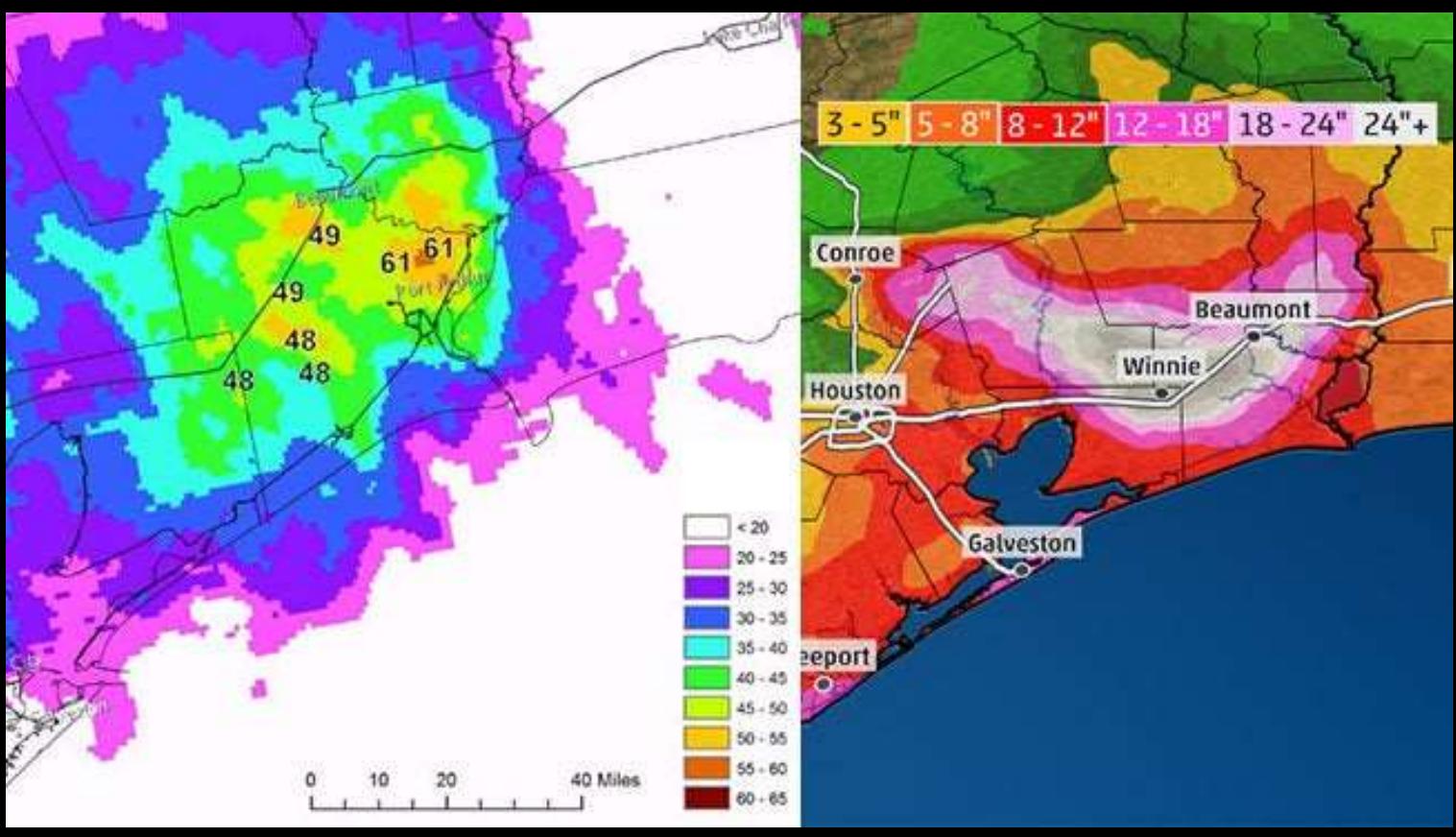
TROPICAL STORM IMELDA

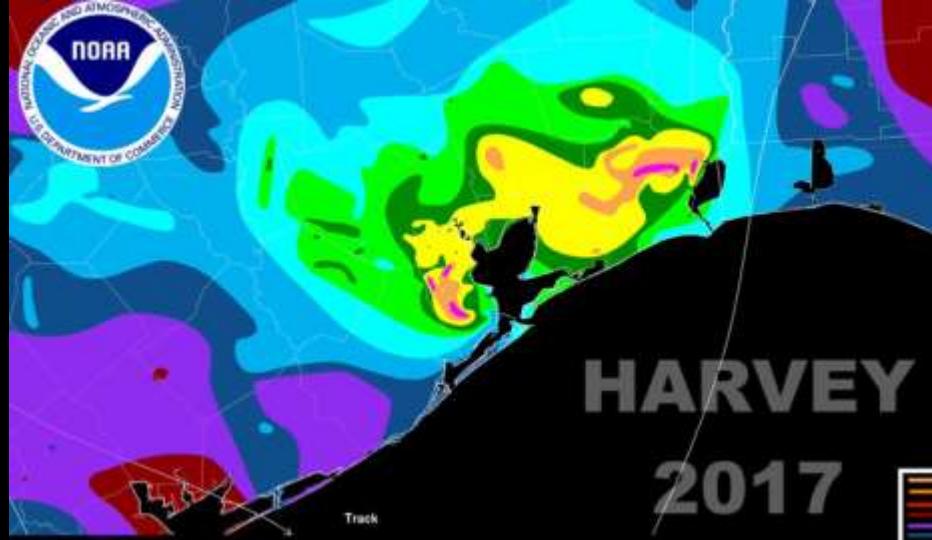
SEPT. 17-18, 2019

DEPRESSION STORM HURRICANE CAT. 3+

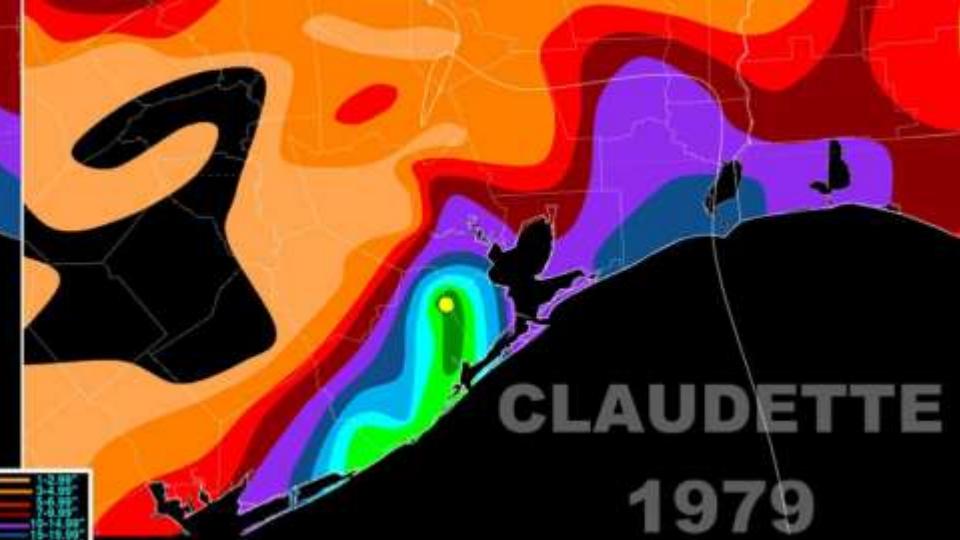


Tropical Storm Imelda was the 5th wettest tropical cyclone on record in the continental United States with some areas experiencing over 43 inches

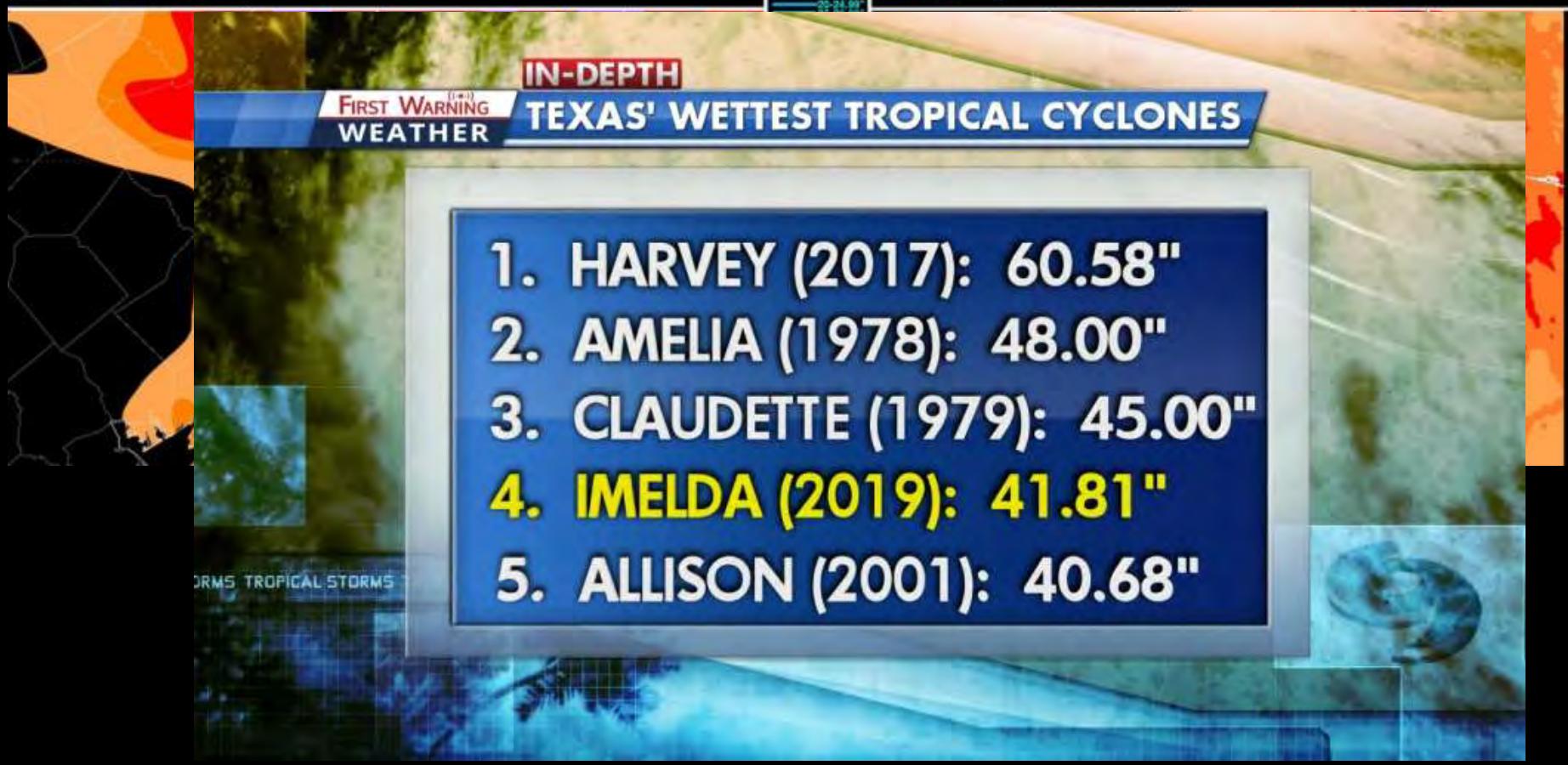




HARVEY
2017

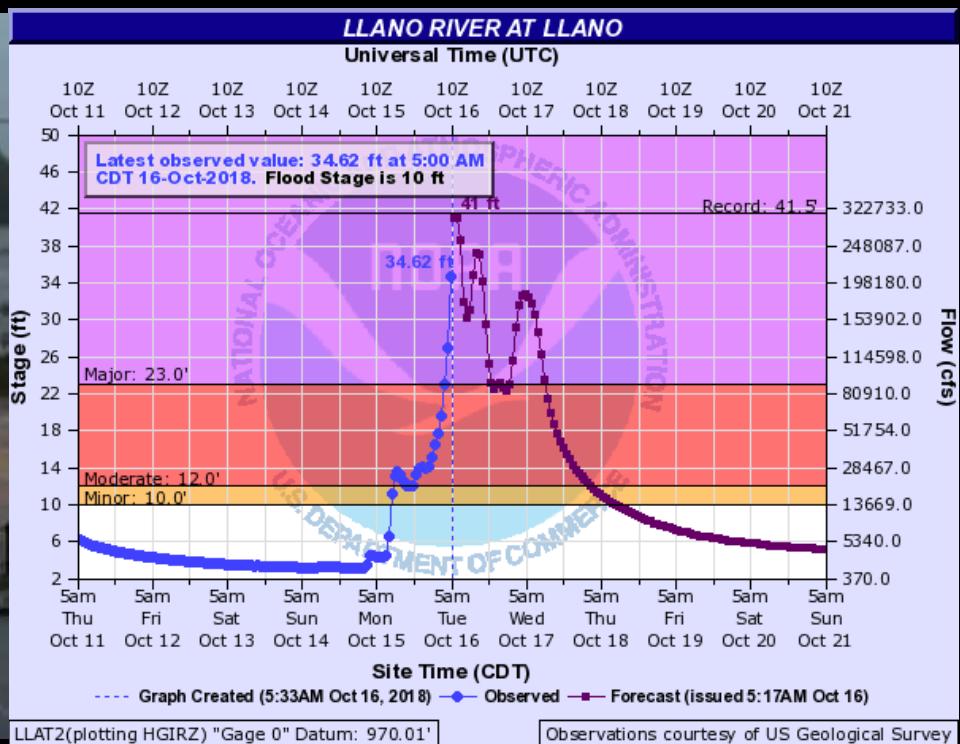


CLAUDETTE
1979



October 2018

The Llano River rises to its second highest recorded stage of 41½ feet, with a streamflow of 325,000cfs – second only to the 1935 flood streamflow of 388,000cfs.





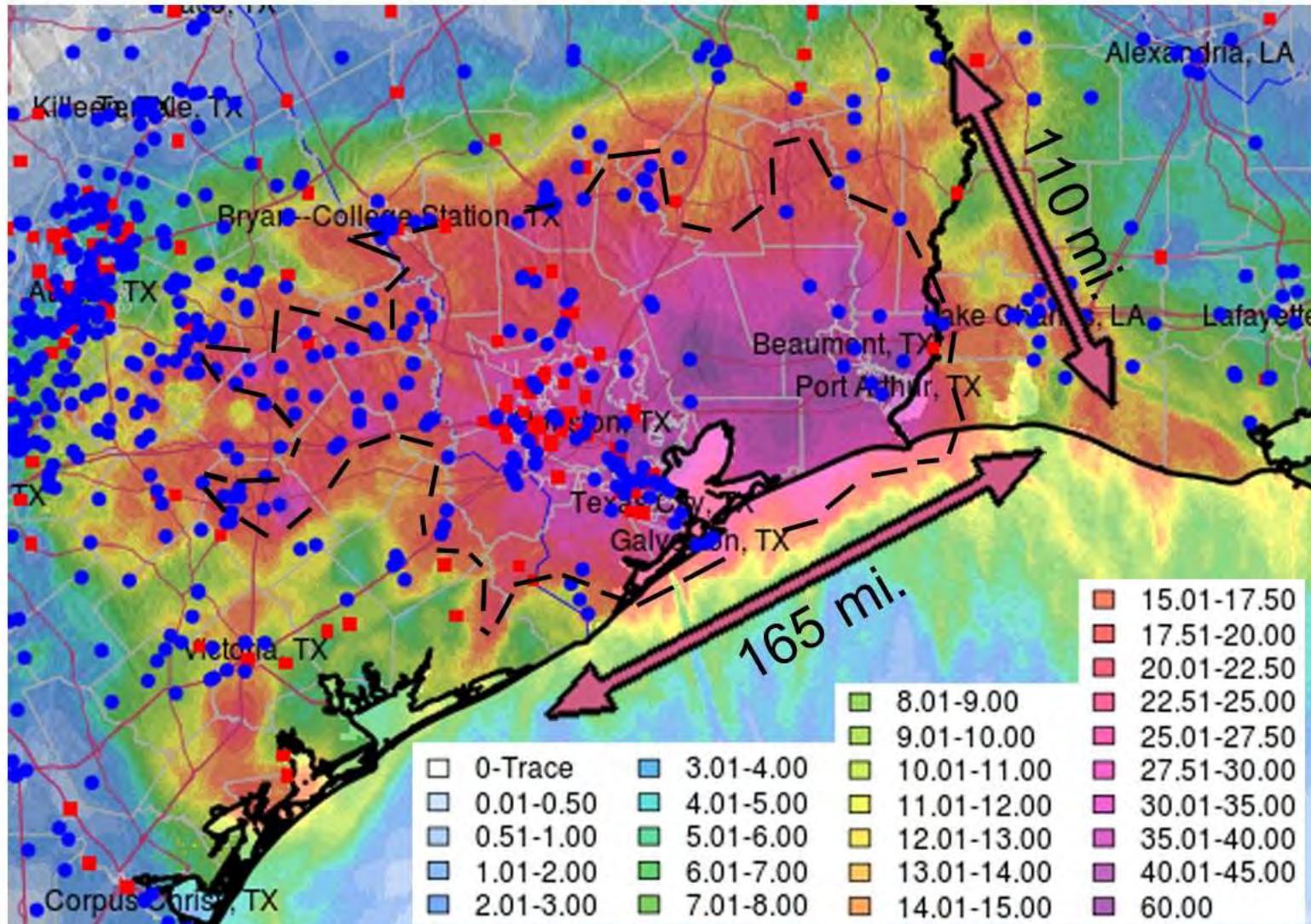
NOAA's Atlas 14: Texas

The 100-year Storm, Now the 25-year Storm

Hurricane Harvey Rainfall

August 25 to August 30, 2017

Dashed line is rainfall in excess of 20 to 27.5 inches



Atlas 14: Texas – The 100-year Storm is Now the 25-year Storm

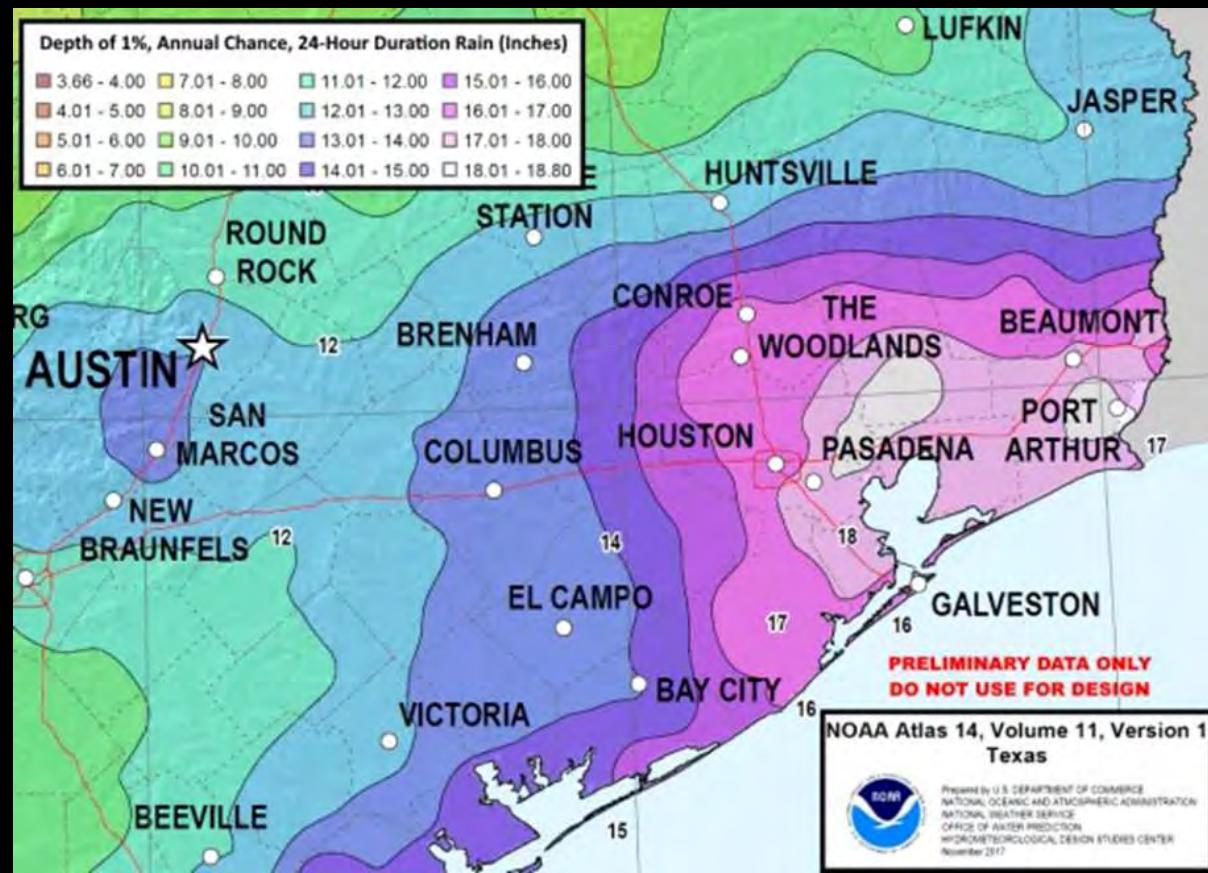
In Houston, the 100-year storm was 12.5 inches in 24 hours.

- The new 25-year storm total is now 12.1 inches.
- The 100-year storm total has increased to 17.9 inches, an increase of 43 percent.

In Austin, the 100-year storm was 10 inches in 24 hours.

- The new 100-year storm rainfall amount for 24 hours is 13 inches.
- The Austin 50-year storm is now 10.6 inches and the 25-year storm is 8.86 inches.

The new values are more accurate than estimates developed 40 to 50 years ago due to decades of additional rainfall data, an increase in the amount of available data, both in the number of stations and their record lengths, and improved methods used in the analysis.



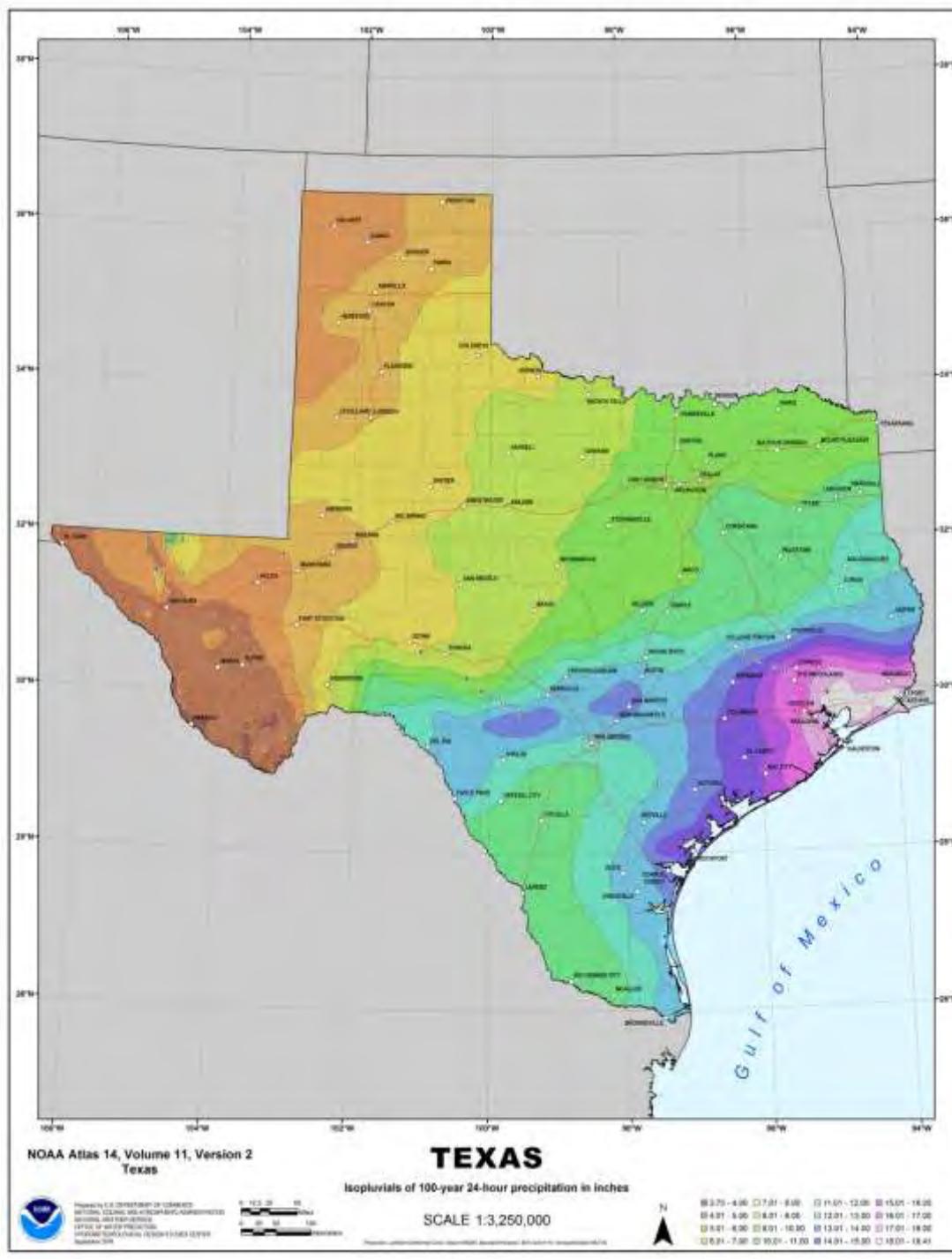
This graphic shows where and how much rainfall has increased for the new NOAA Atlas 14 vs. the old NOAA evaluations from the 20th century. Many areas have remain unchanged, but changes in others have been large. This reflects fairly accurately the general rainfall projections under a warmer climate where inland areas will become drier and coastal areas will become wetter. Only it's happening much ahead of schedule.

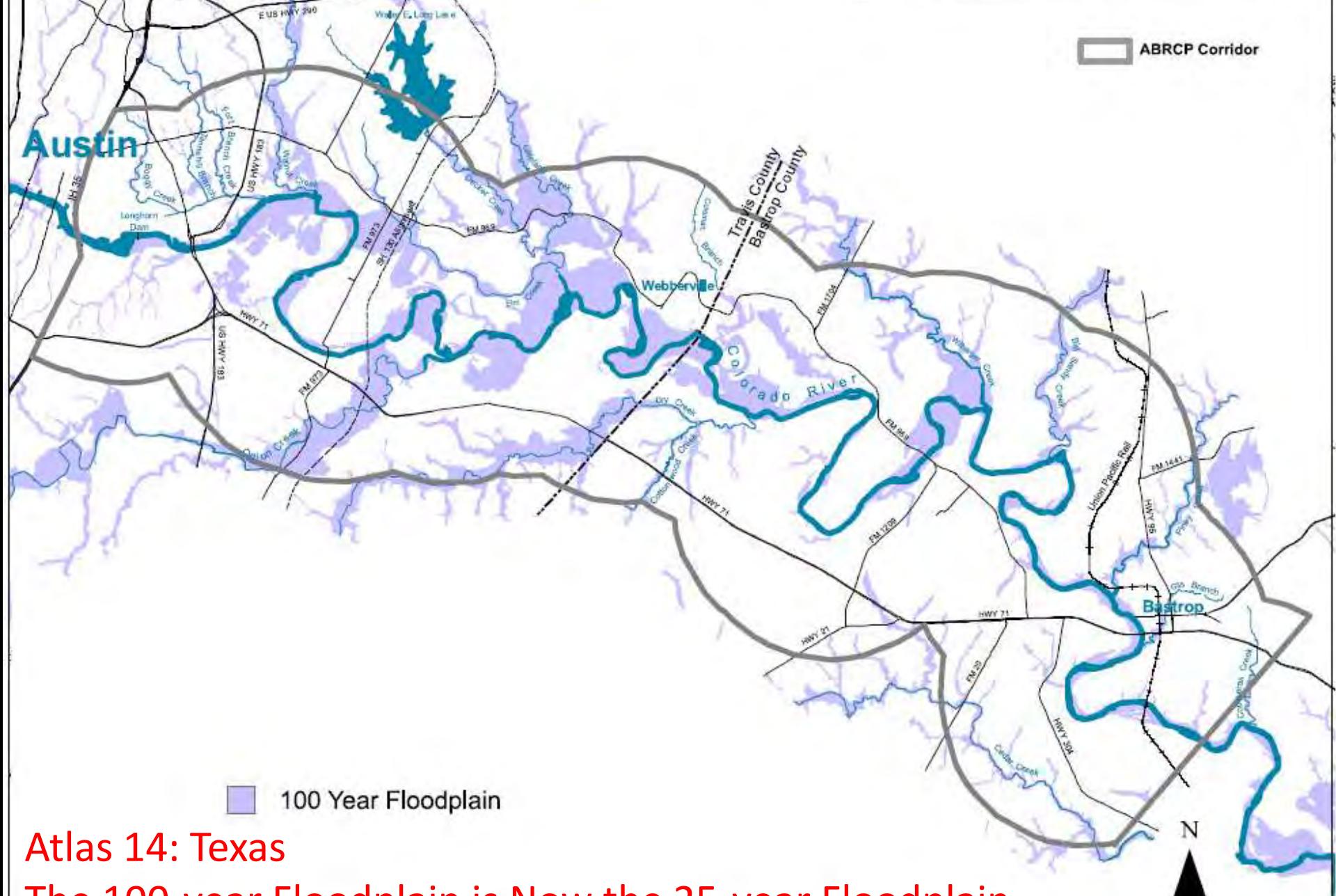


Atlas 14 Impacts

NOAA Atlas 14 rainfall values are used for infrastructure design and planning activities under federal, state and local regulations.

They also help delineate flood risks, manage development in floodplains for FEMA's National Flood Insurance Program and are used to monitor precipitation observations and forecasts that can indicate flooding threats by NOAA's National Weather Service.

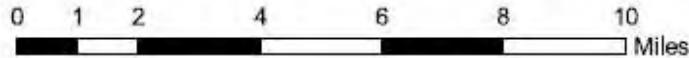




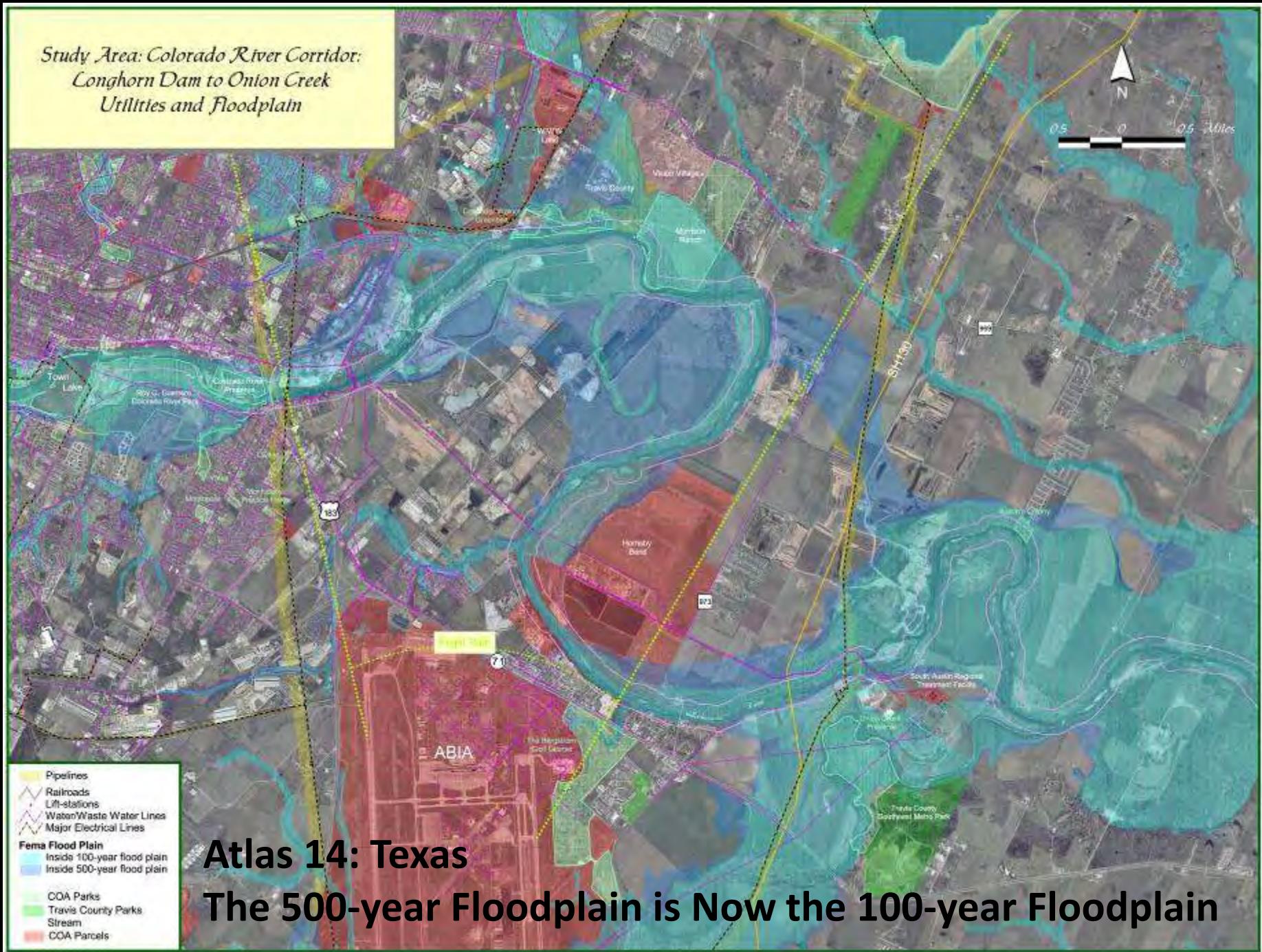
Atlas 14: Texas

The 100-year Floodplain is Now the 25-year Floodplain

100 Year Floodplain (preliminary DFIRM)



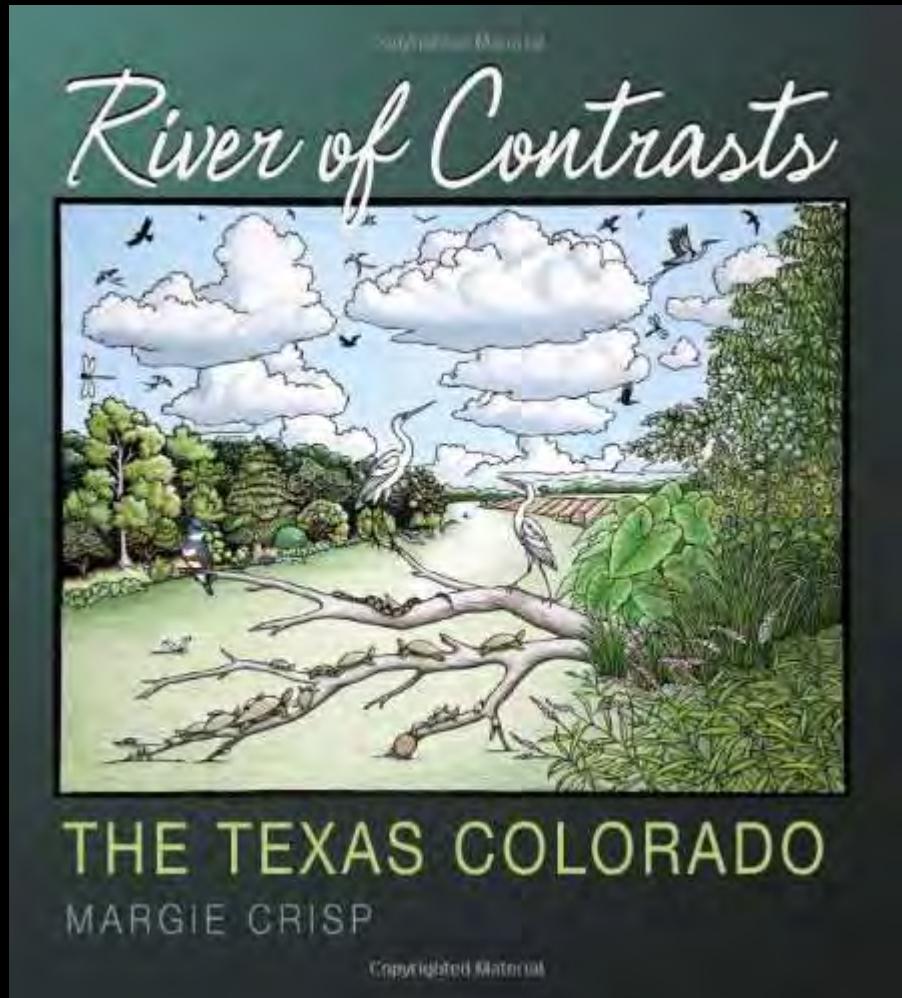
*Study Area: Colorado River Corridor:
Longhorn Dam to Onion Creek
Utilities and Floodplain*



Atlas 14: Texas
The 500-year Floodplain is Now the 100-year Floodplain

A wide-angle photograph of a river scene. The foreground is filled with the dark blue, slightly rippled water of the river. In the middle ground, a dense line of tall, green reeds or grasses grows along the bank. Behind them is a thick, dark green forest of various trees and bushes. The sky above is a bright, clear blue with no visible clouds.

Rediscovery



The Austin-Bastrop River Corridor Partnership

An open conversation about the future of the river corridor

An informal partnership of nonprofit organizations, governmental agencies, businesses, schools, landowners, and other local citizens concerned with the future of the Colorado River corridor from Austin through Bastrop County.

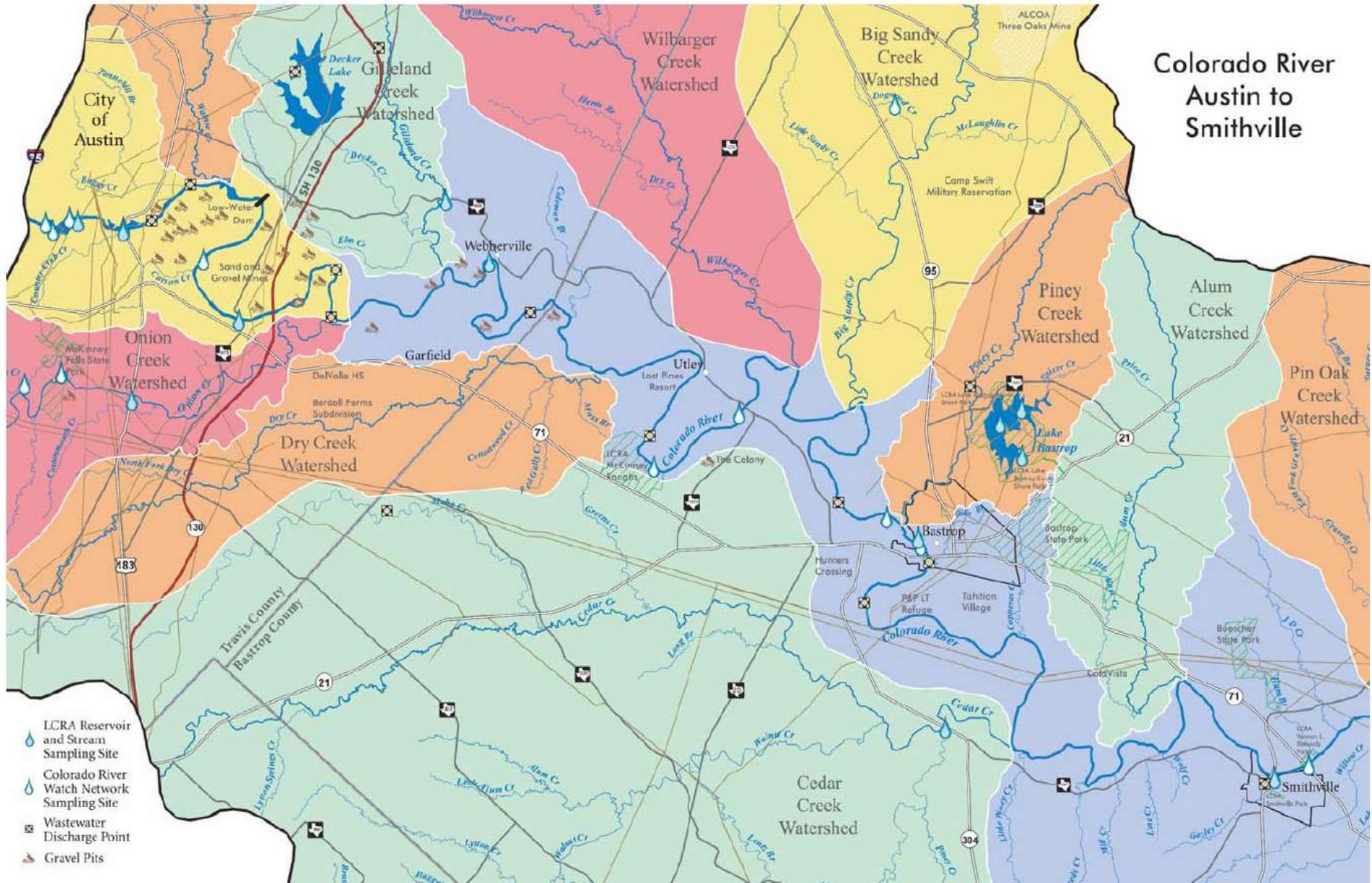
Mission: To support sustainable development and a healthy riparian ecosystem along the Austin to Bastrop River Corridor.

2003 to 2018 Meetings, Workshops, Online Report, River Trips

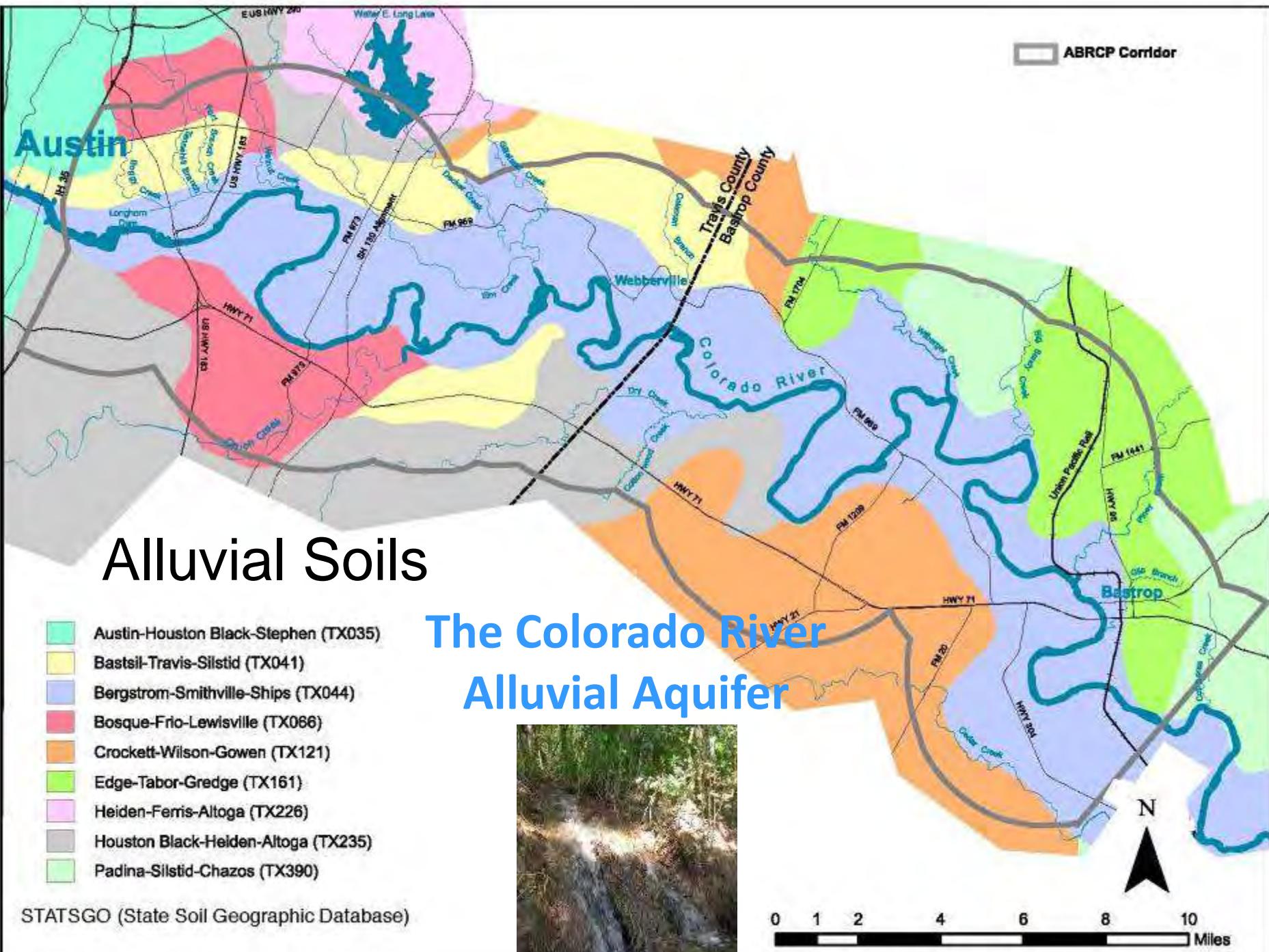


2006 Raising Public Awareness Recipient

Colorado River Austin to Smithville



90 miles of the Colorado River



Alluvial Soils

-  Austin-Houston Black-Stephen (TX035)
 -  Bastrop-Travis-Silolid (TX041)
 -  Bergstrom-Smithville-Ships (TX044)
 -  Bosque-Frio-Lewisville (TX066)
 -  Crockett-Wilson-Gowen (TX121)
 -  Edge-Tabor-Gredge (TX161)
 -  Heiden-Ferris-Altoga (TX226)
 -  Houston Black-Heiden-Altoga (TX235)
 -  Padina-Silolid-Chazos (TX390)

The Colorado River Alluvial Aquifer



STATSGO (State Soil Geographic Database)

Austin-Bastrop River Corridor Partnership Goals

Sustainability Goal: To promote economic and recreational use of the river corridor that supports long-term ecological health and social equity.

Riparian Management Goal: To promote actions that conserve and maintain a healthy riparian system along the Austin-Bastrop Colorado River Corridor.

Restoration Goal: To assist with restoration of riparian habitats along the river corridor.

Public Awareness Goal: To create community awareness and support for land-use planning and restoration of the river corridor.

Austin Bastrop River Corridor Partnership

Monthly River Monitoring Trips



Monthly River Monitoring Trip

1st Saturday of the month

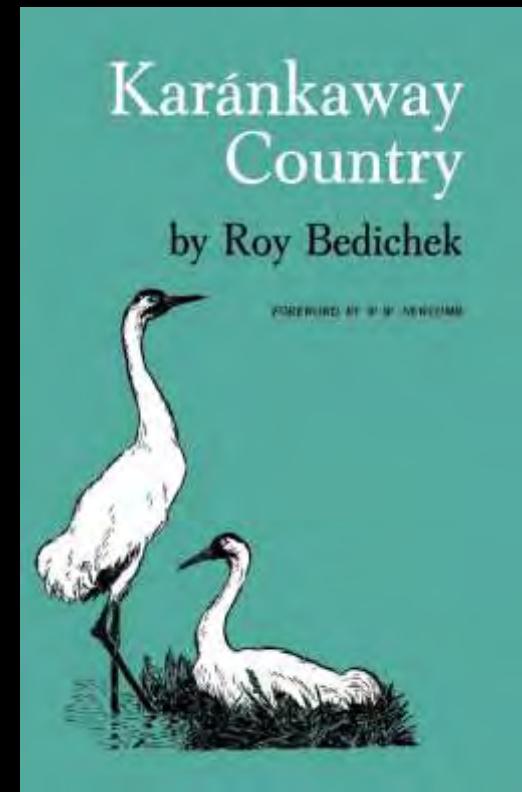
Begun February 2006



Karánkaway Country and the Colorado River

“Texas has a river unity which invites unified treatment of Texas rivers”

- “Rivers intrigue me. I can sit on a log and look upon a flowing stream for an hour at a time without feeling those twinges of conscience which come while idling in other environments.”
- “The river is a living organism, or at least it presents characteristics so similar to those of a living organism that to speak of it as such is more than mere metaphor.”
- “A river system is one of Nature’s units, and it must be dealt with as such if it is to be dealt with successfully for serving human needs.”





Applause!