HISTORICAL ECOLOGY OF THE TEXAS HILL COUNTRY

Historical Accounts of Vegetation Communities from1700-1900, with an Emphasis on the Eastern Edge of the Edwards Plateau

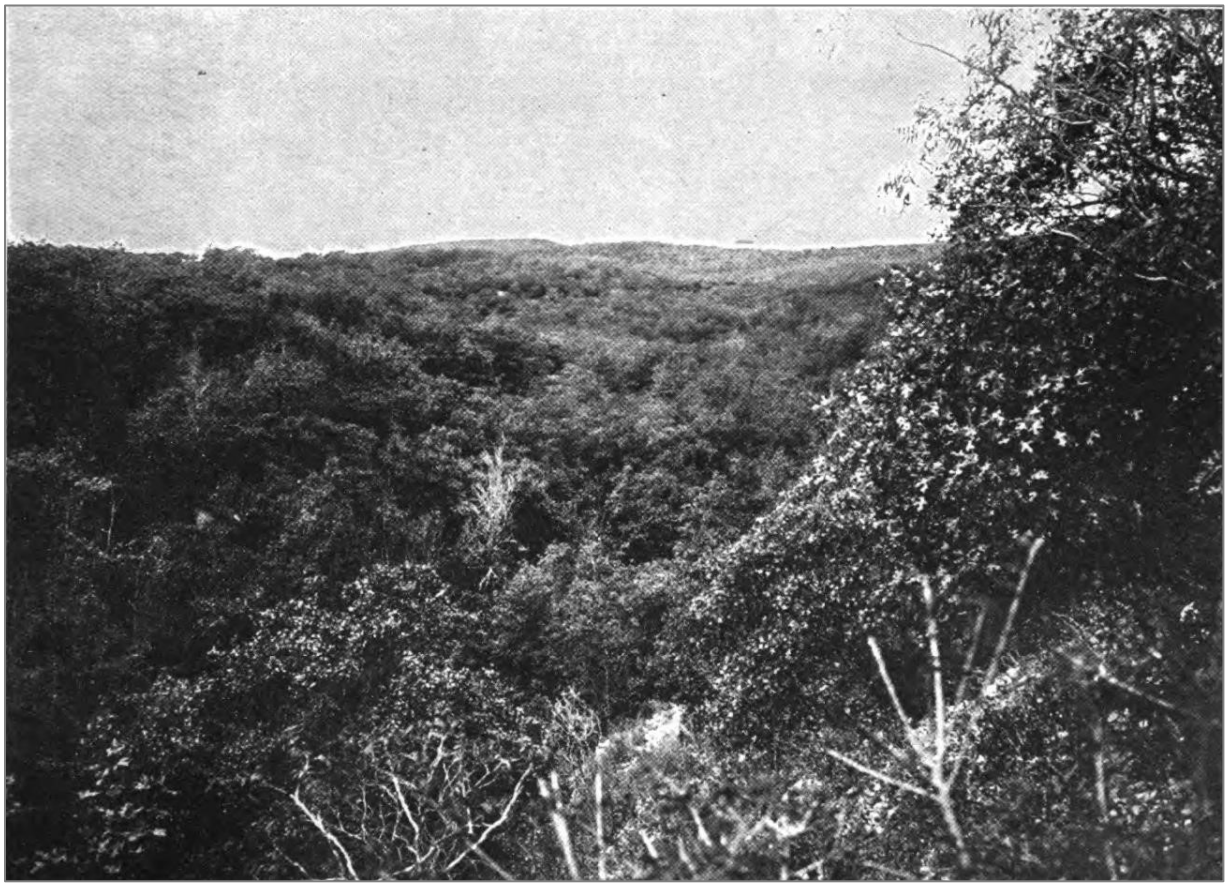

Photo by William Bray (1904) taken near Wild Basin, west of Austin, Texas

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Appendix A: Eyewitness Accounts of Vegetation Communities in the Texas Hill Country with an Emphasis on the Eastern Edge of the Edwards Plateau (1700-1900)

Looking west toward Mount Bonnell, near what is now 35th street and Camp Mabry (~1900)



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"A fundamental aspect of ecosystem restoration is learning how to rediscover the past and bring it forward into the present – to determine what needs to be restored, why it was lost, and how best to make it live again." --D.E. Egan and E.A. Howell, 2001

Introduction

This report covers historical accounts and other documents of the Texas Hill Country[1] vegetation, going back as far as written records are available (early 1700s) to get an idea of what the predominant vegetation communities were prior to European settlement and how they have changed (and how our perceptions have changed) over the past 300 years. The historic documents are primarily from the 1700-1900 time period.

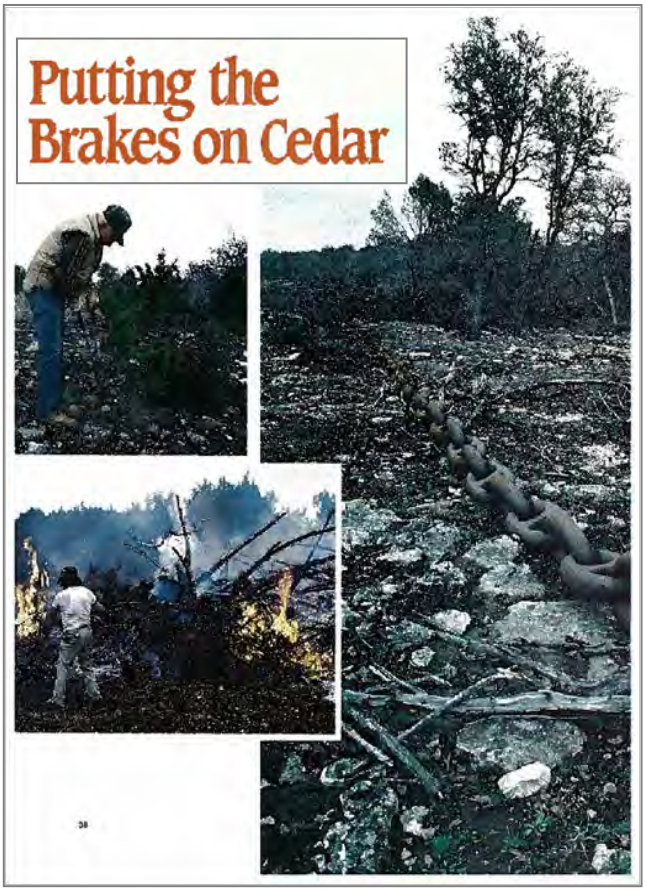
This project continues to be a work in progress. I started compiling historic accounts in the early 1990s when I was working for the U.S. Fish and Wildlife Service, right after the listing of the Golden-cheeked Warbler (*Setophaga chrysoparia*) as an endangered species. It was during this time that I started hearing claims that the Hill Country was originally dominated by grasslands that were invaded by woodlands due to overgrazing and fire suppression; that Native Americans burned on a regular basis; and that Ashe juniper (*Juniperus ashei*, commonly known as "cedar") is not native and was brought in by the Spaniards.

To illustrate some of the widespread beliefs about what the Hill Country looked like historically, the image below shows a photograph from a mural on a building near Kerrville, Texas. Note the year, 1865, and keep this in mind as we explore the historic accounts during this time period.

Mural claiming Native Americans routinely set fires on the Edwards Plateau



[1] The "Hill Country" of Texas is a loose term that includes the hilly portions of the Edwards Plateau, Llano Uplift, and Cross Timbers (https://tpwd.texas.gov/landwater/land/habitats/hillcountry/regulatory/). These hills were often referred to as "mountains" in the historic accounts.



Here is another example of how prevalent the belief is that the Hill Country was originally a grassland, and using historic accounts to support land clearing practices, particularly of Ashe juniper. The article states "When Frederick Law Olmstead crossed the Colorado River in 1857, he described the Hill Country region of central Texas as a 'vast region, on which the live-oak trees stand alone or in picturesque groups near and far upon the green sward, which rolls in long waves…' The first settlers found the landscape covered with little timber other than ancient cypress trees and some scattered, sturdy oaks growing upon a carpet of lush grasses and herbs."

This article appears to have misquoted Frederick Law Olmstead's accounts of the Blackland Prairie, and underscores the importance of knowing the location of the observer. This report will look at what Olmstead and others actually said about the Hill Country.

Keeping the above examples in mind, my goal has been to find historical documentation to support common claims made of Texas Hill Country vegetation, including:

- Ashe juniper is non-native and invasive.
- Ashe juniper and other woody species have encroached into what was historically grassland or oak (*Quercus* spp.) savannah, including the eastern edge of the Edwards Plateau.
- Native Americans started fires that burned large areas and maintained the vegetation communities as grasslands and savannahs.
- This woody plant encroachment occurred following European settlement and 150 years of overgrazing by domestic livestock and fire suppression.
- The resulting woodlands are detrimental to water quality and quantity, including groundwater recharge and streamflow.

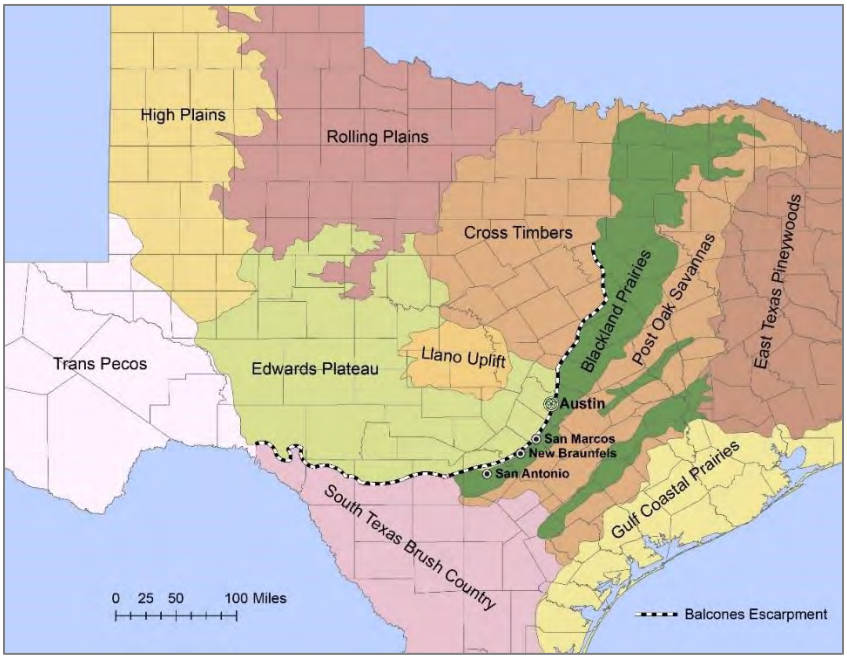
Methods

I have compiled all of the historic accounts that I have been able to find for the Hill Country for the 1700-1900 time period. As a land manager of the Balcones Canyonlands Preserve, much of the focus of my search has been on the eastern edge of the Edwards Plateau, so many of the accounts are from this area. The criteria for each of the historic accounts is that they must be firsthand, eyewitness accounts – for example, letters, diaries, reports/publications – written by the observer soon after the experience. Memoirs tend to be less accurate, as are secondhand accounts, and are excluded. As a work in progress, this report will continue to be updated as new sources of information are found.

Appendix A includes over 20 eyewitness accounts by a variety of observers. For each account, I provide quotes where the observer described the vegetation; descriptions of the vegetation communities within the Hill Country area are highlighted in *italics*. My goal for this project is to give voice to the observers and to allow them to speak for themselves. My role is to provide spatial and temporal context, including where each observer was with respect to major ecological regions, as well as timelines of major historical events.

Spatial Context: For spatial reference, the approximate location of the accounts was entered into a GIS database. It is critical to first determine where each observer was with respect to major ecological regions, particularly the Balcones Fault/Escarpment, which separates the Blackland Prairie from the Hill Country. Austin, San Marcos, New Braunfels, and San Antonio were all settled on the prairie near the base of the escarpment. Their respective counties lie along a major ecological divide and include both the prairie and Hill Country ecoregions, which support different plant and animal communities. So, when Frederick Law Olmstead reported seeing extensive grasslands, we need to know whether he was on the Blackland Prairie or the Edwards Plateau.

Major ecological regions of Texas



Temporal Context: As a temporal frame of reference for the historical accounts, I have divided the 300-year period covered in this report into four major time periods and list some of the major historical events that occurred during each: **before 1700, 1700-1800, 1800-1850, 1850-1900**. This report highlights several accounts that I believe are representative for each time period and are presented in chronological order. For a more comprehensive presentation for each observer, all of the accounts and citations are provided in Appendix A.

During the latter part of the 1800s, other sources of information (historic maps, photos, land grants, species habitat and distributions) became available that can be used to corroborate the written accounts. Wherever possible, we want to piece together information from different sources to provide validation. Historical ecology is like piecing together a puzzle; many pieces are necessary, and should all fit together. It is critical to look at multiple accounts to find common threads and consistency, rather than focusing on one account, and to compare the accounts with other sources of information, such as photographs and maps, to present a picture that is as clear and as accurate as possible.

Prehistoric Records

Because of the scarcity of prehistoric data, especially on the Edwards Plateau, prehistoric records are not the focus of this report. However, the presence of fossilized juniper pollen (dating ~14,000-20,000 years old) in Friesenhahn Cave, in northern Bexar County near San Antonio (Hall and Valastro 1995), is worth noting here because it provides evidence that juniper is not only native, but has been in the Hill Country for a very long time. This finding is especially significant, given that juniper pollen is fragile and does not preserve well in alkaline sediments (Bryant and Holloway 1985) that are typical of the Hill Country. In addition to juniper, Hall and Valastro (1995) report fossilized pollen of other tree species as well as forbs and grasses.



Sketch (unknown artist) of Friesenhahn Cave
From the Bulletin of the Texas Memorial Museum (Evans and Meade 1961)

Major Historic Events: Before 1700

1528 Cabeza de Vaca shipwrecked off the Galveston coast, begins first known European exploration of interior Texas, including south Texas and Mexico

after 1528 Spanish explorers introduced horses, cattle, sheep, goats, hogs

after 1600 Comanches and other Plains Indians acquired horses



Cabeza de Vaca's route (© Texas Beyond History[2], adapted from Krieger 2002: Map 4)

To date, I have been unable to find any written accounts for the central Texas area for this time period (before 1700). However, several significant events occurred that influenced events in the next century, including the introduction of livestock by Europeans, followed by acquisition of the horse by Native Americans.

Major Historic Events: 1700-1800

after 1700 Comanches moved south into Texas, displacing other tribes

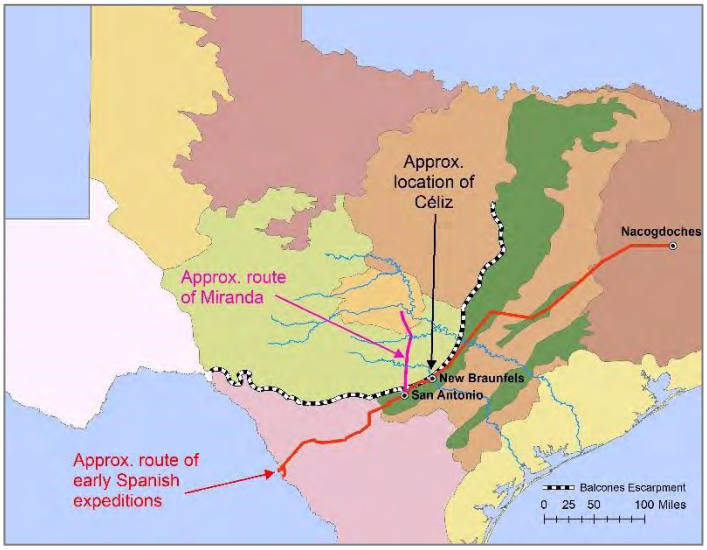
1716-1789 Spain established networks of Catholic missions and presidios, including the Alamo in 1718



Image from Jean Louis Berlandier's Indians of Texas in 1830 (Beinecke Rare Book and Manuscript Library)

[2] For additional information, see Texas Beyond History's online exhibit page by Dr. Alston Thoms, http://www.texasbeyondhistory.net/cabeza-cooking/index.html

Following acquisition of the horse, the Comanches moved south into Texas and displaced many of the neighboring tribes, including those formerly in the Hill Country. Meanwhile, the Spanish were moving to the northeast and establishing a network of missions. All of the written accounts during the 1700-1800 time period are associated with these Spanish expeditions. The earliest expeditions avoided the Hill Country and skirted its edge. The major "highway" during this time was a route between San Antonio and Nacogdoches, which is known today as "Camino Real" or "Old San Antonio Road" and roughly follows Highway 21. Céliz (1719) is the first written account I have been able to find of travel into the Hill Country, beyond the Balcones Escarpment. The map shows the route for the entire expedition from the Rio Grande to Nacogdoches. The Céliz account is near present-day New Braunfels, travelling up the Guadalupe River:



"…we…travelled upstream with a desire to ford [the Guadalupe River] or reach its source. *We travelled about three leagues*[3] *of very rugged land owing to the heavy woods and many rocks*; and at the end of the three leagues two soldiers left for upstream to reconnoiter the land. *They said that it could not be traveled because it is more wooded and contains more rocks….The woods consist of oaks and junipers….*" --F. Céliz, 1719

A few years later, Peña (1722) took a similar route from San Antonio to Nacogdoches: "Travel in this country was dangerous, for it borders on the Lomeria Grande[4] inhabited by the warlike Apaches." – J.A. Peña, 1722.

Miranda (1756) is the first recorded European foray across the Hill Country: "…going past the Balcones [Escarpment], we arrived at the river they call Alarcón [Guadalupe River]. *This [travel] was an effort because of the many hills and rocks, the many arroyos formed by the hills, and some thickets that contain valuable cedar and oak timber*s." "*In all of this region [between the Guadalupe River and Blanco River] there are no commodities nor anything except good cedar and oak timber….*" "*Crossing many swollen creeks and thickets of cedar and oak timber…*we arrived at the Arroyo de los Pedernales." *"[Honey Creek Cove, south of the Llano River] has good grasslands…Of the conveniences…are the large and nearby thickets of mesquite and oak, very useful for charcoal. For house building and…extracting silver, there is much cedar, pecan, cottonwood, and oak timber….*" – B. de Miranda, 1756

[3] Three leagues is about 8 miles.
[4] Don Pedro de Rivera also mentioned the Lomeria Grande when describing the Apaches in 1727, "…it [the presidio of Béxar] has no other enemies in its neighborhood than the Apache Indians, who inhabit the Lomeria Grande (big range of hills)" (Dunn 1910).

Major Historic Events: 1800-1850

1810-1821 Mexican War for Independence

1835-1836 Texas Revolution
First documented permanent European settlement in Austin
The new Texas government began issuing land grants to immigrants

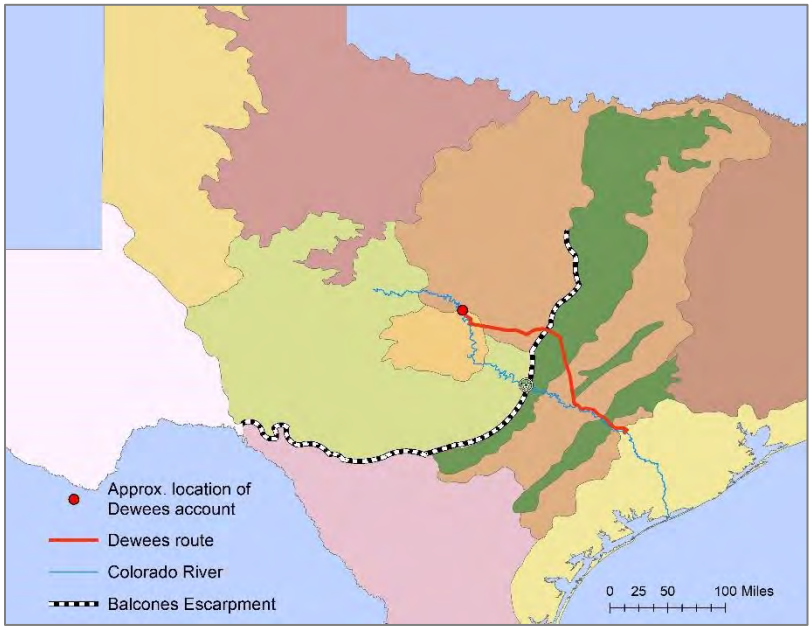
1837 Village of Waterloo (present-day Austin) was founded

1838 Mirabeau Lamar, second president of the Republic of Texas, relocated the capital from Houston to Austin. In his first formal address to the Texas Congress, Lamar launched an "exterminating war" of "total extinction" on the warriors of Texas Indian tribes

1845 Texas was incorporated into the United States

Note Lamar's first formal address to the Texas Congress in 1838 (Anderson 1948), and how the European-Native American relationships might have affected an understanding of Native American cultures during this time period.

The map below shows the approximate route of Dewees (1830). At the approximate location of the following account along the Colorado River, he described an open plain ahead of him to the northwest, and wooded hills to the south:

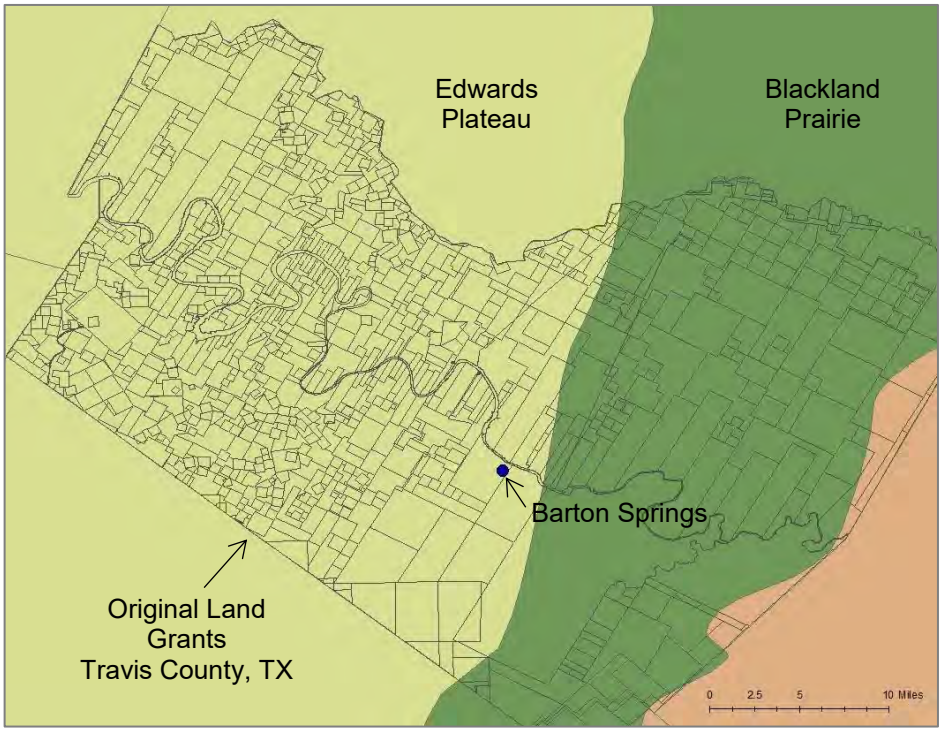


"…as far as the eye could reach was one extended plain covered with verdure and beautiful flowers, and over it were riding numerous Indians driving cavvyards[5] of horses. *On the left hand of the valley rose a mountain to the height of five hundred feet covered with tall cedar trees*. Never in my life have I seen so beautiful a landscape…On our right ran the clear waters of our own dear Colorado, before us lay the beautiful valley, and *on our left towered the high mountain of rock, covered with trees forever green and beautiful*."

--W.B. Dewees, 1830

[5] Cavvyard = herd

Field survey notes and "witness trees" from original land grants: During the mid-1800s, other sources of information became available that we can use to validate the written accounts, including original land grants, photographs, historic buildings, and maps. The map below shows the original land grants for Travis County (outlined in grey), with an overlay of the major ecological regions -- Blackland Prairie (dark green) and Edwards Plateau (pale green).

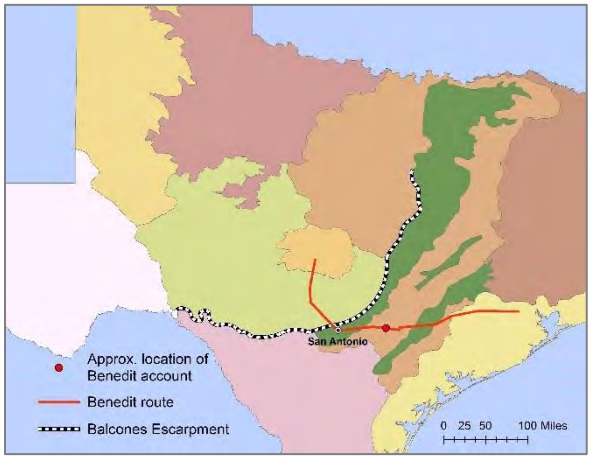




Field survey notes were usually recorded with the original land grants and often provided information on the species of trees and their diameters ("witness trees"). This information can provide insight as to what the dominant trees were at the time the notes were written.

The field survey notes shown at left are for William Barton's property, near the "Big Spring" [Barton Springs]. Barton settled here in 1838. The field survey notes are dated 10 March 1838 and report 1 elm, 1 hackberry, 5 cedars, 1 Spanish oak, and 1 live oak.

Benedict (1839) provides a good example of an observer reporting "grass as far as the eye can see." In his account below, note that he was describing the Blackland Prairie; for his description of the Hill Country, we need to keep reading. His approximate route, from east to west, is shown by the red line on the map. At the location of his account, Benedict is about to enter the Blackland Prairie and can see the Hill Country in the distance:

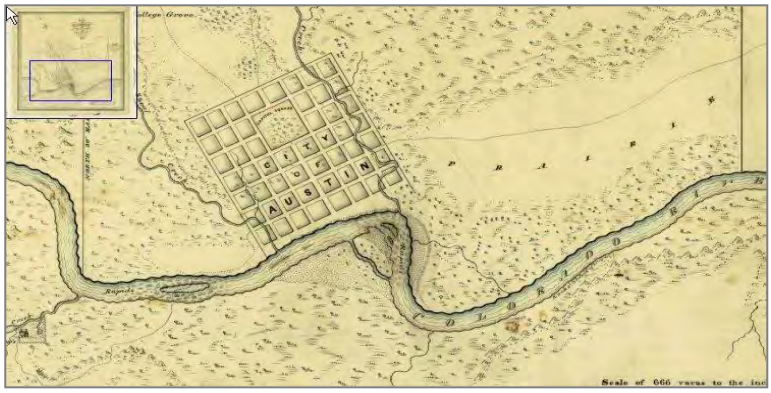


"Immediately before us appeared as an extensive lawn with a beautiful green sward [meadow], slightly tinged with the various flowers which decked its surface. Not a shrub or bush obstructed the monotony except the towering Live Oak…. *Further to the west appeared the skirting timber thickening the further it receded and rising gradually so that mile after mile of the dark boding forest rose to our view so that ones imagination or view would be extending to the intricacies of the forest in search for the curling smoke of the wigwam*." -- W.J. Benedict, 1839

Below is an early map of Austin (note that the artist wrote "prairie" to the east of the town), followed by accounts from early surveyors, political figures, and settlers:

Map of Austin, 1839
(artist: W.H. Sandusky)

© Map # L-2, Austin History Center, Austin Public Library



"The river bank is bluff, from whence a level prairie affording excellent ground for building lots, extends back about two-thirds of a mile, where it rises into *hills, most of them covered with timber*…." –Judge E. Waller, 1839

"[Austin] is about two miles distant from and in full view of *the Mountains… covered with Live Oak and Dwarf Cedar to their summits*." –A.C. Horton, I.W. Burton, W. Menefee, I. Campbell, L.P. Cooke, 1839 (Barklay 1963)

Austin is situated…about three miles from the Colorado mountains and on a beautiful rich prairie….*The Colorado mountains…are covered with Scrubby Live Oak, Cedar, and cliffs of rock*, which present a delightful appearance." – Surveyor Sandusky, 1839

The German Prince Carl of Solms-Braunfels was appointed Commissioner-General to lead the establishment of New Braunfels and other colonies of German immigrants in Texas. As previously noted, the town of New Braunfels was settled on the prairie side of the Balcones Escarpment. Below are descriptions during forays into the Hill Country to the west of town:



Portrait (unknown artist) of
Prince Carl of Solms-Braunfels

On the left bank of Comal Creek there is well forested bottom land which extends to the cedar, oak, and elm covered cliffs which here already have considerable height. Beyond this there is a high ridge with summits here and there similar to our Black Forest."

"From its confluence with the Comal Creek I, with four companions, attempted to reach the head spring. However, *having covered only five miles after hours of chopping through underbrush and heavy forest*, we had to return without success."

"…*I ascended the ridge on horseback, forcing a path through the heavy cedar thickets* and using the outcropping ledges as steps. The view from the high ridge, behind which there is a plateau several miles wide, is enchanting. I rode three or four miles into this tableland without coming to its end." -- Prince Carl of Solms-Braunfels, 1845

Ferdinand Lindheimer was a German botanist, known as the "Father of Texas Botany" for his discovery of hundreds of plant species in Texas. In 1844, he met Prince Carl of Solms-Braunfels during the colonization of New Braunfels. Lindheimer settled and lived the remainder of his life there. While most of his collections were near his home along the Comal River, he made occasional trips into the "mountains":

"The cedars start blooming in mid-January.....In the case of the mountain cedars the branches begin quite low and the [trees] are scarcely 1½' in diameter and 40' high."
-- F. Lindheimer, 1846



Photo by City of Austin staff



Map of New Braunfels, 1881 (artist: Augustus Koch)
[Note the artist's rendition of grass (no texture) versus woodland (textured)]



Lindheimer's house[6]
© Lisa O'Donnell



Bracted Twistflower (*Strepatnthus bracteatus*)
© Jonathan Scalise

"…[*Geranium*] grows in the hills, you see, on the plateau, which is here [New Braunfels] 200' high, full of ravines that are *densely covered with cedars and underbrush*, and to which one has few ways of access along the slopes…*Streptanthus* #15 I really have never found again.[7]
-- F. Lindheimer, 1846

"Live oak, holly, many kinds of cactus, arbor vitae, and the millions of cedar… cover the Comal hills like a mantle…." -- V. Bracht, 1849

[6] The New Braunfels Conservation Society has preserved Lindheimer's house, which is situated along the Comal River: http://www.newbraunfelsconservation.org/headway/lindheimer-house/

[7] According to the status report on *Streptanthus bracteatus* (USFWS 2015), the herbarium label from Lindheimer's original collection states "15. Streptanthus. New Braunfels. May 1846."

Ferdinand Roemer was a German geologist, who spent over a year studying the geology of Texas from 1845-1846 and wrote extensive accounts of his travels. His work was supported by the Berlin Academy of Sciences, in response to a request by Prince Solms to survey the geology of Texas. Roemer spent considerable time in New Braunfels with Lindheimer, where he "learned to know the near and distant surroundings of my new home through daily excursions."

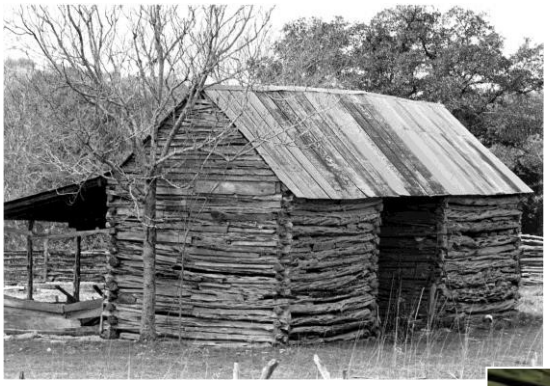
"*The cedars here are not the stunted shrub-like plants found in the Northern States of the Union, but are stately trees with straight trunks, seldom more than twenty to twenty-five feet in height and one and one-half feet thick. They have a uniformly spreading crown….*"

"*This cedar forest is a treasure to the colonists of New Braunfels, since the wood was preferred above all others on account of its durability when used in building houses and fences*." – F. Roemer, 1849



Large Ashe juniper tree on Balcones Canyonlands Preserve (Photo by City of Austin staff)

Below are photos of old cabins and a barn from the Bohls (1860s) and Commons Ford properties on the Balcones Canyonlands Preserve; note the building materials.



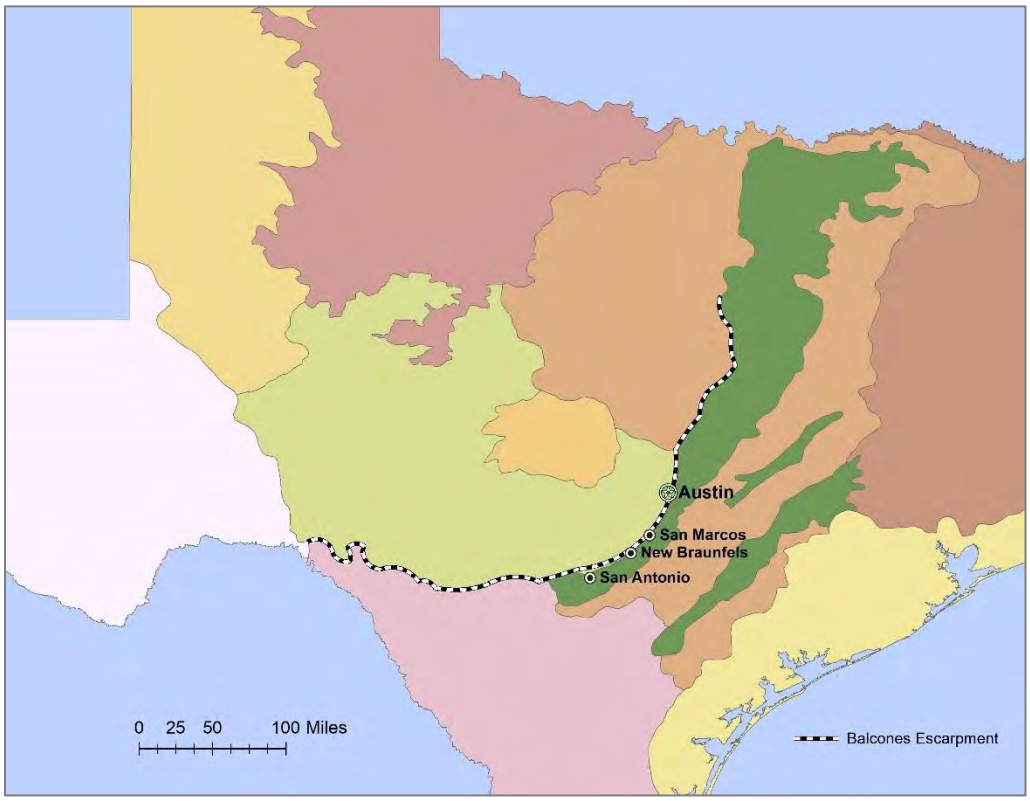
© Photo # CO 2101, Austin History Austin Public Library





(Photos by City of Austin staff)

The following accounts describe the route between Austin and San Antonio, essentially along what is today the I35 corridor:



"The road [between New Braunfels and San Antonio] led us over an open, undulating prairie of great fertility. *A cedar-covered slope, similar to that at New Braunfels, was at our right for the first ten miles*, which farther on flattened out into a low lying chain of hills." – F. Roemer, 1849

"*The hills which extend all the way from Austin to New Braunfels, are covered with heavy timber*." – V. Bracht, 1849



© Lisa O'Donnell

Major Historic Events: 1850-1900

1854	Two Indian reservations established in West-Central Texas
1859	Indians on the Texas reservations moved to reservations in Oklahoma
1861-1865	Civil War
1868	First patent granted for barbed wire
1871	First train arrived in Austin
1872	Yellowstone established as first national park
1875	Last free band of Comanches surrendered and moved to Ft. Sill Reservation in Oklahoma
1875	Huston-Tillotson University opened
1883	University of Texas at Austin opened
1888	Completion of current Texas State Capitol building
1889	Survey reported 25 bison remaining in the Texas panhandle
1893	Completion of first Colorado River dam
1894	Oil discovered in Texas
1900	Last records of passenger pigeons in Texas. U.S. wild bison population dropped to fewer than 40 animals.
>1900	Continued expansion of livestock industries on the Edwards Plateau

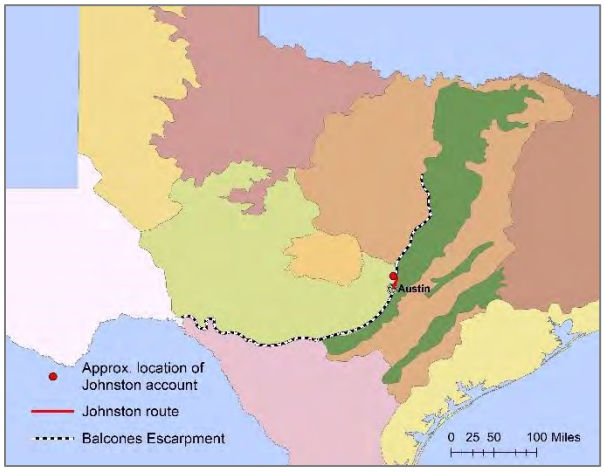
Note the dates of the Indian reservations and removal, and compare this with the mural at the beginning of this report claiming "Area Indians annually burned the 'divide' grasslands to provide fresh graze for antelope and buffalo (1865)". According to the historical timeline, only a few remnant bands of Native Americans remained in Texas at this time.

Meanwhile, the European population surged. The first U.S. census was taken in 1850, when the human population in Texas was 212,592. By 1900, the Texas population was over 3 million (an increase of more than 14 times the 1850 census). The largest increase occurred after 1870.

This time period ends with the extinction and extirpation of two of the most abundant native species ever recorded in the United States, the passenger pigeon and the bison. With the advent of the industrial revolution in Texas and expansion of the livestock industries, these changes would drastically affect the vegetation communities and our perceptions of them.

The following excerpts are examples of written accounts from the 1850-1900 time period.

According to Johnston (1855), Ashe juniper was being cut for rail timber as far back as 1855 (first train arrived in Austin in 1871):



"We rode [from Austin] to the Brushy Creek, 20 miles [near Cedar Park], and encamped for the night. Our road was for about 14 miles of the way over a rich rolling prairie and for about *six miles through a heavy cedar brake. Cedar is the main reliance for rail timber in this section, the live oak being too gnarled for such purposes*." -- A. S. Johnston, 1855

By the late 1880s, there were many maps and photos that we can use to corroborate the written accounts. Note the artist's rendition of grass (no texture) versus woodland (textured) in the map, and compare this with the photo taken from capitol dome and the written accounts during this time period.

Note artist's rendering of forest (textured) and prairie (flat)



Photo taken from Texas Capitol Dome ~1888, looking southwest
© Photo #PICA19238, Austin History Center, Austin Public Library



Map of Austin, 1887 (artist: Augustus Koch)
© Map # L-21, Austin History Center, Austin Public Library

"I have visited Austin for the first time…The surrounding country is quite beautiful…*dark, steep, cedar-covered mountains rise about five miles north of the city*." -- V. Bracht, 1849

"The country on [Barton] creek presents an extensive range of cedar hills and is much broken." – J. De Cordova, 1858

Accounts from Frederick Law Olmstead (1857): Now we come to Frederick Law Olmstead's accounts. Olmstead was a journalist, landscape designer/landscape architect, and designer of urban parks, including Central Park in New York. Compare his accounts of San Marcos with the photo below, and then compare these with the article discussed at the beginning of this report that concluded the Hill Country was predominantly grassland and Ashe juniper is invasive.

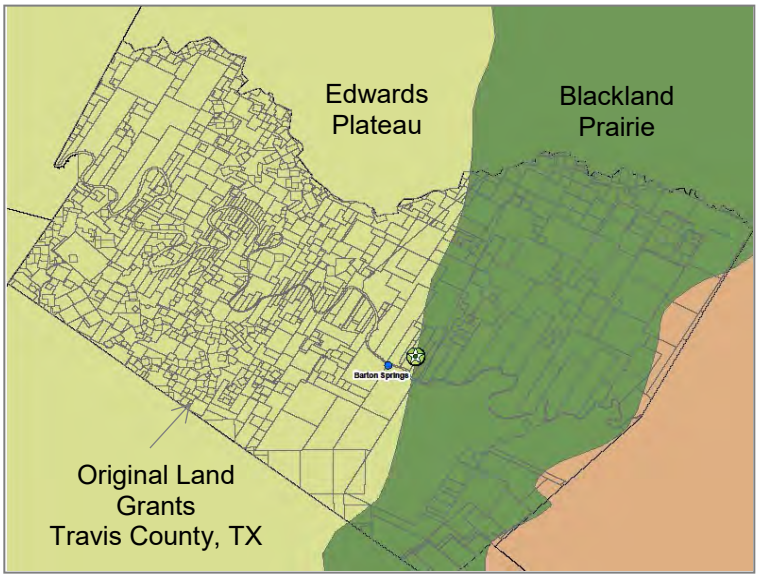


View of San Marcos, 1885 (© DeGolyer Library, Southern Methodist University)

"San Marcos was a town of about three shabby houses. Beyond it our road approached closely *the hill-range, which is made up of spurs coming down from mountains North. They are well wooded with cedar and live-oak*."

"We pitched our tent at night in a live-oak grove, by the side of a deep pure spring, at the mouth of a wooded ravine closed by rugged hills toward the north. *Behind us were the continuous wooded heights, with a thick screen of cedars;* before us, very beautiful prairies, rolling off far to the southward, with the smooth grassed surface, varied here and there by herds of cattle, and little belts, mottes, and groups of live-oak." –F.L. Olmstead, 1857

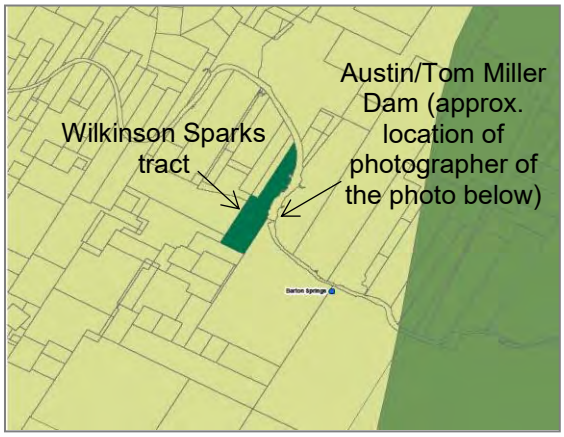
Below are examples of how we can cross-reference multiple sources of information, including the original land grants, photos, and historic accounts. Note that the plot sizes of the original land grants are large on the prairie (green) compared to those on the Edwards Plateau (pale green). The following two historic accounts provide a possible explanation:



"Wild lands [in Travis County] may be purchased at very low rates. The cost of improvements is a serious item; but when a cedar fence is once put round a plantation it will need but little repair for many years. *With vast prairies, we have also cedar lands at intervals seldom exceeding five miles, and these can be purchased at a small price. The planter finds a cedar lot of indispensable value, from the abundant material for improvements with which it furnishes him*." -- J. De Cordova, 1858

Our fences are chiefly made of cedar-rails, from the cedar-brake above Austin. – S.J. Wood, 1861

The map to the right highlights (in dark green) one of the original land grants. De Cordova (1858) describes this tract of land, below. The photo is of the first dam on the Colorado River (Austin Dam, later the Tom Miller Dam) after it collapsed from a flood in 1900, and shows this tract in the background. Note whether the description is consistent with the image in the photograph.



For Sale: "500 acres of land [in Travis County] out of the headright quarter of a league of WILKINSON SPARKS, situated on the river Colorado, opposite the city of Austin, and *including a fine cedar brake*." -- J. De Cordova, 1858



© Photo # PICA 24396, Austin History Center, Austin Public Library

The article below is from the precursor of today's Austin-American Statesman (note the Ashe juniper railroad ties in the photo):



© Photo # PICA 28590, Austin History Center, Austin Public Library

"The cedar tie business has contributed largely to the growth and prosperity of the 'Hill City' [Austin] in the last two years, more especially the last twelve months. A gentleman connected with the Central Railroad says that *two hundred thousand cedar ties have been shipped from this city during the last two years*, and when it is remembered that these ties bring from sixty to ninety cents each, the reader will readily comprehend the vastness of the revenue from this source…." –Austin Daily Democratic Statesman, September 10, 1874

Henry Attwater was a naturalist, ornithologist, and conservationist. He became the agricultural and industrial agent for the Southern Pacific Railroad and the Director of the National Audubon Society. In 1892, he published his field notes of birds he observed near San Antonio:



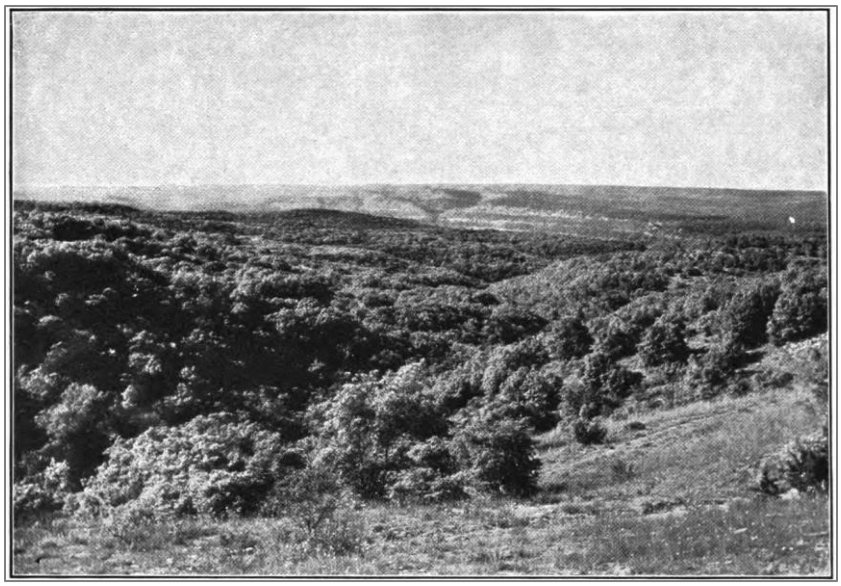
© Gil Eckrich

[Golden-cheeked Warblers] are nowhere abundant, and only to be met with *in the thickest cedar brakes*, and as these are fast being cut and burnt out, the bird will no doubt become still more rare." – H.P. Attwater, 1892

The following quote is from a U.S. Geological Survey report (Hill and Vaughan 1898):

"From the more open and level lower country [the Balcones scarp line] appears as *a sharp line of timber-covered hills*, and these are universally called 'mountains' by the people of the region." –R. Hill and T. Vaughan, 1898

The historical accounts for this project end with William Bray's publications in 1904. Bray was a professor of botany at Syracuse University, an associate of Gifford Pinchot, and one of the founders of the Ecological Society of America. He wrote extensively about the forests of the Edwards Plateau:



The photo to the left was taken near what is today Bee Caves Road and Cuernavaca Drive, looking north.

From Plate II, Fig. 1 in Bray (1904b): "Characteristic View of the Edwards Plateau Forest, on the Colorado River, 10 miles above Austin. Mostly cedar on the summits here. Mountain oak lower down the sides of the gorge. This timber prevents rapid run-off and erosion after rainfall."

"*It is not to be inferred that the whole Edwards Plateau is a continuous timberland. On the contrary there is a considerable amount of open grassland. Even more of it is covered with a scattered scrub timber, but there is enough real timber to warrant the classification of it as a timbered country*."–W. Bray, 1904a

"*The data are not at hand to warrant even an approximate estimate of the area covered by cedar. The Colorado River brakes, one of the largest series, are almost continuous from Austin to the San Saba country; it is perhaps no exaggeration to estimate the area of these alone at 500 square miles*." –W. Bray, 1904a

Photo of a waterfall along Bull Creek, Austin, Texas



© Photo #PICA19726, Austin History Center, Austin Public Library

"Cedar Chopper" Culture

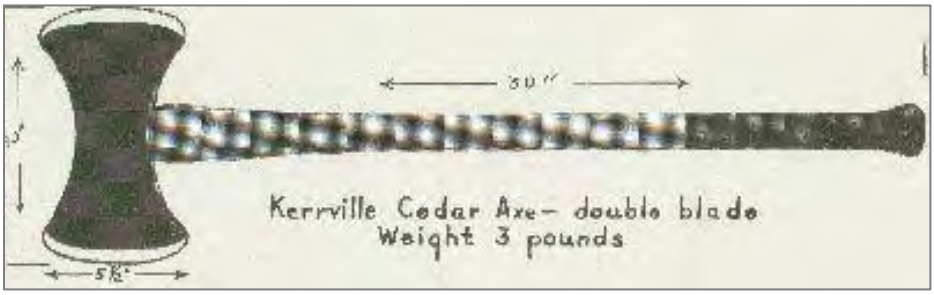
"Cedar" was so abundant it supported a whole "culture" of people dedicated to harvesting it. Ashe juniper was first used to make charcoal ("charcoal burners") and later for fenceposts, railroad ties, telegraph poles, and other building materials.



"The writer knows of no region in which any species of cedar is so uniformly abundant and dominant as is the mountain cedar in the limestone country of Texas. ... [Mountain cedar] is the most valuable tree of the semiarid hill country of Texas*."*

"With the exception of cedar, the hill timber finds a market chiefly as fuel, of which enormous quantities are consumed….Cedar likewise is extensively consumed as fuel and in charcoal burning; but its great value lies in its yield of railway ties, poles, posts, sills, and innumerable other articles which utilize its great durability." "…poles 20 to 30 feet in length and with a base diameter of 1½ to 2 feet were formerly common." "*...cedar timber large enough to furnish ties and poles is becoming scarce, except in remote districts.* –W. Bray, 1904b

"Cedar" clearing was such a big industry that an axe was created specifically for this purpose.



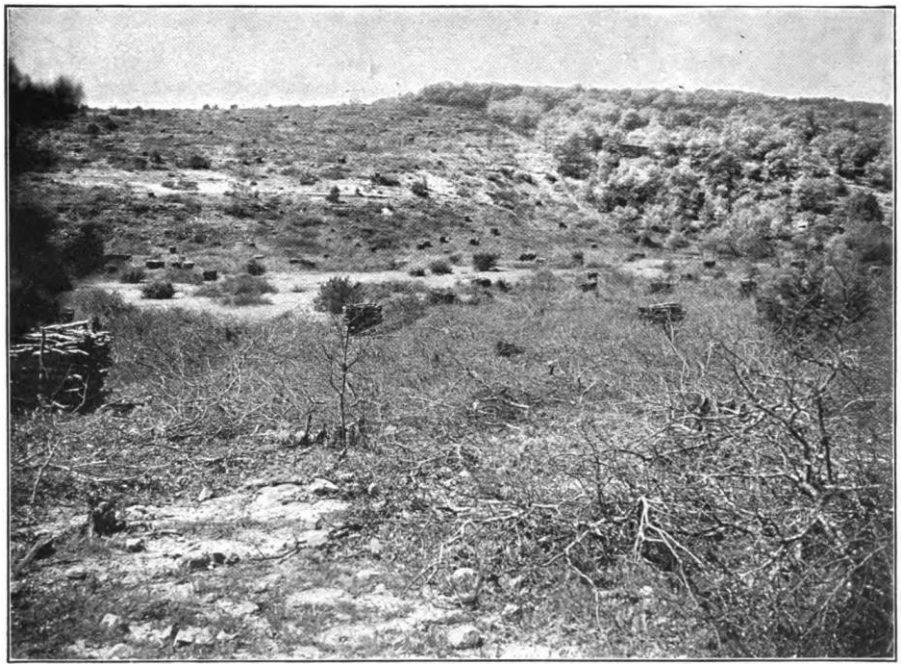
From Hollon (1946) with permission from Texas State Historical Association

"The cedar eradication program was greatly accelerated as a result of the invention of a new type of axe ['Kerrville Cedar Axe'] especially suited for cutting cedar trees and cedar brush. The cedar axe is a product of the Hill Country in Texas, where armies of cedar choppers have been swinging away for over thirty years. It was invented partly by accident and partly because of a real need for a better tool to do the job." –G. Hollon, 1946



Photo by City of Austin staff

"In addition to the cedar, other species of the hill timber are constantly being drawn upon for fuel and the rough construction material in demand on ranches and farms…*.[Mountain Spanish oak] is the most common oak in the Edwards Plateau region of Texas. It is a small tree, 5 to 10 inches in diameter and 20 to 30 feet high, occurring on the more stable slopes and hilltops. It often forms dense timber on sides of gorges, where by collecting much debris it aids the formation of rich soil, which it prevents from being washed away.* The wood is good for posts and rails. It is much in demand locally for fuel, and all of the sizable trees are being cut."
–W. Bray 1904a



"We have seen that the commercial value of timber, particularly of the cedar, results in a heavy drain on the supplies. So long as the small owners depend in large measure for their income upon the sale of wood, the temptation will be strong to denude rough, thin-soiled hillsides which would far better be kept with a protective timber covering (Pl. II, fig. 2)."

From Plate II, Fig. 2 in Bray (1904b): "Hill Near Austin Covered with Pure Stand of Mountain Oak. On the left the timber has been cut clean for fuel. Such clearings show rapid renewal of timber."

Historic Accounts of Fire

While the focus of this project is on vegetation communities, the historic accounts in Appendix A can also be searched for references to fire, water, and other topics of interest. To date, I have been unable to find any accounts of Native Americans intentionally setting fires in the Hill Country. Fires mentioned in the 1700s appeared to be small and used to hide or escape and to communicate (smoke signals). Espinosa (1709) and Miranda (1756) provide some examples:

> "The…Indians, who made a thick smoke in the woods upon our arrival, did not show themselves again and were lost in the thickness of the woods along the bank." – Espinosa 1709 [this account is east of the Balcones Escarpment]
>
> "We made signal fires to attract the attention of [the Indians]." – Espinosa 1709 [this account is east of the Balcones Escarpment]
>
> "In order to succeed in encountering some [Indians], I made use of the scheme of setting fire to the field at several places…" – B. de Miranda, 1756 [this account is on the Llano Uplift south of the Llano River]

Based on the eyewitness accounts, the size and intensity of fires appear to have increased during the mid to late 1800s, following European settlement. Below are a few examples:

"A section of the cedar forest was destroyed by a forest fire during my stay in New Braunfels." -- F. Roemer, 1849

"…the forest had a very desolate appearance, not only because the trees were bare, but also because the ground was covered with black ashes. Through the negligence of several settlers, the grass had caught fire in the neighborhood of the city [Fredericksburg] and had spread several miles beyond it." -- F. Roemer, 1849

"We had to pass [from Austin to Cedar Park] several prairies on fire and the smoke of the cedar brake burning filled the air. The views were very fine, though the country is yet blackened with fire and the grass not yet at its full verdure." -- A. S. Johnston, 1855

Olmstead (1857) described fighting a fire started by his companion who "began to burn the grass off a small circle of the ground, that we might have a place to cook our supper upon." Upon its conclusion, Olmstead notes "There is something peculiarly exciting in combating with a fierce fire. It calls out the energies and the strength of a man like actual war."

"[Golden-cheeked Warblers] are nowhere abundant, and only to be met with in the thickest cedar brakes, and as these are fast being cut and burnt out, the bird will no doubt become still more rare." – H.P. Attwater, 1892

"A deplorable loss of cedar has taken place from brake fires. For half a century these have periodically occurred; areas which have not been burned over are the exception. Every old settler can tell of big fires which burned for days. In July, 1901, a very disastrous fire occurred near Marble Falls, in which about 600 acres of valuable cedar were destroyed" -- W. Bray, 1904a

"Forests do not begin to burn up of themselves. While it is true that lightning has been known to originate forest fires, the proportion of fires from natural causes is so small as to be negligible." -- W. Bray, 1904a



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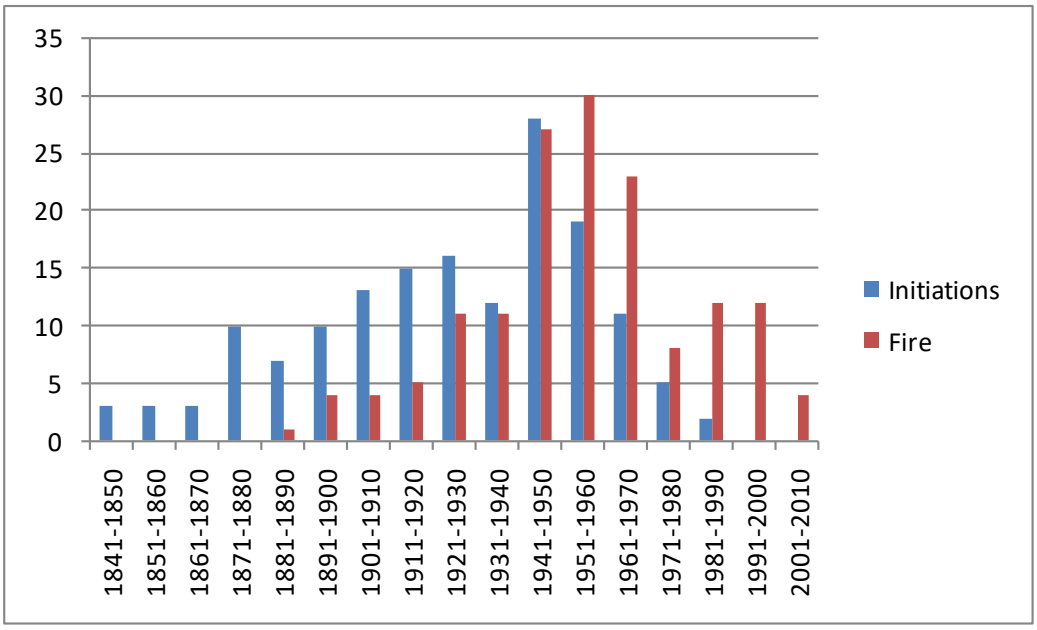
While the sample size is small and from a limited area, tree ring analyses collected from 158 tree slabs on the Balcones Canyonlands Preserve also suggest that fire frequency did not decrease following European settlement. Tree ring analyses on the Balcones Canyonlands National Wildlife Refuge show a similar trend (Murray et al. 2013).

Initiation (establishment from basal sprouting or seed) and fire scar frequency by decade for tree slabs collected at the Balcones Canyonlands Preserve[8]



[8] Unpublished data provided by Dr. Joseph White, Baylor University, to City of Austin

Historic Accounts of Livestock

The following account is from Hays County near Buda: "I am getting a little afraid the sheep will take the mountains in four or five years more…. Sheep is mighty hard on the range. You can tell a sheep range before you get in two or three miles of the house, for they keep the grass eaten off plum in the ground…." – E. Burrowes, 1860

Cedar cabin on what is today RM 2222, looking west with Bull Creek in background (circa early 1900s), illustrating effects described above by Burrowes (1860)



"About one fourth of [Travis] county is mountainous or hilly, the land rather poor and rocky, but well watered, and *some of it covered with cedar and others kinds of timber*. It is well adapted to the raising of horses, cattle, sheep, and goats. The balance of the county is gently rolling prairie or level prairie and river-bottom…." -- S.J. Wood, 1861

© Photo #C02101, Austin History Center, Austin Public Library

"…the country is primarily a cattle country, and cattlemen are apt to regard the timber as a nuisance rather than a benefit." –W. Bray, 1904a

Large cattle drives began in earnest in Texas after 1866, with an estimated 20 million cattle driven from Texas to Kansas between 1866 and 1886. The sheep and goat industry also started up around this time and continued to expand into the 20th century. The map illustrates how concentrated the sheep and goat industry was on the Edwards Plateau. The photo below is of an Angora goat herd on the Bohl's property in the early 1900s (today part of the Balcones Canyonlands Preserve). Again, consider how these changes might have influenced the vegetation communities we see today.

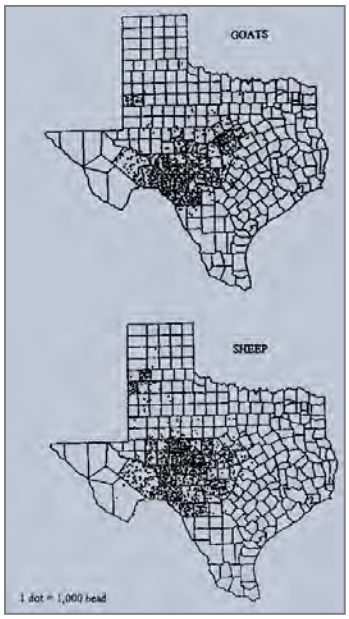


Figure 1 from Nunley (1995)



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Historic Accounts of Water

Based on the historic accounts, water flowing from the Edwards Plateau was abundant, which led to the establishment of towns (Austin-San Antonio) along the base of the Balcones Escarpment:

Bull Creek, near confluence with Colorado River,
looking north/northwest (circa early 1900s)



© Photo #CO1827, Austin History Center, Austin Public Library

"The waters of the Guadalupe are clear, crystal and so abundant that it seemed almost incredible to us that its source arose so near." --I. de Espinosa, 1716

"[A large spring near Blanco State Park] has such conveniences as easily withdrawn water, much rock, and cottonwood, oak, and cedar timber, all in considerable amount." -- B. de Miranda, 1756

"[Barton Creek] and its tributaries afford perhaps the greatest and most convenient waterpower to be found in the Republic."--A.C. Horton, I.W. Burton, W. Menefee, I. Campbell, L.P. Cooke, 1839

"…the mountains…are covered with cedar, and send clear crystal waters gushing from them…." --J. de Cordova, 1858

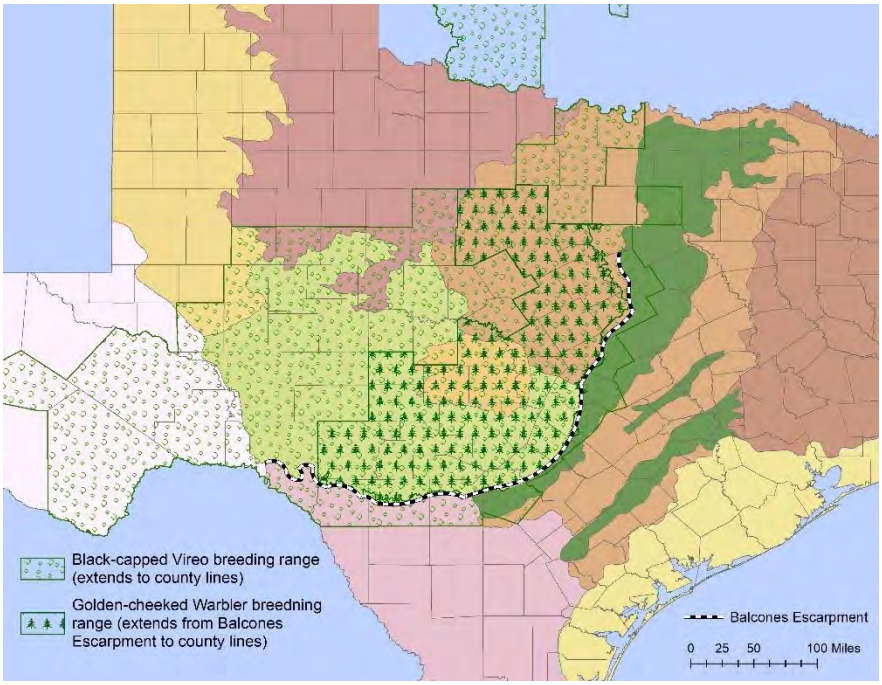
"About one fourth of [Travis] county is mountainous or hilly, the land rather poor and rocky, but well watered…" –S.J. Wood, 1861

"…forests tend to conserve the water supply and to maintain full springs and an even flow of streams." –W. Bray (1904b)

Endangered and Rare Species

While William Bray (1904) described extensive woodlands and cedar brakes, he emphasized that there was not a continuous or uniform cover across the entire Edwards Plateau. In the excerpt below, he describes a "patchy mosaic" of vegetation communities across the Edwards Plateau, from tall, dense woodlands along the edge of the Balcones Escarpment, becoming thinner and shrubbier farther west, and grading into desert vegetation of the trans-Pecos and the true grasslands of the rolling and high plains.

Note the consistency of this account with the major ecological regions and the breeding ranges of the Golden-cheeked Warbler and Black-capped Vireo. The Golden-cheeked Warbler's breeding habitat (Ashe juniper and oak forests) is concentrated along the edge of the Balcones Escarpment. The Black-capped Vireo breeds in shrub-dominated habitat that extends farther west and ranges from Mexico through central Texas to Oklahoma.



Source of Black-capped Vireo and Golden-cheeked Warbler breeding ranges:
U.S. Fish and Wildlife Service, Environmental Conservation Online System

"*…in general, the Edwards Plateau is a timbered region only in the deeply eroded portions, becoming prairie on the level uplands, and finally passing into the great grass plains which stretch northward into Canada. One must however, distinguish many degrees of forestation, according to the relative amount of moisture. Through a gradual dwarfing and thinning out the timber passes from the big, heavy growth of the watered canyons to the stunted though continuous forest of the hills and bluffs and the scant tree growth of the loose, stony slopes in the eastern part of the area, until at the west there remains only scattered chaparral, and finally the unique vegetation of the Sotol Country, in which the sotol, cactus, yucca, and agave reign supreme*." –W. Bray, 1904

Within the Bull Creek and Cypress Creek watersheds of the Balcones Canyonlands Preserve, some of the largest populations of Jollyville Plateau Salamanders coincide with the highest densities of Golden-cheeked Warblers, providing another example of how juniper-oak woodlands and water quality/quantity are not mutually exclusive.

Golden-cheeked Warbler: The Golden-cheeked Warbler breeds exclusively in Ashe juniper and oak forests in central Texas. It depends on Ashe juniper for nesting material, as well as nesting substrate and foraging. Within the Balcones Canyonlands Preserve, densities are highest in tall (>3 m), closed-canopy forests of mixed Ashe juniper and oaks (Reidy et al. 2017). Contrary to the prevailing belief that Golden-cheeked Warblers only nest in canyons, nest survival on the Balcones Canyonlands Preserve from 2011-2015 (n = 610 nests) was highest on relatively level land and decreased on steep slopes (Reidy et al. 2017). Nest survival also increased in closed-canopy forests with a well-developed woody understory and higher densities of Ashe juniper trees.

Jollyville Plateau Salamander: The Jollyville Plateau Salamander (*Eurycea tonkawae*) is found in springs, springruns, and wet caves on the Jollyville Plateau and Brushy Creek areas of the Edwards Plateau. An aquatic species, it depends on a consistent supply of clean, flowing water.



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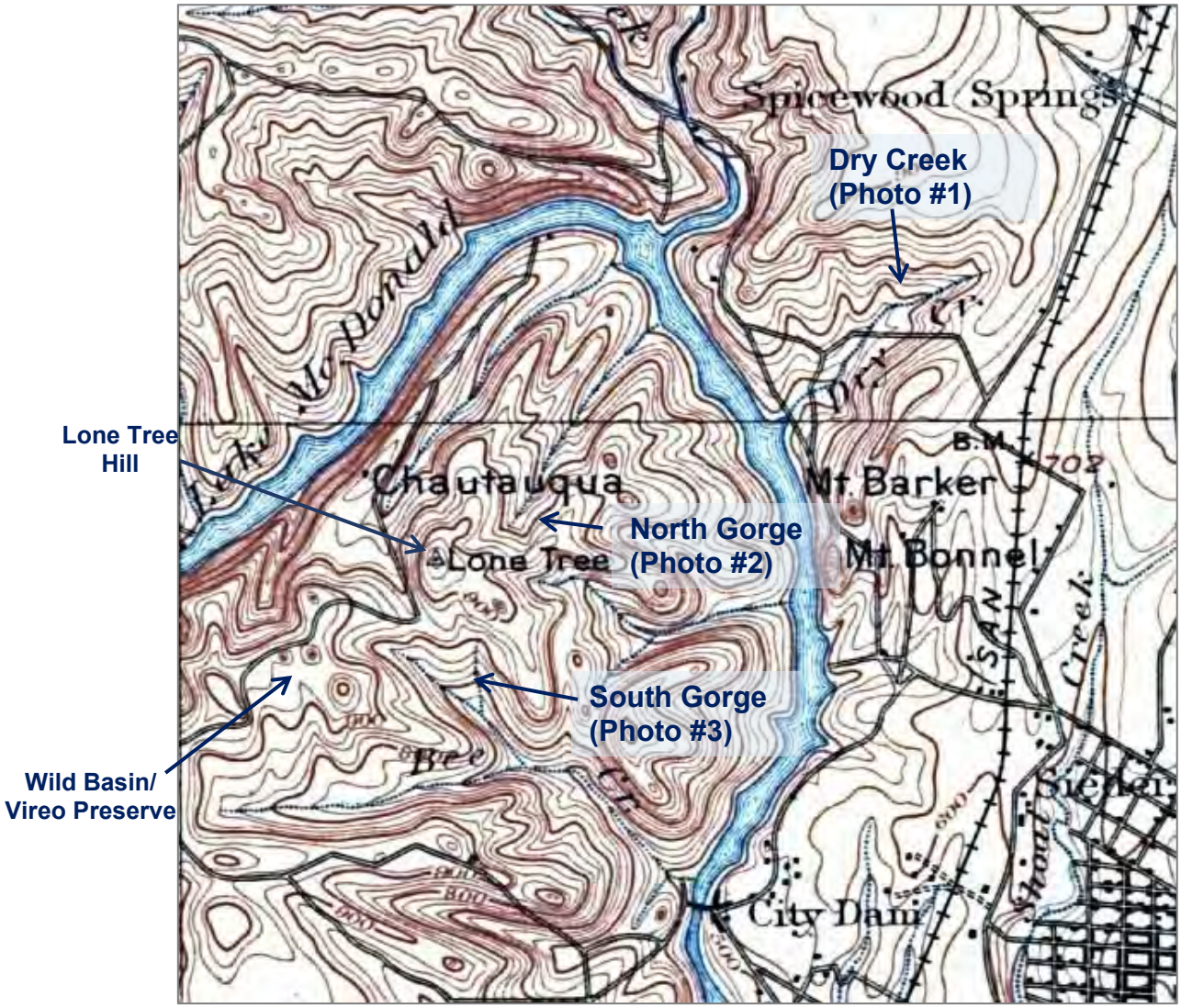
Using Historical Accounts to Inform Land Management

In the article presented in the Introduction, assumptions that the Hill Country was predominantly grassland invaded by woody species have been used to promote land clearing practices. The following illustrates the importance of researching the history of a given tract of land to understand how land use and legacy effects have influenced current vegetation communities and successional trends and using this information to make informed land management decisions.

Below is a topographic map from ~1895 of the Westbank Peninsula, Austin, Texas. Today, this areas encompasses the Wild Basin and Vireo Preserve tracts of the Balcones Canyonlands Preserve. We have the advantage of having both written accounts and photographs for this area dating back to 1893 and 1904; the map provides points of reference for these:



The Chautauqua Association purchased ~1200 acres of land on the Westbank Peninsula in the early 1890s. Their 1893 Prospectus includes the following description:

"Nature may be seen here now in her wildest, now in her gentlest aspect. *Trees of enormous size* send their great roots deep down among the rifted rocks and sustain their lives with draughts of living water; their branches rise high in the air and receive the first and last kisses of the rising and the setting sun. *Their foliage is dense and green*. Their shade is dark and inviting. Nature in her supportive moods, has placed here and there *great stones of a hundred tons weight, and covered them with moss as soft as velvet, or draped them with ferns as silken as a maiden's hair. She has festooned the arching limbs with the ivy and the vine; and she has clothed the sod with flowers* 'as fair as ever bloomed under the rays of a Castilian sun.'" – Colorado River Chautauqua Association, 1893

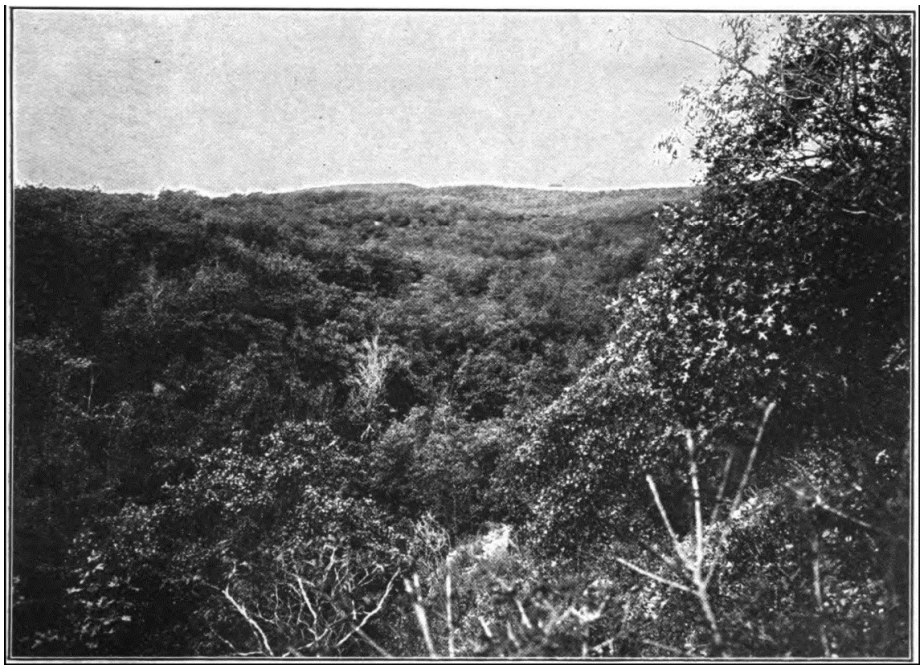
By the early 1900s, Bray (1904b) documented that many stands of Ashe juniper were already being cleared a second time, and that while junipers were quick to recolonize these areas, the diameter growth rates were too slow[9] to provide much value beyond fuel.



From Fig. 1, Pl. IV in Bray (1904b): "cedar brake near Austin twenty-five years after first cutting. A heavy crop of fuel and charcoal. Shows capacity for reforestation."

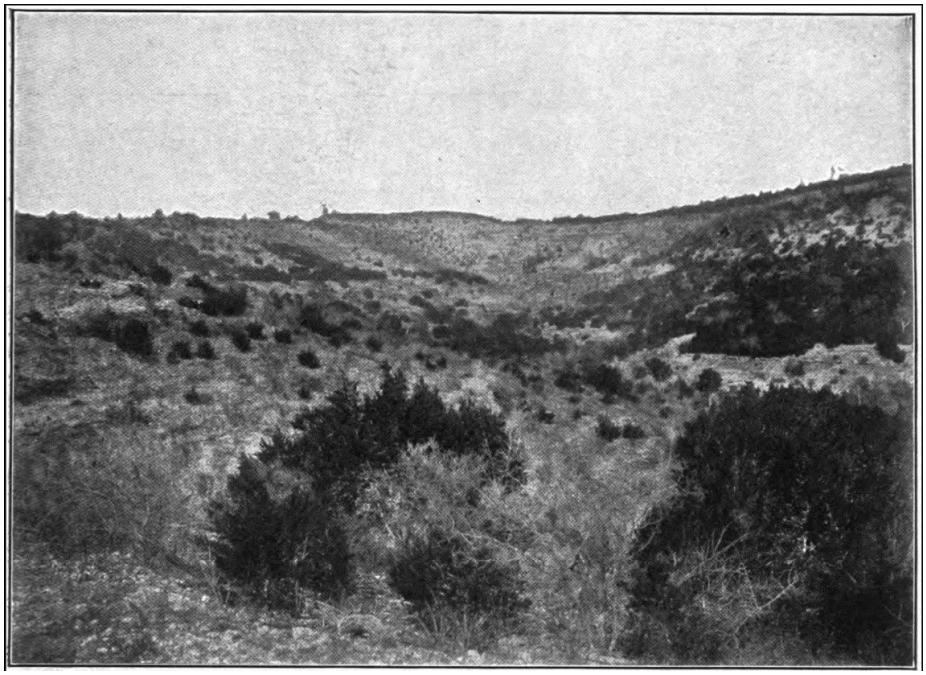
Photo #1: "During the past two or three years this tract ["on Dry Creek, near Austin, from which the timber was cleared twenty-five years ago"] has again been cut, with a large yield of fuel timber. Fig. 1 of Pl. IV shows the condition of the cedar brake after twenty-five years' growth. Of course there was very little, if any, tie or post timber in this, and no clear heart cedar." –W. Bray 1904b

[9] Diameter growth rates of 30 Ashe juniper trees on Balcones Canyonlands National Wildlife Refuge from 1998-2010 averaged 1.5 cm/year (Jeff Hatfield, U.S. Geological Survey, unpublished data). Growth rates on Balcones Canyonlands Preserve have averaged 1.5-2.5 cm/year (City of Austin, unpublished data).



From Fig. 2, Pl. V in Bray (1904b): "'North Gorge' from Lone Tree Hill.
Heavily timbered slopes. Violence of rainfall broken and rapid run-off prevented."

Photo #2: Bray (1904b) further described this area as having "almost impenetrable growth of cedar and mixed timber" and a "deep layer of rich soil."



From Fig. 2, Pl. V in Bray (1904b): "'South Gorge' at its head under Lone tree Hill, near Austin.
The slopes have been denuded of timber. The run-off after heavy rainfall is very violent."

Photo #3: Bray (1904b) described this area as having been cleared of most of the woody vegetation and "denuded of soil down to the rock and adobe."

Bray (1904b) used the previous two photos (# 2 and #3) to make several points, including: forests build soil; forests protect soil from erosion, keeping it cool and moist; and soil acts as a sponge. "For all these reasons, forests tend to conserve the water supply and to maintain full springs and an even flow of streams." He believed the woodlands of the Edwards Plateau were critical to protecting water supplies downstream and advocated for their protection, recommending that the State of Texas purchase and reserve large tracts of timber: "Both the welfare of the Edwards Plateau itself and the welfare of the Coast Plain adjacent to it strongly demand the retention of a permanent timber covering on the plateau."

Below is a recent photo of the south slopes of the Vireo Preserve (part of the Balcones Canyonlands Preserve), which is near Bray's "South Gorge" (Photo #3). The eroded slopes and sparse vegetation provide an example of legacy effects from past land clearing, as evidenced by more recent aerial photographs (1940-present) and old juniper stumps with hatchet marks that are still scattered across this area. Based on the land use history, efforts are underway to reforest and rebuild soils on this part of the preserve.



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Similar to Bray's description of a "deep layer of rich soil" under forest canopy in 1904, this photo shows a close-up of dark soil from under forest canopy today, which is high in organic matter (left), compared with soil from under the sparse cover of native bunchgrasses (right).

© Lisa O'Donnell



© University of North Carolina Chapel Hill Herbarium

William Willard Ashe

(1872-1932)

A bit of trivia: Ashe juniper (*Juniperus ashei*) was not formally described until 1930, by John Buccholz, and was named in honor of William Ashe, a forester with the U.S. Forest Service who first collected it from Arkansas and noted differences from other juniper species. Ashe was an early advocate of the positive influences of forest cover on water quality.

Conclusions

Reviewing the claims presented in the Introduction section of this report, we can draw several conclusions from the historical documents:

- Ashe juniper is a native species. Fossilized juniper pollen from Friesenhahn Cave in northern Bexar County date to the last ice age, 14,000-20,000 years ago. Written accounts of juniper trees in the Hill Country date as far back as the early 1700s. The endangered Golden-cheeked Warbler nests exclusively in Ashe juniper-oak forests of central Texas.

- Eyewitness accounts of early explorers, settlers, and scientists from 1700-1900 reported extensive forests dominated by Ashe juniper and other woody species in the Hill Country, especially in the canyonlands along the Balcones Escarpment from Austin to San Antonio as well as the Colorado River and other riparian corridors. These accounts are supported by other documents, including field notes from original land grants, maps, and photographs. Many claims that the Hill Country was primarily grassland prior to European settlement, or that the eastern Edwards Plateau was a live oak savannah, appear to be based on misinterpretations of where the early explorers' observations took place on the landscape. Major European settlements (Austin, San Marcos, New Braunfels, San Antonio) were established along the Blackland Prairie, at the base of the Balcones Escarpment. Several accounts of extensive grasslands interspersed with the occasional live oak have been erroneously placed in the Hill Country but in fact took place on or near the Blackland Prairie.

  The extent of the juniper-oak forests reported in the historic accounts is consistent with the breeding range of the Golden-cheeked Warbler. For example, William Bray (1904b) describes the extent of these forests as follows: "In general, cedar timber occurs upon all of the hilly or rough parts of the limestone region of Texas from the Palo Pinto country to the Colorado, and thence westward over all of the drainage breaks and the escarpment nearly to the eastern forks of the Devils River. The most extensive bodies of cedar known to the writer are those of the Colorado River breaks from Austin to the San Saba country."

  Ashe juniper was once considered a valuable asset and commodity. Ashe juniper was extensively logged for fuel, fence posts, railroad ties, building construction, telegraph poles, and oil beginning in the mid to late 1800s. By the early 1900s, many stands of Ashe juniper were already being cleared a second time. Ferdinand Roemer described the juniper forests near New Braunfels in 1849 as "stately trees" and "a treasure to the colonists of New Braunfels, since the wood was preferred above all others on account of its durability when used in building houses and fences." In both of his 1904 publications, William Bray noted "With the exception of cedar, the hill timber finds a market chiefly as fuel, of which enormous quantities are consumed….Cedar likewise is extensively consumed as fuel and in charcoal burning; but its great value lies in its yield of railway ties, poles, posts, sills, and innumerable other articles which utilize its great durability." "[Cedar] is, in fact, one of the most valuable assets of the region, as well as the most characteristic feature of the hill timber" (Bray 1904b). "Cedar chopping" became such a big business during the early 1900s, a special axe was created specifically for this purpose. The clearing of vast areas likely contributed to the myth that juniper is invasive and not native to the area.

- Little documentation exists to support the extent or frequency of fires prior to European settlement. To date, I have been unable to find evidence of Native Americans using fire as a management tool within the Hill Country. Wade (2003) provides an extensive study of Native Americans of the Edwards Plateau, with no mention of fires intentionally being set. Regardless, the historic accounts and tree ring analyses do not support a prolonged period (i.e., 150 years) of fire suppression following European settlement but rather suggest that the extent and frequency of fires increased.

- Overgrazing by domestic livestock altered vegetation communities. The introduction of domestic livestock following European settlement is well documented, and some of the historical accounts expressed concern about the impacts this had on the vegetation.

- Water was abundant in the forested regions of the Hill Country, which led to the establishment of towns along the base of the Balcones Escarpment. Bray (1904a,b) believed the forests of the Edwards Plateau were critical to protecting water supplies downstream and advocated for their protection, recommending that the State of Texas purchase and reserve large tracts of timber: "Both the welfare of the Edwards Plateau itself and the welfare of the Coast Plain adjacent to it strongly demand the retention of a permanent timber covering on the plateau" (Bray 1904a). Today, some of the largest populations of the aquatic Jollyville Plateau Salamanders coincide with the highest densities of Golden-cheeked Warblers, providing another example of how juniper-oak woodlands and water quality/quantity are not mutually exclusive.

Looking south toward Mount Bonnell, 1935



© Photo # PICA 16299, Austin History Center, Austin Public Library

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Appendix A:

Eyewitness Accounts of Vegetation Communities in the Texas Hill Country
With an Emphasis on the Eastern Edge of the Edwards Plateau
(1700-1900)

Compiled and edited by Lisa O'Donnell, Senior Biologist
City of Austin
Wildland Conservation Division
Balcones Canyonlands Preserve

Updated January 2019

DRAFT WORKING DOCUMENT[10]

[10] I encourage anyone with an interest in this subject to read through the following accounts and go back to the original sources for a more comprehensive understanding of each observer. As a collector of eyewitness accounts, if the reader knows of other accounts that are not included in this report, I would greatly appreciate hearing from you (lisa.odonnell@austintexas.gov) so this document can be updated.

Eyewitness Accounts Excerpts and Annotations

References to vegetation communities within the Hill Country area are *italicized*.

1700-1750 (Expeditions East of the Balcones Escarpment): [Editor's Notes: The following accounts describe expeditions from the San Juan Bautista Mission, which was located on the Rio Grande at the present-day Guerrero, Coahuila, south of Nuevo Laredo and the Falcon Reservoir. It served as a base for exploration beyond the Rio Grande from 1700 to 1716. Both the 1709 and 1716 expeditions travelled through south Texas and east of the Balcones Escarpment. The 1709 expedition travelled northeast to the Colorado River, the 1716 expedition went farther northeast to the vicinity of Nacagdoches on the Neches River. These accounts are noteworthy in the diversity of the landscape and its inhabitants, including the number of indigenous tribes mentioned and the abundance of animals. Choosing a route to the east of the Balcones Escarpment was probably not a coincidence, since travelling through the Hill Country would likely have been difficult during this time period.]

Espinosa, Fray Isidro Felis de. 1709. The Espinosa-Olivares-Aguirre expedition of 1709. Translated by Reverend Gabriel Tous, *in* Preliminary Studies of the Texas Catholic Historical Society (March, 1930), Volume 1, Number 3.

> 5 April – 28 April, 1709. The diary mentions several tribes, including Pacuasian, Xarames, Payaya, Pampoa, Siupan, Chaulaame, Sijame, Sanac, Tejas (Asiani), Yojuan, Simonos, Tosonibi, Apache, and Paxti. All encounters described were friendly. Smoke from signal fires was used on several occasions to attract the attention of local tribes. Vegetation described included mesquite forests, oak forests, and riparian areas filled with walnuts, poplars, elms, mulberries, "holm-oaks" [evergreen oak], willows, and wild grapes. Animals included large herds of buffalo and deer, turkeys, and bear. Water from the rivers crossed on this expedition (Nueces, Frio, Hondo, Medina, San Antonio, Guadalupe, San Marcos, Colorado) were described as abundant, fresh, clear, and good with a variety and abundance of fish. Travelling east along the Colorado River, they encountered many herds of buffalo, wooded riparian areas, a forest "so dense we could not penetrate it," water that was "the best we have found," a Rancheria with 150 circular huts, and people from the Yojuan, Simonos, and Tosonibi tribes.

Espinosa, Fray Isidro Felis de. 1716. Ramon expedition: Espinosa's diary of 1716. Translated by Reverend Gabriel Tous, *in* Preliminary Studies of the Texas Catholic Historical Society (April, 1930), Volume 1, Number 4.

> 25 April – 10 July, 1716. Native American tribes mentioned included Bozales, Paraguas, Mesquite, Tejas (Asiani), Payaya, Yeripiano, Mixcal, Hicamamera, Pamaya, Cantonae, Xarame, Sijame, Nasoni, and Nacono. Except for brief mention of possible horse theft, all encounters appeared to be friendly. Signal fires were used to attract the attention of local tribes. Mesquite and oaks are the predominant vegetation described, followed by riparian woodlands and open plains. Diverse descriptions include sparse mesquite flats; a few low hills without trees; marshes with mesquite and Indian fig trees; small woods,

groves, and glens of mesquite; little plains surrounded by trees; holm-oak [evergreen oak] groves; hills and plains with some mesquite trees on the knolls; forests and groves of oaks; forests of oaks and scattered mesquite; spacious forest; hills and dales of grammagrass; large and dense woodland; and ravines of ash, walnut, mulberry, oaks, poplars, elms, willow, blackberry bushes, and grapevines. Nopals (cacti) are mentioned in several areas. Rivers are described as being surrounded by extensive and often dense woodlands. Forests appear to alternate with savannahs and clear plains. At the San Marcos River, the "foliage was so dense that the ground was never illuminated by the rays of the sun." Further east, the expedition crossed a forest "so dense that there were not enough hatchets and knives to open a passage." Still farther east, the forests are described as containing scattered pines, walnut trees, oaks, and grapevines.

As in the 1709 expedition, buffalo and turkeys are mentioned as the predominant game animals. Ticks continued to be problematic, and mosquitoes are mentioned at one location. The expedition travelled with a herd of goats, and dogs are mentioned at one of the Native American camps. Rivers crossed on this expedition included the Nueces, Frio, Hondo, Medina, San Antonio, Guadalupe, San Marcos, Colorado, and Trinity. The San Antonio River is described as having an "abundance of water, and multitude of fish" as well as alligators. "The waters of the Guadalupe are clear, crystal and so abundant that it seemed almost incredible to us that its source arose so near." Fish are described as abundant in nearly all of the rivers, and alligators are mentioned several times.

Céliz, Fray Francisco. 1719. Diary of the Alarcón expedition into Texas, 1718-1719. Translated by Fritz Leo Hoffman, *in* The Quivera Society (1935). Los Angeles, CA.

"[We] travelled upstream with a desire to ford [the Guadalupe River] or reach its source. *We travelled about three leagues of very rugged land owing to the heavy woods and many rocks*; and at the end of the three leagues two soldiers left for upstream to reconnoiter the land. *They said that it could not be traveled because it is more wooded and contains more rocks….The woods consist of oaks and junipers*, and the bank of the river is densely bordered by very tall savins."

Peña, J.A. 1722. Peña's diary. Edited by Thomas Meehan, *in* Historical records and studies (1934). United States Catholic Historical Society, New York, NY.

"The Apache live in Lomeria[1] Grande, a very broken country about a league to the north."

"Travel in this country was dangerous, for it borders on the Lomeria Grande inhabited by the warlike Apaches. If any of these were found efforts were to be made to establish peace with them."

"The Guadalupe [River] has its source in three large springs…; it is rather wide, and in its vicinity there is a great variety of very beautiful trees. These are so shady that the sunlight cannot penetrate the foliage, in which several species of song birds warble."

1750-1800

Miranda, Bernardo de. 1756. Miranda's inspection of Los Almagres: his journal report, and petition. Edited and translated by Roderick B. Patten, *in* Southwestern Historical Quarterly (October, 1970):74(2):223-251.

Miranda's Journal, February 17 to March 10, 1756. "…going past the Balcones [Escarpment], we arrived at the river they call Alarcón [Guadalupe River]. This [travel] was an effort because of the *many hills, and some thickets that contain valuable cedar and oak timber*....After many hardships because of the many hills, arroyos, and brush, we arrived at a creek generally known as Arroyo Blanco [Blanco River]….*In all of this region there are no commodities nor anything except good cedar and oak timber*, and on the Rio de Alarcón…there are cypress groves, very valuable in so far as it can be determined."

"*Crossing many swollen creeks and thickets of cedar and oak timber*…we arrived at the Arroyo de los Pedernales."

Miranda's Report to Jacinto de Barrios Y Jauregui, Governor of Texas, March 29, 1756. Miranda describes an area believed to be in the vicinity of Blanco State Park as having a spring with a discharge of "almost a "buey de agua" [footnotes states this is equivalent to several thousand gallons per minute]. "*It has such conveniences as easily withdrawn water, much rock, and cottonwood, oak, and cedar timber, all in considerable amount*." The Honey Creek Cove area south of the Llano River is described as having "*good grasslands*." "Of the conveniences, not the least are the large and *nearby thickets of mesquite and oak, very useful for charcoal*. For house building and other necessities needed by haciendas for extracting silver, *there is much cedar, pecan, cottonwood, and oak timber*…." The area from the Llano to its junction with the Colorado *"offers no commodities of any kind except plentiful and useful timber*."

Miranda's Petition to the Viceroy, February 15, 1757. Miranda states he did not find "any Indian of the Apache nation who would guide me so that I could make other discoveries [of mineral deposits]. In order to succeed in encountering some [Indians], I made use of the scheme of setting fire to the field at several places…"

"…The ten mines claimed by the civilians of San Antonio cannot be worked as long as a presidio of at least thirty men to restrain the Indians is not established. With its protection they can work them….The existing presidio need only be while the mines are being settled with a number of residents capable of defending themselves in case of barbarous Indians."

Rubi, Marquis de. 1767. A copy of the report sent to his Excellency the viceroy, Marquis de Croix regarding the advantages of the maintaining or removing the presidio of San Saba, August, 1767. Edited and translated by Ernest Wallace and David M. Vigness, *in* Documents of Texas History (1963), The Steck Company, Austin, Texas.

[Editor's Note: The Mission San Saba de la Santa Cruz was established in 1757 on the south bank of the San Saba River about three miles upstream of the present-day Menard. In March 1758, about 700-2000 Comanches and their allies, under the guise of friendship, entered and pillaged the mission. The mission was never reactivated, though the presidio held out for another ten years. In 1767, the Marquis of Rubi inspected the presidio and recommended that it be withdrawn due to its unfavorable location.]

"…the presidio is located between two ravines which lie open in unequal distances to the north and south. The enemy [Comanches] can come and station themselves in these under cover for the purpose of attacking this presidio. Especially may this be done through that of the river on the southern side. *From there they can make, as they do, a great deal of trouble helped by their proximity and the shelter of the underbrush. The thickness of this and the fertility of the soil which allows it to grow back so quickly prevents its being kept cleared away by so small a garrison*."

<u>1800-1850</u>:

Barklay, Mary Starr. 1963. History of Travis County and Austin, 1839-1899. Texian Press, Waco, Texas.

Barkley presents the following excerpts from the "Report of the Commissioners Named to Select a Permanent Capital for the Republic of Texas (April 13, 1839)":

"We found the Brassos [sic] River more central perhaps in reference to actual existing population, and found in it and its tributaries perhaps a greater quantity of fertile lands—than are to be found on the Colorado, but on the other hand were of opinion that the Colorado was more central in respect to Territory, and this in connection with the great desideratums of health, fine water, stone coal, water power &c, being more abundance and convenient on the Colorado than on the Brassos river…."

"The site is about two miles distant from and in full view of the Mountains or breaks of the Table Lands which, judging by the eye, are of about three hundred feet elevation. *They are of Limestone formation and are covered with Live Oak and Dwarf Cedar to their summits*…. Lime and Stone coal abound in the vicinity, *timber for firewood and ordinary building purposes abound on the tract, though the timber is not of so fine a character as might be wished, being mostly Cotton wood, Ash, Burr Oak, Huckberry [sic], Post Oak and cedar, the last suitable for shingles and small frames*."

"At the distance of eighteen miles west by South from the site, on Onion Creek, a stream affording fine water found at intervals up the River for a distance of forty miles, and together with *immense quantities of fine cedar* might readily be floated down the stream, as the falls two miles above the site present no obstruction to floats or rafts, being only a descent of about five feet in one hundred and fifty yards over a smooth bed of limestone formation…. By this rout also immense

quantities of Stone Coal, building materials, and in a few years Agricultural and Mineral products for the contemplated city, as no rapids save those mentioned occur in the River below the San Saba…."

"Opposite the site, at the distance of one mile, Spring Creek [Barton Creek] and its tributaries afford perhaps the greatest and most convenient waterpower to be found in the Republic."

"Walnut Creek…and Brushy creek…afford very considerable water power….This section of the Country is generally well watered, [and] fertile…."

"On May 23, 1839, Judge Edwin Waller wrote to President Lamar: 'The river bank is bluff, from whence a level prairie affording excellent ground for building lots, extends back about two-thirds of a mile, where it *rises into hills, most of them covered with timber*…'"

"Surveyor Sandusky's enthusiasm about the new capital city was reflected in a letter he wrote to H.J. Jewett in August 1839: 'Austin is situated on the east bank of the Colorado…about three miles from the Colorado mountains and on a beautiful rich prairie about 40 feet above the level of the River extending back one half mile to the "Bluff"…. Two beautiful streams of limestone water flow through the upper and lower parts of the town, taking their source in the hills from Springs which can at little expense be conducted to any part of the city….*Timber for building is rather scarce in the immediate vicinity (except on the opposite side of the river) but within six or eight miles there is an abundance….The Colorado mountains about 3 miles Nr. West…are covered with Scrubby Live Oak, Cedar*, and cliffs of rock, which present a delightful appearance."

Dewees, W.B. 1858. Letters from an early settler of Texas. Compiled by Clara Cardelle. Louisville, KY.

January 2, 1830. "During the past summer there have been constant depredations on the frontier settlements by the Indians…. At last we heard that a party of Whacos and Towaconies [sic] had encamped during the summer at the mouth of the San Saba river, for the purpose of raising a crop of corn…. We now set out, traveling the east bank sixty or seventy miles, we then struck out taking the dividing ridge between the Colorado and Brazos rivers, crossing the Yegua, Brushy and Little river into the mountains of the Colorado. For several days we continued our course through the mountains, till our guides informed us they thought we were within thirty miles of the Indian encampments…We remained where we were till dark, when we set out for the Indian village with the expectation of arriving and attacking the Indians before day. The night was very dark, and *our course lay over mountains of rock and through cedar brake, which so impeded our course and bewildered our guides*, that at daylight we found ourselves near the Colorado river and ignorant of our distance from the Indian village. *Here was a deep ravine running down between the mountains, and hid from the eye of the Indians by the lofty trees, which towered their heads in grandeur toward the deep blue*

heavens above….Into this ravine we went with our horses; we tied our horses to the trees and secreted ourselves…."

Dewees and his party left their hiding place on the ravine and continued to advance on the Indian village. The inhabitants of the village had apparently just received word of the impending attack and began to flee. "We now received orders to ride in quickly and fire. We obeyed; but only succeeded in killing one man; *the rest were soon hid from our view by the thick cedar brake*, and we feared pursuit would be useless…."

"We followed on after the Indians till we came to a perpendicular cliff about five hundred feet height, extending out from the river about six miles, and from which we could find no possible way of descent. Before us lay a beautiful valley, along the side of which ran the river; as far as the eye could reach was one extended plain covered with verdure and beautiful flowers…. *On the left hand of the valley rose a mountain to the height of five hundred feet covered with tall cedar trees*. Never in my life have I seen beautiful a landscape…On our right ran the clear waters of our own dear Colorado, before us lay the beautiful valley, and *on our left towered the high mountain of rock, covered with trees forever green and beautiful*."

Benedict, W.J. 1839. Diary of a campaign against the Comanches. The Southwestern Historical Quarterly (1929) 32:300-310.

"Sometime in August, 1839, our government made a requisition for a certain number of men from each county in the Republic to quell the Indian disturbances upon our frontier." [Editor's Note: Benedict was part of a company of volunteer-mounted riflemen from Galveston. During the fall of 1939, the company set out from Houston for San Antonio and then on to San Saba. From five miles west of Houston to Columbus, Benedict described crossing prairies with vast herds of deer. From there he described post oak woodlands and patches of prairie interspersed with clusters of live oaks and other trees. Animals mentioned included deer, wolves, bear, and wild hogs.]

Upon reaching the Guadalupe River, Benedict described the following scene: "Before us lay outspread a broad extensive valley intersecting on the one hand with the Guadalupe while on the other to the north the view extended far as the eye could reach toward its source at the foot of the mountains. Immediately before us appeared as an extensive lawn with a beautiful green sward, slightly tinged with the various flowers which decked its surface. Not a shrub or bush obstructed the monotony except the towering Live Oak…. *Further to the west appeared the skirting timber thickening the further it receded and rising gradually so that mile after mile of the dark boding forest rose to our view so that ones imagination or view would be extending to the intricacies of the forest in search for the curling smoke of the wigwam*." Benedict described recent depredations by Comanches. His company then proceeded to cross the Guadalupe: "…the water of this river has the purest look of any I ever saw. It flows over a bed of small pebbles. The current is rapid and difficult to cross."

On October 20, Benedict and two companies of Cavalry, along with surveyors and scientists, headed from San Antonio to San Saba. On October 21, they "Entered a valley about ten miles from San Antonio, very picturesque scenery. Hilltops upon Hilltops reveal themselves higher and higher. Grand views of the distance following our course encamped in the valley with towering hilltops on each side. This evening a bear was killed near camp." On October 22, they "Continued along the valley part of the day. *Today first saw species of wild grass 3 or 4 feet high*. We came to an almost interminable ravine. To pass huge rocks shelving on either side we were compelled to dismount our horses and let them slide down. This country has a peculiar wildness. *The wild pine and juniper grows here*."

"This day we raised a hill from whose summit we had a view of a great extent of the country around in every direction…We had followed the course of a valley to attain the summit which was with great difficulty…On attaining the eminence we were at once on a rocky plateau from which we could view in every direction hilltops piercing one above another in every direction till they were closed from view behind the blue veil of distance…This may be termed the dividing ridge between the Guadalupe and the San Saba or properly the San Saba Hills. *We had a rocky descent into the valley through a broken surface covered with rocks and oak timber*."

Benedict reported killing buffalo along the Pedernales River, as well as deer and bear. They surprised and killed several Comanche before they could escape.

Moore, Francis. 1840. Map and description of Texas, containing sketches of its history, geology, geography, and statistics: with concise statements relative to the soil, climate, facilities of transportation, population of the country; and some brief remarks upon the character and customs of its inhabitants. Texian Press (1965), Waco, TX.

"Above the undulating region section of hilly country extends inland about one hundred miles towards the sources of the San Saba. This region, although much less fertile than the sections below it, abounds in the most picturesque and romantic scenery, and is watered by innumerable beautiful streams, flowing over pebbly beds, and forming numerous cascades that would afford excellent mill seats. *Few of these hills attain an elevation exceeding five hundred feet; their summits are generally flat, and tufted with dense thickets of cedar*."

"The hills have generally a very light thin soil, consisting chiefly of a layer of vegetable mould only a few inches deep, resting upon horizontal strata of limestone."

"A species of wild plum of an excellent flavor is found in many western counties, and the nopal or prickly pear is found in immense thickets in those sections. The forests furnish vast quantities of valuable timber, consisting of live oak, pine, cedar, mesquite which nearly resembles mahogany, bois d'arc, and other timber highly prized for cabinet furniture."

Bonnell, George. 1840. Topographical description of Texas, to which is added an account of the Indian tribes. Reprinted by Texian Press (1964), Waco, Texas.

"Four miles above [Austin], upon the east side of the river, is a high peak, called Mount Bonnell. From the top of the mountain there is a perpendicular precipice of seven hundred feet down to the water. The prospect from the top of this mountain, is one of the grandest and loveliest in nature. On the north and west extend the mountain peaks, rising in bold magnificence hill above hill, for a distance of twenty miles. And though what are here called mountains, would in many countries be looked upon as inconsiderable hills, they form a bold contrast to the flower clad prairie, which stretches off to the south and east as far as the eye can extend…. Upon the tops of the mountains are frequently large tracts of rich table lands, and the valleys are unsurpassed in fertility by any land in the world. Large springs, many of which would afford five or six hundred barrels of water a minute, are bursting out at the foot of the mountains and watering the rich valleys below. *Some portions of the hills are very well timbered—others are prairie*. The musquit grass extends to the top of the hills, while the valleys are covered with wild rye. It is not surpassed by any country in the world for cattle and hogs."

"The large springs in the hills, a few miles west of the City of Austin, afford the finest water power in the world. They have a sufficient supply of water for all the purposes of machinery. They are never affected by long droughts, nor heavy rains, and there would, consequently, be a constant supply of water, without any danger of the works being carried off by floods."

"The country between the San Saba and the Colorado is one of extraordinary beauty. *It is about two-thirds prairie—the rest of it timber and bottom lands*, beautifully undulating, and containing running streams of pure water in every valley. Nature has designed it for a stock raising and grain growing country; and it will be more celebrated for the abundance of its productions that any portion of Kentucky or Tennessee."

"After crossing the Colorado the road becomes a little more hilly, but the country is still fertile, well watered, and contains an abundant supply of muquit and wild rye for grazing. This portion of Texas, during the summer season, contains more buffalo and other wild game than any other part; but the game usually travel to the south in the winter, in order to feed on the more luxuriant prairies."

"Spring creek [Barton Creek] is a stream of eighteen miles in length, which enters the Colorado from the west, one mile above the City of Austin. It rises in the mountains, and after running a few miles almost disappears: but about one mile from the river, at a place called Barton's springs, it is again supplied with water, by four large springs, which supply a stream of sixty feet in width and four feet deep, and runs with a brisk current to the river. A company are about erecting a mill at this place. *A portion of the land, towards the head of [Barton] creek, is broken and hilly, but of a rich quality, and well supplied with timber*. It has extensive, rich and beautiful valleys, and some excellent table land upon the hills. *Towards the mouth it runs through a country beautifully undulating, rich, and agreeably interspersed with woodland and prairie*."

"Four miles above Austin commences a cluster of hills known by the name of the Colorado mountains. The highest of them are not more than six or seven hundred feet in height. They generally rise gradually, and some of them have large tracts of table lands upon their summits, which are admirably calculated for the production of grain, fruit and the vine. The valleys in those hills are frequently extensive, and of extraordinary beauty and fertility. They have been represented in the papers of this country and the United States as belonging to a chain of the Cordilleras—this is not the case. They are not more than thirty-five miles in extent, and the Cordilleras are several hundred miles distant from them. They contain extensive quarries of marble, lime stone, and granite, and *will for centuries supply the city of Austin and the adjoining country with timber*. They abound in springs of pure crystal water, and constantly running streams. They afford the best grazing land in the world, and a sufficient quantity of the best arable land for cultivation. Those mountain springs afford the best facilities for water power, for they are neither affected by long drouths nor constant rains. They afford many of the most delightful situations for private residences to be found in any country. They never suffer from drouth: the hills attract the clouds so that they always have an abundance of rain."

"The Agua Frio is a stream formed by a large spring in the Valle de Flores, which enters the Colorado river from the west, twelve miles above the City of Austin. The stream runs for about six hundred yards from its source through a solid block of white marble—at which place it has a fall of twenty feet, nearly perpendicular. The stream is not more than three miles in length, but contains water enough for machinery of the largest kind. *The valley contains ten or twelve thousand acres of land; it is about one-third prairie and the rest heavily timbered land*. It is a place of extraordinary beauty and would be a delightful place for private residences—and a fine location for a manufacturing establishment. It received the name of the Valle de Flores from the thousand varieties of wild flowers which carpet the valley."

"The Piedernales river is a large stream which enters the Colorado twenty-two miles above the City of Austin, from the west; and though it is but sixty-five or seventy miles in length, it receives so many of those large mountain springs, that when it unites with the Colorado, it is difficult to tell which is the largest stream….[The] bottoms are covered with as thick growth of cypress timber, and are bounded by perpendicular rocks, frequently of three hundred feet in height. The stream is gentle and smooth, and the timber may be floated down to Austin without difficulty. The river is composed almost entirely of springs, and so pure and transparent is the water that pebbles may be seen at the bottom in forty feet water. After ascending the rock from the cypress bottom, we reach a rich, level muquit prairie of great extent. *It has a great quantity of muquit timber, with occasional groves of live and post oak, and considerable cedar*."

"About eight miles above the mouth of the Piedernalis [sic], Honey creek enters the Colorado, from the east [Editor's Note: this is not the Honey Creek that enters the Guadalupe River]. It is a considerable stream, but only about eighteen miles in length. It runs through *a beautifully rolling and well timbered country, till it approaches near the river; when it passes through and extensive bottom prairie. The bottoms in this portion*

of the Colorado river are generally about four miles in extent and skirted with beautiful and picturesque hills, which are generally covered with timber."

"The Llano river enters the Colorado from the west, about ten miles above the mouth of Honey creek. Like the Piedernales, it is a short but large river, and like that stream is entirely formed by springs. It is about eighty miles in length, and flows through a beautifully undulating country, of good water and rich land. *The land upon [the Llano] river contains a sufficient supply of timber for all the purposes of agriculture*."

"Hunting creek is a stream about sixteen miles long, which enters the Colorado from the east, four miles above the great falls. The bottoms upon it are extensive, and *the land well timbered and fertile*."

Kennedy, William. 1841. Texas: the rise, progress, and prospects of the Republic of Texas in one volume. The Molyneux Craftsmen, Inc., Fort Worth, TX.

"The mountainous region [west of Austin] forms part of the Sierra Madre, that great chain which, broken at the junction of the rivers Puerco and Rio Grande, and taking a north-easterly course, enters Texas Proper, at the sources of the river Nueces. Continuing thence, in the same direction, to the head waters, of the San Saba, a tributary of the Colorado, and inclining eastward down the San Saba, it crosses the Colorado, and is finally lost in the woodlands of the Upper Brazos, between the river of which name and the Sabine the country is rolling or level. Spurs of this mountain range project southwardly down the rivers Medina and Guadalupe, to the vicinity of San Antonio de Bexar. Other spurs branch down the rivers Llano and Piedernales [sic] and the smaller western tributaries of the Colorado, and similar spurs extend to the Colorado above San Saba for a considerable distance, rounding the head waters of the San Andres and Bosque rivers, which flow into the Brazos.

"The mountains are of third and fourth magnitude in point of elevation: those of the San Saba are deemed the highest. *They are clothed with forests of pine, oak, cedar, and other trees, with a great variety of shrubbery.* Extensive valleys of alluvial soil wind throughout the range; most of them susceptible of irrigation and profitable culture. The sides of the mountains themselves, with not a few of their summits, are adapted to agriculture. Copious and limpid springs abound in the highlands, fertilising [sic] the soil and forming innumerable rivulets which, gliding with a rapid current, unite their waters, until they swell into large and bounteous rivers, that scatter plenty over the central and western districts of the Brazos and Bexar. Of the table lands beyond the mountains, which are said to be healthy and fertile, little is known, and still less of the northern region, extending to the 42° of north latitude.

"The counties of Bastrop and Travis (formerly Bastrop) resemble in the lower section Colorado and Fayette. A vast chain of prairie, extending from the western bank of the Colorado to the mountains, is inferior to no part of Texas in beauty of aspect and fertility of soil. The bottoms on the eastern side are about four miles in width. The Colorado bottoms differ much from those of the Brazos and the rivers of Eastern Texas, which are

always covered with a heavy growth of timber. Many of the richest bottoms of the Colorado are prairie of extraordinary fertility, skirted with wooded uplands, lying a short distance backward. These elevated uplands are from four to six miles in breadth; in some places, tolerably fertile, but, in general, gravelly and broken. They are the dividing ridges between the Brazos and the Colorado. The land upon Cedar Creek is prairie, with the exception of the bottoms, which are narrow and covered with cedar. Upon Walnut Creek the land is generally good, but, occasionally, broken and hilly. *The hilly portion is timbered with white, red and post oak, pine, and cedar.*

"Onion Creek flows through a fine rolling country of mingled prairie and woodland: about ten miles from its mouth there is a grove of the best description of cypress, to the extent probably of six thousand acres. There are, besides, cedar, live oak, black walnut, white, red, and post oak, hackberry, mulberry, wild peach, &c. There is an excellent opening at this place for a saw-mill and lumber trade."

"On the eastern border of the Colorado, about four miles below a range of high lands, named the Colorado Mountains, is the infant city of Austin, the capital of Travis County, and the seat of government of the Republic of Texas. The most elevated of the hilly range about Austin in not higher than six or seven hundred feet, and the chain does not extend farther than about thirty-five miles. *The hills contain extensive quarries of marble, limestone, and granite, and will, for many years, supply the adjoining country with timber*. They are intersected by fertile and pleasant valley, watered by crystal springs and perennial streams. The pasturage of wild rye and musquit-grass is exuberant, and there is ample proportion of land for profitable cultivation."

"The Piedernales River flows through a district almost entirely elevated table-land; its banks are very steep, and its bottoms not exceeding from one to three hundred yards in width. These bottoms are covered with a thick growth of cypress, and are bounded by perpendicular rocks, frequently three hundred feet in height. Ascending the rock form the cypress bottom, there appears *an extensive sweep of rich musquit prairie, abounding in muquit timber, with insulated groves of live and post oak and cedar*."

"The San Saba river, which, through its whole course of about two hundred miles, runs between high-land ranges, waters a valley extending from six to twenty-five miles. *Timber is abundant*…. About thirty miles from the mouth of the San Saba there was once a Spanish Mission and fort…" Kennedy proceeds to relay an account of the destruction of the San Saba Mission by Comanches.

Solms, Prince of. 1845. Prince Solm's 10th report dated 27 March, 1845 on Comal Creek. Compiled and edited by Chester William and Ethel Hander Geue *in* A New Land Beckoned: German Immigration to Texas, 1844-1847 (1972). Texian Press, Waco, TX.

"On the 18th [of March 1845] I crossed the Guadalupe at the ford of the great military road from Nacogdoches to San Antonio. The river is locked in by rocky cliffs and rushes wildly over rocks and boulders. Right here is the beginning of the land which I brought into Verein's possession. The Comal Creek runs through it. On the right bank of Comal

Creek there is rich prairie land with open terrain which continues toward a dominant elevation. *On the left bank of Comal Creek there is well forested bottom land which extends to the cedar, oak, and elm covered cliffs which here already have considerable height. Beyond this there is a high ridge with summits here and there similar to our Black Forest* [in Germany]."

"The ridge runs from N.W. to S.E. Through this bottom land the Comal Spring [River] flows. It bubbles forth from the cliffs in seven separate springs and immediately attains a width of twenty steps. This stream of crystal clear water of considerable depth steadily widens, winds about like a forest torrent, and rushes on."

"From its confluence with the Comal Creek I, with four companions, attempted to reach the head spring. However, *having covered only five miles after hours of chopping through underbrush and heavy forest*, we had to return without success."

"Each day, I rode about the region to familiarize myself with the country. On the 20th of this month, for the first time *I ascended the ridge on horseback forcing a path through the heavy cedar thickets* and using the outcropping ledges as steps. The view from the high ridge, behind which there is a plateau several miles wide, is enchanting. I rode three or four miles into this tableland without coming to its end."

"All over the country there are signs of large and smaller camps of the Indians who, on account of the good hunting and excellent water, occasionally pitched their nomad tents here. However, *as soon as civilization comes near, [the Indians] withdraw because the sound of the ax in the woods is annoying to them*. Should some go astray and wander this way, I believe that the clatter of mills on the river and the noise of the forges would scare them off. The Comal River is especially adapted for just such installations on account of its ever constant water supply."

Hughes, George. 1846. Memoir: descriptive of the march of a division of the United States Army, under the command of Brigadier General John E. wool, from San Antonio de Bexar, in Texas, to Saltillo, in Mexico. Government Printing Office (1850), Washington, D.C.

According to this account, by this time there was "a good wagon road now in use" from San Antonio to San Saba.

Goyne, M.A. 1991. A life among the Texas flora: Ferdinand Lindheimer's letters to George Engelmann. Texas A&M University Press, College Station, Texas.

New Braunfels, 5 February 1846. "The cedars start blooming in mid-January. In your journal about the West of American you say that [this variety] would grow in Illinois, if there were boulders. The cliff [sic] cedars here are paltry compared with the coastal cedars of lower Texas. On Buffalo Bayou there are cedars 1½' in diameter and probably about 100' in height and of erect stature. In the case of the mountain cedars the branches begin quite low and the [trees] are scarcely 1½' in diameter and 40' high." p. 149

10 October, 1846. "…on the plateau, which is here 200' high, full of ravines that are densely covered with cedars and underbrush, and to which one has few ways of access along the slopes. One can get up them along cleared paths, but when one wants to come down, one cannot always find the right places again, but instead often comes to thickets that are incredible or to steep declivities. So one can wander around for many hours among the manifold windings of the shifting peninsulas of sand on the plateau before finding what is practically the only spot at which one can ride down. In addition to this, things were a bit eerie up there in that spring, and the unusually lush vegetation of spring made the area quite unrecognizable….*Streptanthus* #15 I really have never found again." p. 170

"Of the *Asclepiadea* #190 (which reminded me of *Lyonia maritime*) you will be receiving lots more blossom and fruit specimens. *It is common in the cedar forests*." p. 171

Gregg, Josiah. 1847. Diary and letters of Josiah Gregg. Edited by Maurice Garland Fulton, *in* Southwestern Enterprises: 1840-1847 (1941). University of Oklahoma Press, Norman, OK.

"Much of the timber about Austin is live oak, but of a scrubby character. In the highlands most of the timber, however, is post oak and black jack. Out to the N.E. the prairies seem extensive—as also to the S.W. but *to the N.W. set in a chain of rough, though low, woody mountains. These commence hardly a mile to the N.W. of the city and continue to the S.W. a little to the N. of San Antonio. How far to the N.E. they extend I have not learned, but, I believe beyond the Brazos*."

Roemer, Ferdinand. 1849. Texas with particular reference to German immigration and the physical appearance of the country. Translated by Oswald Mueller. Eakin Press (1995), Austin, TX.

"*A steep hill, about four hundred feet high, rises just across the Comal and extends in a northeasterly direction…. A dense forest covers the slope of this hill, but the trees do not have the verdant green of those found in the bottoms, but are of a dark, olive green color. These are the red cedars (Juniperus Virginiana L.) [now Ashe juniper (Juniperus asheii)] which are found singly among other trees in the lowlands of Texas, but nowhere forming a continuous forest of their own.*" p. 92.

"[The] water [of the Guadalupe River] is pure and clear….The Comal…excels the former in the clearness of its water and the luxuriant growth of trees on its banks….The unexcelled beautiful Comal Spring has its source at the base of a mountain range, hardly half a mile distant from [New Braunfels]." pp. 92-93.

"[Some houses had] walls made of cedar posts driven vertically into the ground like the posts of a stockade." p. 93.

"Wagons were…lacking to transport the felled trees. Wooden shingles, so necessary to cover the house, were also scarce, as the manufacturing of them required a special dexterity. The trees suitable for their manufacture were also getting scarce in the immediate neighborhood." p. 101.

"…the springs of the Comal…lay in a straight course about one mile distant from [New Braunfels]…. *A road, made by the settlers for hauling the cedar trunks, used in building their homes, from the hilltop, was the only sign of human activity.*" p. 109.

"After traveling some time toward the base of the range of hills, we suddenly heard near us the murmuring of rapidly flowing water, and a few moments later we stood at the most beautiful spring I had ever beheld…. This, however, is not the only spring of the Comal. *Near [Comal Springs], in the dense forest, and difficult to approach on account of the steep hill slope*, are four or six more springs of even greater volume of water and of equal clearness. Every one of them could turn a mill at its immediate source." p. 109.

"Several other streams of West Texas, such as the San Antonio and the San Marcos, are quite similar to the Comal in that they too issue forth as full-fledged streams from mighty springs. All begin at the foot of the mountain range which crosses Texas in a north-westerly direction…" p. 110.

"*Our path led us again past the springs of the Comal, but suddenly ascended the steep, wooded slope of the hill. The cedar trees…which covered the slopes exclusively, formed an impenetrable thicket through which a path had to be cut. The cedars here are not the stunted shrub-like plants found in the Northern States of the Union, but are stately trees with straight trunks, seldom more than twenty to twenty-five feet in height and one and one-half feet thick. They have a uniformly spreading crown. This cedar forest is a treasure to the colonists of New Braunfels, since the wood was preferred above all others on account of its durability when used in building houses and fences. A section of the cedar forest was destroyed by a forest fire during my stay in New Braunfels. The fire spread rapidly due to the resinous nature of the wood and the close stand of the trees*." p. 112.

"*As soon as we reached the summit of the hill, the cedar forest ended.* An open, grassy plain, only broken here and there by brushwood and scattered live oak trees, spread out before us. It extended to Mission Hill about two miles distant and we had to follow a narrow Indian trail to reach it. Several such trails converge here, leading to Comal Springs." p. 112-113.

"The road [between New Braunfels and San Antonio] led us over an open, undulating prairie of great fertility. *A cedar-covered slope, similar to that at New Braunfels, was at our right for the first ten miles*, which farther on flattened out into a low lying chain of hills." p. 117.

"…the buffalo, which at the time the first settlers came here under Prince Solms, were still seen on the heights north of New Braunfels, had retreated long ago and did not come within many miles of the city. The deer also disappeared quickly in the immediate vicinity since they were hunted extensively….During the earlier colonization period, bear…were shot by the colonists in the immediate neighborhood of New Braunfels on the forested banks of the Comal, but they have since retreated entirely." p. 141. Roemer

mentions other mammals, including cougars, bobcat, ocelot, wolves, peccaries, and flying squirrels.

"…we followed the course of the Guadalupe [River] upstream….we came to a spring, fringed with dainty bushes of the palmetto and shaded by beautiful forest trees. It gushed forth with a volume and intensity equal to the springs of the Comal….We were not able to able to penetrate much farther than this point, for here the valley of the Guadalupe became a steep, rocky gorge. *Near us lay a hill, several hundred feet high, covered sparsely with stunted cedars*." pp 148-149.

"*As far as the banks of the Cibolo are rocky, they are lined by cedar bushes….The cedars of western Texas do not extend anywhere else to the fertile soil of the plains, except in a few bottoms. There they form high, slender trunks on which the lower limbs appear to have died, leaving a sparsely foliated crown. Among the cedar bushes grew yuccas and cacti*." p. 151.

"*…a pair of oxen belonging to a settler, had been found, killed with arrows, on the cedar forest of the hill slope, hardly two miles from [New Braunfels]*." p. 158.

"*About two miles distant from [Austin], a beautiful rounded hill, probably eight hundred feet high with sharp outlines and a heavy growth of cedar on its slope, presents an unusual sight*. The Colorado issues from among these hills in a manner similar to that of the Guadalupe at New Braunfels. As a matter of fact, the location of New Braunfels and Austin are very similar. Both places lie on the border between the undulating hilly country and the hilly plateau, at the present time inhabited only by roving bands of Indians." p. 173.

Description during a trip from Austin to New Braunfels: "Toward the south and southeast the immeasurable, undulating prairie could be seen*, whereas in the north and northwest the wooded chain of hills arose.*" p. 174.

Roemer mentions a prairie fire near the Brazos River. "…the strip of flame, a mile long, raced along over hill and dale…. My companion was of the opinion that Indians had without doubt started the fire, since they do this often to drive the game in a certain direction, and also to expedite the growth of the grass by burning off the dry grass." p. 191.

From January 20 – April 17, 1847, Roemer made a round-trip excursion from New Braunfels to Fredericksburg and the ruins of the Mission San Saba near present-day Mendard. The route from the Cibolo River to Fredericksburg was described as being predominantly "barren hills" covered with dry, yellow grass with occasional live oak and post oak trees. A prairie fire "several miles in extent" was reported on the night of January 22. The next day, they encountered "a company of about 20 men who had been sent…to repair the road between New Braunfels and Fredericksburg." They met a company of surveyors the following day. They found "a large herd of cattle, belonging to the colonists of Fredericksburg" in a "beautiful mesquite prairie of great fertility" near

the Pedernales River. *An oak forest extended from the opposite side of the Pedernales River to the north of Fredericksburg. "This forest extended over almost the entire surrounding country with the exception of a small strip of open prairie, which ran parallel with the larger creek. The stumps in the streets were by no means all removed….Several laborers were…engaged in felling trees." "Many logging roads…crossed the forest and robbed it of its primitive appearance which it had only a few months ago." "…the forest had a very desolate appearance, not only because the trees were bare, but also because the ground was covered with black ashes. Through the negligence of several settlers, the grass had caught fire in the neighborhood of the city and had spread several miles beyond it." "The number of inhabitants in Fredericksburg at the time of my arrival was six hundred, but it increased to nine hundred within a few weeks." "…I rode to a place near [Fredericksburg] where the majority of the male settlers were engaged in felling trees….The sound of the axe and the crashing of falling trees could be heard in all directions. The straight trunks of the oak trees were split into fence rails; the limbs and twigs were gathered into piles and burned. Every one worked industriously and seemed to feel that the future success of the colony depended upon this work." "…the grass had been burned everywhere in the vicinity of Fredericksburg…." Travelling northwest of Fredericksburg , "…we came to a stony, infertile plateau, which, on account of the stunted oaks and exposed limestone visible in many places did not present a very cheerful view and it seemed all the more cheerless since all the grass had been burned as far as the eye could see. Only once was this cheerless picture broken and that in an agreeable manner by a little valley…." "We had gone only twelve miles in the direction of the Llano….Due to the fire, all the grass had also been burned here, and only a few stemless yuccas and a few cacti…were spared." "We entered a post oak forest which…extended a number of miles and which formed the only larger, continuous forest we had seen thus far on our trip. Several times we had difficulty to follow the trail of the von Meusebach expedition preceding us, since…the wind had obliterated it still more by covering it with ashes….When we had traveled about twelve miles in this oak forest, quite wintery and desolate in appearance with its barren trees and black burned soil, we suddenly entered a beautiful, broad meadow, which could be none other than the valley of the San Saba.*" pp. 220-241. A camp of Comanches lay on the other side of the river. Roemer describes meeting the Comanches and having council with three chiefs (Mopetshokope, Santa Ana, and Buffalo Hump) and Herr von Muesenbach to negotiate the German settlement of the region from the Llano River to the San Saba.

Bracht, Viktor. 1849. Texas in 1848. Translated by Charles Frank Schmidt. Naylor Printing Company, San Antonio, Texas.

"The country between Austin on the Colorado and New Braunfels is hilly; its valleys are charming, and streams of clear water meander through them. The uplands are very fertile. They consist of clay mixed with sand, and if properly cultivated, will undoubtedly produce large crops of wheat. The valleys are covered with a thick growth of fine mesquite grass. *The hills which extend all the way from Austin to New Braunfels, are covered with heavy timber*."

"General E. Burleson has chosen a genuine rural spot for his home on the slope of the hills, at the foot of which the famous springs of the San Marcos River gush forth."

"The city of New Braunfels is still growing…The site presents scenes of picturesque beauty rarely found elsewhere. On the one side the Guadalupe rushes by with great speed, while on the other the matchless Comal, crystal clear, rolls by at a speed of about six miles an hour."

"…the main branch of the Comal…is at least fifteen feet deep at one place and so clear that the smallest particles at the bottom can be seen…We watched the numerous fishes play in the crystal stream. Cress of green, yellow, and purple colors grows in the deep water, imparting its colors to the fish and to the water."

The Comal River has "four main springs and many smaller ones; they gush forth bodily at the foot of the mountains."

"Live oak, holly, many kinds of cactus, arbor vitae, and *the millions of cedar that cover the Comal hills like a mantle*, preserve the pleasant picture of summer when the icy northers sweep down on us in November, December, and sometimes in January."

"The road to the Pedernales is finished, and is said to be satisfactory. It is less difficult to proceed thence to the Llano and to the San Saba."

"I have visited Austin for the first time…The surrounding country is quite beautiful…*dark, steep, cedar-covered mountains rise about five miles north of the city*. The well-equipped mill, that supplies Austin and Fredericksburg in part with corn meal is located near a spring on the Colorado [Barton Springs], at the foot of those mountains."

"*On the upper Medina…timber of the first quality like that in the mountainous regions, consisting of cypress a thousand years old, cedar, etc.*, is found in no other part of Texas—not even in the East. To market this timber 100,000 dollars would be necessary to build a sawmill, open roads and purchase teams and wagon but it would yield a profit of half a million plasters."

1850-1900

Johnston, Albert Sidney. 1855. With Albert Sidney Johnston in West Texas: Austin to Fort Chadbourne, March 1855. Edited by Marilyn McAdams Sibley, *in* West Texas Historical Association Year Book (October, 1964). West Texas Historical Association, Abilene, Texas.

"When the military trail from Austin to Belknap was first blazed in 1851, it followed an old Indian trail which wound around the breaks in the table lands. When Will Johnston made the trip, he headed northwestward along the old military road to a point high upon Brushy Creek near the present village of Cedar Park, and continued northwesterly through Mills and Brown counties…."

"Austin, Texas. March 13, [1855]…. We rode to the Brushy Creek, 20 miles, and encamped for the night [near Cedar Park]. Our road was for about 14 miles of the way over a rich rolling prairie and for about *six miles through a heavy cedar brake. Cedar is the main reliance for rail timber in this section*, *the live oak being too gnarled for such purposes*. *We had to pass several prairies on fire and the smoke of the cedar brake burning filled the air*. The prairie land was almost all of excellent quality, black or chocolate, though some had good crops of stone even the brakes which were rich but stony. The views were very fine, though the country is yet blackened with fire and the grass not yet at its full verdure."

Olmstead, F.L. 1857. A journey through Texas; or, a saddle-trip on the southwestern frontier: with a statistical appendix. Dix, Edwards & Co., New York, New York.

Olmstead traveled from Austin to San Antonio along the Old San Antonio Road (roughly what is now the I35 corridor), to the west and south of the Balcones Escarpment. He describes the prairies along this stretch, stopping near Manchaca Spring (just north of Buda), San Marcos, and New Braunfels. He mentions recently areas of recently burned prairie between New Braunfels and San Antonio (p. 147).

"San Marcos was a town of about three shabby houses. Beyond it our road approached closely *the hill-range, which is made up of spurs coming down from mountains North. They are well wooded with cedar and live-oak*." p. 137

"We pitched our tent at night in a live-oak grove, by the side of a deep pure spring, at the mouth of a wooded ravine closed by rugged hills toward the north. *Behind us were the continuous wooded heights, with a thick screen of cedars; before us, very beautiful prairies*, rolling off far to the southward, with the smooth grassed surface, varied here and there by herds of cattle, and little belts, mottes, and groups of live-oak." p. 137

On a later excursion, Olmstead traveled from San Antonio to Boerne and Sisterdale.

"Five or six miles from San Antonio, the prairies rise, in gentle slopes, into hills, which become steeper and nearer one another as you travel further. In thirty miles, the valleys have become very narrow, and the hills and mountains rugged with projecting strata of limestone….*The stunted live oaks were rarely to be seen, besides grass, there were only large cacti, yuccas, and agaves, scattered over the arid rocky elevations*." p. 188

"…a town called Boerne had been laid out, and a few houses built. But the natural use of the country was, palpably, for grazing, and that, sheep-grazing. We could hardly refrain from expecting, on each bleak hill, to startle a black-faced flock, and see a plaided, silent, long-legged shepherd appear on the scene." pp. 188-189

"*Next day our road took us over a rugged ridge to the valley of the Guadalupe. From the summit was a wide and magnificent view of misty hills and wooded streams.* We were crossing a little creek beyond [when we met with] two men of Sisterdale, in search of stray

cattle. Sisterdale is a settlement of eight or ten farms, about forty miles from San Antonio, upon the Guadalupe, at the junction of Sister Creek and the crossing of the Fredericksburg road." p. 191

"Up and down the Guadalupe…are a dozen or twenty more, single men, earning a tough livelihood splitting shingles….They are …a sort of political hermits, who have retired into the woods, and live with one companion, or in complete solitude." p. 191

"The [upper] Guadalupe was even more beautiful here than below, quick and perfectly transparent. I have rarely seen any resort of wood-nymphs more perfect than the bower of cypress branches and vines that overhang the mouth of the Sister creek at the ford near the house….*the cypresses rise superbly from the very edge, like ornamental columns. We found, while shooting in the river bottoms, some real monarchs of this species – (C. disticha). One of them, which had fallen, was at least fourteen feet in diameter. Its heart, as is frequently the case, was unsound. It is one of the most common trees along the creeks of this region*." Pp. 193-194.

"[Fredericksburg], we learned, was quite similar in character to Neu-Branfels [sic], but on a much smaller scale, containing about 700 inhabitants….The country around them, although not equal to that below, *was excellent pasturage. Following the Llano and San Saba, downwards, the land becomes richer and better wooded*, and the region of the Upper Colorado was described to us as being one of the finest parts of the state. This district, now Llano and San Saba counties, has since been much taken up by emigrants, principally planters, who have located, as much as possible, with reference to the proposed line of the Pacific Railroad. The outposted settlers here, however, are still much exposed to attacks of Indians. Fredericksburg itself has grown rapidly during the last year or two. The population of the town is now 1,200….The adjacent country has also become closely settled." p. 201

"The furthermost German settlements now reach the San Saba. The extreme settlements of the northern part of the state are near the clear fork of the Brazos, at Fort Belknap, where there is an Indian reservation of forty leagues, and enough American settlers to have formed the new County of Young. These outposts are connected by a road, now in considerable use, which passes by Forts McKavett, Chadbourn, and Phantom Hill. A line of settlements will soon follow, and the Indians will then be confined to the great desert plains which can furnish them with little game, and, probably, no cultivated food. Starvation will compel submission or emigration, and this great district will become open to peaceable occupation." Pp. 201-202

"…we came upon Currie's Creek, and found an American settler….[who] is owner of an adjacent saw-mill…. *The chief wood sawed is cypress, and all lumber finds a ready market*." p. 213

"*Our road followed Currie's Creek, a pleasant brook, bordered by meadows, here and there interrupted by ledges of rock, extending from the hills, and walling the roadside with stunted live-oak and cedar*." p. 213

"…we gradually mounted the ridge which sheds the water of the creek, and, from the highest point of the road, ascended a little peak not far off….The whole upper valley now lay before us, with those of the two Sister creeks and a wild array of tumbled hills to the north. *The valleys appeared densely wooded, with here and there a green and fertile prairie*. With the glass we could distinguish three houses in the dale, and behind us the settlements we had left three hours before. *A dwarf live-oak reached even these summits, with the cactus and the aloes. A coarse, thin grass covered all the soil….As we descended, we found thicker grass, and abundant springs, guaranteeing its verdure through the summer. There could not be better range for sheep. For other purposes it is of no value*." Pp. 213-214

Olmstead described fighting a fire started by his companion who "began to burn the grass off a small circle of the ground, that we might have a place to cook our supper upon." Upon its conclusion, Olmstead notes "There is something peculiarly exciting in combating with a fierce fire. It calls out the energies and the strength of a man like actual war." Pp. 215-221

"A good deal of large game is still found in these hills, though it is disappearing before the rapid settlement of the country." p. 223

De Cordova, J. 1858. Texas: her resources and her public men. J.B. Lippincott & Co. Philadelphia, PA.

"It is now very common to find Texas cattle quoted in the markets of the North….On the San Saba the grass is very fine and is admirably adapted for grazing….for ranching, this Western country is the best in the State."

"[Sheep-raising in Texas] is one of the most profitable occupations that a prudent and careful farmer can engage in…."

"The mountainous districts of our State have proved themselves most admirably adapted to the raising of sheep."

De Cordova provides a lengthy list of his lands that are for sale, including "*500 acres of land [in Travis County] out of the headright quarter of a league of WILKINSON SPARKS, situated on the river Colorado, opposite the city of Austin, and including a fine cedar brake*." [Editor's note: this tract is currently in the area of the Ullrich Water Treatment Plan.]

"Burnet County…is situated on both sides of the Colorado River, about forty miles above the city of Austin, in what is commonly designated as the 'Mountain-Region.' It crosses the divide between the waters of the Brazos and Colorado, including a large portion of the beautiful undulating prairie-country on the head-waters of the San Gabriel River....It is well supplied with fine springs and clear streams meandering through its numerous valleys. *Many of the hills are covered with a dense forest of 'mountain cedar.' The valleys are about half covered with timber; the remainder are small prairies*." *De Cordova mentions a vast quantity of cedar lumber for building material and a 580-acre tract of land for sale on the west side of the Colorado River, "a considerable part of which is covered with excellent cedar timber for building purposes*."

In Coryell County, *"There are mountains on both sides of Coryell Creek, which furnish large quantities of cedar*."

In San Saba County, "The Colorado River, some two hundred yards wide, flows rapidly by ["the Great Colorado Sulphur Spring"]. *The mountains, capped with their evergreen cedars, almost surround it*….To the sportsman it furnishes a few buffalo, plenty of wild cattle, Mexican hogs, bear, deer, turkey, fish, and wild honey in great abundance."

In Travis County, *"Large bodies of timber are found in the bottoms [of the Colorado River], comprising pecan, cottonwood, elm, &c. On the hills the cedar grows in great abundance.*"

"*Barton's Creek empties into the Colorado on the west side, near Austin. At a little distance from its mouth…are some very large springs….The country on this creek presents an extensive range of cedar hills and is much broken*."

"*Wild lands [in Travis County] may be purchased at very low rates. The cost of improvements is a serious item; but when a cedar fence is once put round a plantation it will need but little repair for many years. With vast prairies, we have also cedar lands at intervals seldom exceeding five miles, and these can be purchased at a small price. The planter finds a cedar lot of indispensable value, from the abundant material for improvements with which it furnishes him*."

In Bexar County, *"From the Medina to the Hondo the soil is rich weed and mesquite [sic] prairie pretty fairly timbered up to the mountains, which are covered with cedar, and send clear crystal waters gushing from them at different points to feed the different streams we have named….The Sabinal has also some cedar*…."

De Cordova refers to the mesquite tree as "this celebrated tree" and "this friendly tree," which "flourishes abundantly and attains it greatest size in Western Texas." Its wood "is used to the exclusion of every other wood for making wagon hubs and spikes," as well as for cabinetry, fencing, and fuel.

In Hays County, *"a chain of hills…are covered with a dense growth of mountain cedar and live oak, this affording through the winter ample protection for stock during the prevalence of the northers*." De Cordova described the immediate area around Jacob's Well as "a beautiful valley, which, though small in size, is very rich and is surrounded by elegant building-sites."

Davis, T.H. 1861. Hays County. The Texas Almanac for 1861, with statistics, historical and biographical sketches, &C., relating to Texas. W. & D. Richardson, Galveston, Texas.

"*There is a sufficiency of timber, such as cypress, cedar, and post-oak, to supply all necessary home consumption*….The mountain region of this country [Hays County] is considered to be a very desirable section of country for the raising of sheep, and is

rapidly filling up with shepherds, who have been very successful with their flocks, as they are much more healthy upon the mountains than they are upon the prairie."

Wood, S.J. 1861. Travis County. The Texas Almanac for 1861, with statistics, historical and biographical sketches, &C., relating to Texas. W. & D. Richardson, Galveston, Texas.

"*About one fourth of the [Travis] county is mountainous or hilly, the land rather poor and rocky, but well watered, and some of it covered with cedar and others kinds of timber*. It is well adapted to the raising of horses, cattle, sheep, and goats. The balance of the county is gently rolling prairie or level prairie and river-bottom….*Our fences are chiefly made of cedar-rails, from the cedar-brake above Austin*. One of these fences will last an age. Stone of the best quality for building purposes is everywhere to be found. *Cypress shingles are obtained from the mountains above Austin*, and pine from Bastrop County."

Patterson, N.M.C. 1861. Uvalde County. The Texas Almanac for 1861, with statistics, historical and biographical sketches, &C., relating to Texas. W. & D. Richardson, Galveston, Texas.

"About two thirds of this [Uvalde] county is prairie, the soil varying from a black land, not so very waxy, to a mulatto color. The timber in the valley consists of musquit, hackberry, live-oak, cypress, pecan, and*, in the mountainous part of the county and in the cañons, is cedar in abundance, and some post oak, which is fine for fencing*."

M'Cutchen, M.M. 1861. Coryell County. The Texas Almanac for 1861, with statistics, historical and biographical sketches, &C., relating to Texas. W. & D. Richardson, Galveston, Texas.

"*About one half of this [Coryell] county is hilly or mountainous, which portion is covered with scrubby timber, such as live-oak and Spanish oak*."

Ullrich, G. 1861. Comal County. The Texas Almanac for 1861, with statistics, historical and biographical sketches, &C., relating to Texas. W. & D. Richardson, Galveston, Texas.

"*Timber: We have cypress for shingle, cedar, live-oak, post-oak, Spanish-oak, black-walnut, pecan, elm, hackberry, musquite, black-jack, etc*. For building material the cedar and Bastrop pine are preferred, but these are now superseded by the more substantial rock….*Cedar is generally used for fences*; but in the last few years, stone fences have been built in the county."

Burrowes, Edward. 1860. Letters in "New Jersey Pioneers in Texas", by Charles M. Snyder (1961). Southwestern Historical Quarterly 64(3):348-368.

"I got lost the first time I went to Austin. It was only a patch for to travel on horseback through the woods the distance of thirty miles."

> "I am getting a little afraid the sheep will take the mountains in four or five years more, for their h[e]rds from 500 head to 5000 passing every five or six weeks going up a little higher than I am, and once in a while a herd will stop within three or four miles of us. Sheep is mighty hard on the range. You can tell a sheep range before you get in two or three miles of the house, for they keep the grass eaten off plum in the ground, and cattle or horses can't get hold of it. And after they are on a place six months thair haint no grass within a quarter of the pens [sic]. And that keeps off other stocks."

Austin Daily Democratic Statesman, September 10, 1874

> "The cedar tie business has contributed largely to the growth and prosperity of the 'Hill City' [Austin] in the last two years, more especially the last twelve months. A gentleman connected with the Central Railroad says that *two hundred thousand cedar ties have been shipped from this city during the last two years*, and when it is remembered that these ties bring from sixty to ninety cents each, the reader will readily comprehend the vastness of the revenue from this source, to say nothing of the harbest which Austin reaps from other portions of the State by her immense shipments of lime and building rock."

Unknown Authors. 1885. Historical and descriptive review of the industries of Austin, 1885. Austin, TX. Published by "The Authors," Austin, Texas.

> "*From the heavily timbered hills, in some places assuming the proportion of mountains*, in the Western portion, the surface slopes down to the rich alluvial bottoms of the Colorado river and the rolling prairies in the Eastern section."

> "[*Travis] county, in addition to being well watered, possesses the scarcely less valuable condition of being abundantly timbered*. About four-fifths of the area is more or less densely covered by a growth comprising almost every species of tree known to Texas, except the pine and sweet gum, which indeed are rarely to be found elsewhere than in the Eastern and Southeastern portions of the State. *The hills and uplands abound in cedar and oak of the several kinds*, while the bottoms and rolling lands are studded with the pecan, hickory, ash, walnut, elm, cypress, hackberry, bois d'arc, mesquite and cottonwood."

Attwater, H.P. 1892. List of birds observed in the vicinity of San Antonio, Bexar County, Texas (concluded). The Auk 9(4):337-345.

> Dendroica chrysoparia. GOLDEN-CHEEKED WARBLER.-The nearest point to San Antonio that I have observed this bird, is about twenty miles west of the city. I have also taken them in Medina, Bandera, Kerr, Kendall, and Comal Counties. *They are nowhere abundant, and only to be met with in the thickest cedar brakes, and as these are fast being cut and burnt out, the bird will no doubt become still more rare.* They breed in all the counties I have named, as I have observed them feeding young birds at localities in all of them, but I was too late to get eggs both in I890 and I891. I can give no account of the migration of this species; the nearest approach to a migratory movement that I have observed was on May 13, 1891, when I obtained a male, ten miles from thick cedar, in company with

Redstarts, Blue-headed Vireos, and a Wilson's Warbler. (The migration of birds in 1891 was unusually late.) In 1889 I obtained them in the middle of April. Upon examining the stomachs of a number of young birds which were being fed, I found they all contained (with other insects), a number of small black lice (Athis sp.) which I watched the old birds collecting from the green cedar limbs. The adult female must be an extremely shy bird, as I have met with it only when feeding its young. The actions of the male Golden-cheeked Warbler are similar to those of most Warblers, flying from tree to tree in search of insects, and at short intervals uttering its note, which when once heard is not easily forgotten, nor easily described. It consists of four parts, and is unlike any other Warbler's note I have heard. In addition to this there is the usual alarm note common to so many other Warblers and small birds. Breeding in the same localities with the Golden-cheeked Warblers I found Rock Sparrows, Black-capped Vireos, and Mexican Goldfinches.

Colorado Lake Chautauqua Association. 1893. Prospectus of the Colorado Lake Chautauqua Association at Austin, Texas, For the Season of 1893. Pamphlet, 1893; Austin, TX. (texashistory.unt.edu/ark:/67531/metapth38123/: accessed December 16, 2018), University of North Texas Libraries, The Portal to Texas History, texashistory.unt.edu; crediting Austin History Center, Austin Public Library.

"To carry out the foregoing purposes, the Association has purchased one of the most eligible pieces of property to be found on the Lake. It comprises about twelve hundred acres of land, situated about two and one-half miles above the dam, as the crow flies, or six miles by water, on the south bank of the Colorado river, on which it has a frontage of three and one-half miles. The conformation of the land and the nature of the soil are such as to give it an almost perfect drainage. After the hardest rains, the water is either entirely absorbed by the soil, ore it quickly passes down gentle declivities into the Colorado, or one of its small tributaries. For this reason, the property is remarkably free from that trio of pests, mud, malaria, and mosquitoes."

"…much of this property has already been divided into blocks, lots, streets, alleys, drives, walks, parks, evidence of which may be found in the records of the clerk of Travis county. Hundreds of these lots have been bought not only with a view to occupying them during the hot summer months, but also to building permanent residences on them. In the inception of the interprise, considering the great desirability and fascination of living on so beautiful a body of water as the Lake, the Association knew there would be some one point on the Lake from which boats would run on schedule time to enable business men to reach the city in the morning in time for business, and return home at night. Such a place evidently could not be very far from Austin. Since the inauguration of the Chautauqua movement by comment consent, Chautauqua meets all the requirements in respect of distance, scenery, suitability of grounds, price and size of lots, water, light, protection, transportation, freedom from liquor selling and other immoral influences, character of the people who are buying the lots, the nature of the soil, the perfection of natural drainage, the character and scope of the Chautauqua exercises, the establishment of a first-class institution of learning, etc."

"Nature may be seen here now in her wildest, now in her gentles aspect. *Trees of enormous size* send their great roots deep down among the rifted rocks and sustain their lives with

draughts of living water; their branches rise high in the air and receive the first and last kisses of the rising and the setting sun. *Their foliage is dense and green*. Their shade is dark and inviting. Nature in her supportive moods, has placed here and there *great stones of a hundred tons weight, and covered them with moss as soft as velvet, or draped them with ferns as silken as a maiden's hair. She has festooned the arching limbs with the ivy and the vine; and she has clothes the sod with flowers* 'as fair as ever bloomed under the rays of a Castilian sun.'"

"It requires but a few touches of art to make this park a most delightful retired and restful place. Its nearness to Austin; its accessibility by boat; *its beautiful springs of pure water; its giant trees; its twining vines; its green shrubbery; its soft mosses; its huge boulders; its pretty and lovely flowers*, all make it the place that will be sought when day of pleasure and sport and fun and genuine recreation is to be spent."

"The Devils Canon [sic]. This name is full of suggestion. Whether it was given upon the supposition that is was the home of his Satanic Majesty; or from its great depth reaches his supposed place of abode; or whether, from the awe and terror that is inspires, it was thought to be his handiwork, is not known. Certain it ism it is a great curiosity, and is not reckoned among the least of the Chautauqua's many attractions. *Standing upon one of its perpendicular walls of solid masonry, one can scarcely see the tip of the tallest trees that rise out of its bottom. By holding to the points of rocks and clinging for support to such trees and shrubs as have gained a footing in the clefts of rock*s, one may at great risk of life and limb make the descent from top to bottom. He will be surprised to find that when he thinks he has gone sufficiently far to reach the bottom, he is in face but half way down. The water enters this chasm for one quarter of a mile, and thus renders it an excellent place for fishing as well as a safe harbor for vessels in case of a storm."

"If we except pure air, nothing is more conducive to good health than pure water; for this reason the Association desires to call especial attention to the many beautiful springs of purse, clear crystal water to be found on its grounds. The water from these springs falls as rain on the many lofty elevations that surround the Chautauqua, sinks at once into the porous limestone soil, and finds an outlet at the break where the land and the river basin meet. Falling far above all possible sources of contamination, and threading its way deep down in its subterranean course, it emerges cool and sparking just at those points where, in many a leap on its way to the sea, it now delights the eye with the poetry of its motion, now lulls the ear with its gentle murmur, and now, as the only true elixir of life, it slacks the thirst of man and spreads through his form a sensation as delightful as it is healthful."

Hill, R. and T. Vaughn. 1898. Geology of the Edwards Plateau and Rio Grande plain adjacent to Austin and San Antonio, Texas, with reference to the occurrence of underground waters. Extract from U.S. Geological Survey 18th Annual Report. U.S. Printing Office, Washington, D.C.

"The traveler by rail from Austin via San Antonio to Del Rio, on the Rio Grande, sees from the car window two conspicuous regions, each having its peculiar geographic features. On the left is a gently undulating plain whose margin the railroad follows. This is here termed

the Rio Grande Plain. On the right is constantly visible a line of low, circular, flat-topped hills, the Balcones scarp line, which represents the jagged southeastward front of a higher region which has been called the Edwards Plateau." Pp. 201-202.

"From the more open and level lower country [the Balcones scarp line] appears as *a sharp line of timber-covered hills, and these are universally called 'mountains' by the people of the region*." Pp. 203.

"The characteristics of the plateau are most strongly impressed on the observer who enters it from the Rio Grande Plain, for in crossing the Balcones line he experiences a sudden and complete change of scenery, with accompanying changes in floral, geologic, and cultural conditions. Instead of long, wide sweeps of prairie, void of sharp relief, he finds a region of steep canyons and sloping hillsides. The monotony of deep and dusty soils is replaced by alternate outcrops of cream-colored rocks and marls, occurring in long, continuous, and horizontal lines of stratification. A deciduous flora suddenly appears in the canyon valleys, replacing the semiarid chaparral. Rivers of flowing water, fringed by forests, replace the dry and stony stream ways of the plain, the mere trace of which is often lost in times of drought, and they now become fixed features of the landscape, boxed in with steep-walled canyons. *Rugged evergreen hills* succeed the long stretches of low undulating land with the yellow-brown adobe soils. Some of the beds of stratification composing the canyon walls are barren of foliage; others are occupied by the *dark evergreen shrubs, juniper and Sophora, extending like garlands around the brows of the circular hills*." Pp. 205-206.

"The summit of the plateau is reached by ascending the long canyons of the streams and passing out upon it through their 'draws' or caletas. Like that of the Llano Estacado, it is flat and void of constant-running streams….In general it is covered with a thick growth of nutritious grass and is without forest. Here and there, however, may be seen thick patches of scrub live oak, known as 'shin oaks,' growing in dense patches called 'shinneries'….This summit region has an altitude of about 2,400 feet in the northern edge of Edwards County, gradually rising, with an ascent of about 4½ feet per mile, to the west and northwest and falling at the same rate toward the east." P. 206.

"The flora of the Edwards Plateau presents many peculiar variations from that of the adjacent regions, especially the Rio Grande Plain. It shows three distinct phases, viz: the phase of the stream bottom, that of the breaks, and that of the summit. The low, alluvium-filled valleys of the rivers present conditions of loose soil and constant moisture favorable to the growth of trees; hence narrow ribbons of forest are found along the streams and extending up into the semiarid region, far west of the limits of the upland forests of the humid region and dissociated from them. These embrace many species, such as the elm, chestnut oak, walnut, sycamore, cypress, live oak, and pecan. The live oaks and pecans attain great size and beauty. The occurrence of the cypress is a peculiar anomaly….This flora of the valleys is of interest, inasmuch as it is a modified representative of that of the great Atlantic timber belt, occurring as an isolated outlier in the semiarid region, preserved and nurtured in these valleys by the presence (due to geologic causes) of water and soil.

"While the valleys support this modified flora of the humid region, the rocky slopes of the breaks between the streams and the summit present another group of vegetation – shrubby trees which prefer the crevices of rocks, or small scrubby plants which develop large, strong, and hearty roots, out of proportion to the size of the growth above the grounds. These plants are found along the ledges of limestone wherever their roots can find a hold, or on the almost soilless outcrop of the interstratified chalky marls. Among them are dwarf oaks, the pinon Sophora, and mountain juniper, which seem to prefer to follow the ledges of loosely jointed rock, besides many coriaceous perennials, including the agarita (Berberis) and the eastern yucca. There are also many small species of Compositae, Liliaceae, the wild poppy (*Argemone mexicana*), and other plants growing on these slopes.

"The flora of the summit of the plateau is radically different from that of the breaks or of the valleys. All trace of shrubs or trees disappears, save here and there a patch of shin oaks and dwarf evergreens, and in time of verdure the eye beholds apparently a never-ending sea of grass, through which appear many bright-colored flowers. This is the southern end of the flora of the Great Plains region, which continues far northward.

"Although there is much agriculture in the wide, fertile, plaza canyon valleys indenting the plateau, especially in Blanco, Gillespie, Comal, and Kendall counties, the slopes and summits constituting the larger part of the area are not adapted to agriculture, owing to the rocky character of the soil, the semiaridity of the country, and the impossibility of irrigation. So little are they fitted for agriculture that the extent of the summit of the Edwards Plateau can almost be traced upon the map by the scarcity of post-offices and other evidences of population. They constitute, however, good grazing country and support many large sheep and cattle ranches." Pp. 211--212.

Bray, William L. 1904a. Forest resources of Texas. U.S. Department of Agriculture, Bureau of Forestry – Bulletin No. 47. Government Printing Office, Washington.

"*…the central Texas hill zone [has] a rainfall of from over 30 to less than 25 inches, where occur mountain cedar, mountain oaks (five or six species), cedar elm, gum elastic, Mexican persimmon, and numerous others*."

"*Next to the forest area of east Texas, [the Edwards Plateau] is the most important timbered region of the state*."

"*It is not to be inferred that the whole Edwards Plateau is a continuous timberland. On the contrary there is a considerable amount of open grassland. Even more of it is covered with a scattered scrub timber, but there is enough real timber to warrant the classification of it as a timbered country*."

"*The dense growths of cedar form the most characteristic feature of the vegetation of the Edwards Plateau, and constitute a valuable timber resource. They are found also, upon hills and bluffs offering similar conditions, northward and westward as far as the canyons and escarpment of the Staked Plains*."

"*The data are not at hand to warrant even an approximate estimate of the area covered by cedar. The Colorado River brakes, one of the largest series, are almost continuous from Austin to the San Saba country; it is perhaps no exaggeration to estimate the area of these alone at 500 square miles*."

"*A cedar brake is so dense as to be penetrable only with extreme difficulty*."

"*Whole communities, like Austin…are largely dependent upon the cedar for fuel, especially from September to March, and the consumption for this purpose far exceeds all other uses. Hundreds of thousands of sticks have also, for many years, been annually consumed for rail fences, posts, telegraph and telephone poles, ties, house blocks, sills, and all manner of rough construction*."

"*The cedar brakes have more than a commercial value. Cedar can grow on the most soilless limestone debris, and its wide, low branching and thick stand make it a close cover which collects soil, prevents washing, and holds back the water to a marked degree*."

"*In Bell County a characteristic cedar brake has succeeded a stand of Texas mountain oak, having occupied the ground exclusively after the removal of the latter. Near Austin cedar brakes that were cut close twenty-five years ago are now being cleared a second time and are yielding a vast amount of fuel, although too young to furnish much split wood. On the other hand, a very competent observer testifies that toward the southwest, in the more arid part of its range, the cedar recovers very slowly after clearing, and almost not at all after fire. Here it is succeeded by oaks*."

"*A deplorable loss of cedar has taken place from brake fires. For half a century these have periodically occurred; areas which have not been burned over are the exception... In July, 1901, a very disastrous fire occurred near Marble Falls, in which about 600 acres of valuable cedar were destroyed*."

"*In addition to the cedar, other species of the hill timber are constantly being drawn upon for fuel and the rough construction material in demand on ranches and farms*. While this demand results in the denudation of many arid hills upon which timber growth will be reestablished only with great difficulty, on the while the consumption is not keeping pace with the spread of the timber area. An interesting case in point is furnished by conditions along the line of the Austin and Northwest Railway, between McNeil and Burnet. In the vicinity of the former town the country is being rapidly denuded of timber to furnish fuel for the limekilns. But immediately beyond this, large tracts of dense thicket exist where formerly were fields or pastures, and so on up the line it is manifest that the hill timber is encroaching rapidly upon the prairie. On the other hand, the areas being denuded are left in an exposed condition where erosion is imminent, and the soil accumulation of years may this be suddenly lost."

"*To sum up, then, the timber of the Edwards Plateau is gaining ground, but is also losing possession of some of the steeper hillsides. Its immediate value consists in the amount of*

fuel and rough construction stuff furnished, in which the cedar excels. Its greater and permanent value lies in its capacity to furnish protection, whereby soil can be collected in difficult situations; to prevent erosion from sudden bursts of rainfall; and to retain a large percentage of the rainfall instead of permitting it to run off in destructive floods."

"The State of Texas, with a mercantable forest that covers only 10 per cent of its entire area, cuts nearly a billion board feet of lumber a year. The lumber industry is exceeded only by the cotton and cattle industries. But of its comparatively small area of timberland 125,000 acres are cut annually, and cut in such a way that the land will not grow valuable forests again. Other timberlands, valueless for lumber, but of the first importance as a protection for agriculture and as a source of water supply, are burned and destroyed without regard for their great usefulness."

"Forestry in Texas should aim…to prevent the destruction of forest growth which is needed to protect streams."

"The renewal of the forest is made impossible by the agencies which prevent the growth of seedlings. The worst of these is fire. Fires are invited, and their destructiveness is very greatly increased, by the great quantities of waste left after logging. Often they are regularly set by cattle owners to improve the range. But for them, in the wake of lumbering, great quantities of seedlings would quickly spring up. Seed is produced in great abundance every three or four years. The seeds are widely distributed, and germinate prolifically. Wherever fire has been kept away, thickets of seedlings, saplings, and poles show what would be the general condition if the forests were protected against its great enemy."

"*Forests do not begin to burn up of themselves. While it is true that lightning has been known to originate forest fires, the proportion of fires from natural causes is so small as to be negligible*."

"*Both the welfare of the Edwards Plateau itself and the welfare of the Coast Plain adjacent to it strongly demand the retention of a permanent timber covering on the plateau*."

On the Edwards Plateau the rock strata, exposed by erosion and dislocated by faulting, normally take up the water, which then percolates slowly to feed the steady-flowing streams. But to make this possible there must be a soil covering to hold the water when it falls. *The plateau is a deeply cut up, mountainous area, with canyon-like valleys and highlands, thinly covered with soil. The rain comes in sudden cloudbursts, which, if not held back by forest growth, pours rapidly from the hillsides, carrying down soil and stones, and rushes off in destructive floods to inundate great areas of farm land below…. Destruction of the forest cover does not take away the reservoir; it opens the gates to pour the water down in successive inundations, instead of holding it in check until it is needed*."

"*These hills, stripped of forest cover, become arid and worthless. On the sides and slopes of deep gorges which are heavily wooded there is found a deep accumulation of leafy humus. The cedar brakes also collect and hold large quantities of debris, and thus provide a covering several inches deep over the rocks. After the removal of the timber all this is rapidly washed away, and the restoration of the forest growth becomes impossible. Kept under timber, the land can be made to furnish a vast amount of material for posts, poles, ties, and rough construction purposes, as well as cheap fuel in a region where coal is very expensive. Yet there is little hope that the owners will preserve the forests. Small holdings are cut for the sake of the immediate profit. Large holdings are used chiefly as pasture lands, and the grasses flourish better without the timber. The country is primarily a cattle country, and cattlemen are apt to regard the timber as a nuisance rather than as a benefit. All of the available timber is being cut as rapidly as it can be sold; in consequence, the steeper hillsides have become so denuded that natural reforestation seems impossible*."

"*Manifestly this area needs a close covering. Fortunately, the forest type native to it is both dense and an energetic ground gainer. Many miles of old, stony pasture are growing up into thickets of live oak, cedar, elm, mountain oak, and shin oak; and on hills in Bell County and elsewhere from which a thick growth of mountain oak has been cut, an equally thick growth of cedar is taking its place. Timber tracts in the vicinity of Austin which were denuded twenty-five years ago are now heavily forested with cedar, which is again being cut, although immature*."

"…[bald cypress] occurs occasionally along the banks of streams, reaching far into the canyons of the Edwards Plateau, where specimens attain 6 feet or more in diameter. Only in a few places difficult of access does the cypress remain uncut. The lumber is much on the market now as shingles and for finishing—especially for doors—as well as for larger construction."

"[*Mountain juniper] occurs on limestone hills, often where very little soil exists. Its characteristic occurrence is in impenetrable brakes….It is the most valuable tree of the semiarid hill country of Texas*."

"[*Mountain juniper is] especially abundant in the hilly Edwards Plateau country of central Texas, but also found on rocky hills and bluffs northward toward the Red River, and southwestward and westward as far as beyond the Pecos, and probably into Mexico*."

"[Mountain Spanish oak] is the most common oak in the Edwards Plateau region of Texas. It is a small tree, 5 to 10 inches in diameter and 20 to 30 feet high, occurring on the more stable slopes and hilltops. It often forms dense timber on sides of gorges, where by collecting much debris it aids the formation of rich soil, which it prevents from being washed away. The wood is good for posts and rails. It is much in demand locally for fuel, and all of the sizable trees are being cut. Acorns are produced in abundance, and young timber readily establishes itself."

"*In the Edwards Plateau country, cedar elm is common on the uplands wherever rich soil has collected*, but here it is small—20 to 40 feet tall, and 8 to 12 inches in diameter. At Austin the wood is used for fuel. It is, however, inferior for this, but would probably be useful in turnery, woodenware, posts, and small timbers."

"*Small specimens of black cherry are frequent along the gorges in the Edwards Plateau*."

Bray, William L. 1904b. The timber of the Edwards Plateau of Texas: its relation to climate, water supply, and soil. U.S. Department of Agriculture, Bureau of Forestry – Bulletin No. 49. Government Printing Office, Washington.

"*…in general, the Edwards Plateau is a timbered region only in the deeply eroded portions, becoming prairie on the level uplands, and finally passing into the great grass plains which stretch northward into Canada. One must however, distinguish many degrees of forestation, according to the relative amount of moisture. Through a gradual dwarfing and thinning out the timber passes from the big, heavy growth of the watered canyons to the stunted though continuous forest of the hills and bluffs and the scant tree growth of the loose, stony slopes in the eastern part of the area, until at the west there remains only scattered chaparral, and finally the unique vegetation of the Sotol Country, in which the stool, cactus, yucca, and agave reign supreme*."

"Many of the trees of this region are its own peculiar product. Thus, *the most abundant species of all, the mountain cedar…is practically continued to the central Texas limestone country. So also in the case of mountain oak, Mexican persimmon, and so on*."

"*It is not to be inferred from what has been said about the timber vegetation of this region that the Edwards Plateau is covered with continuous forest, even in its rougher parts. On the contrary, the timber is very much interrupted by open, grassy uplands. The present trend, however, is toward a continuous timber covering, and this fact has significance for the future water supply*."

Bray provides lengthy descriptions of the "*timber of the canyons and streamways", and "the hill and bluff timber" (mixed timber, shinneries, mountain oak thickets, cedar brakes, post oak timber)*. Of the mixed timber, Bray notes "*This is by far the larger part of the timberland of this region…for example, on the breaks of the Colorado, along the escarpment from Austin westward, and on the Guadalupe, the Pedernales, and the Frio*." Also with respect to mixed timber, he states "*Heavy, though more stunted, is the timber on the level uplands known as 'hardscrabble," where the limestone is hard and breaks in vertical fissures, as for example about McNeil, in Travis County*." The reader is encouraged to read through these sections in their

"*The mountain oak, also called Spanish oak…is valuable for fuel and for some other purposes. On slopes of low gradient (formed especially by harder limestone which splits into large blocks), on the sides of gorges cut in this harder limestone, and on the flat tops of buttes this mountain oak establishes itself in dense thickets, and soon makes a most*

effective covering and protection….Mountain oak is most eagerly bought for fuel: the tree sprouts up quickly from the stump and is easily renewed."

"*The writer knows of no region in which any species of cedar is so uniformly abundant and dominant as is the mountain cedar in the limestone country of Texas*."

"*…the mountain cedar is one of the most pronounced and hardy xerophytic trees of all the arid Southwest. It is, in fact, one of the most valuable assets of the region, as well as the most characteristic feature of the hill timber. It is most conspicuous on the white, arid hills of crumbly limestone, because it is there the dominant and practically the only species. But it also grows in mixture with other species, and attains its largest growth in the mixed forest of lower flats already described, where there is more water and richer, deeper soil. In such situations the best yield of poles and ties is found. Reasonably clear poles 20 to 30 feet in length and with a base diameter of from 1½ to 2 feet were formerly common*."

"*…the intense light of this climate is little checked by cedar foliage, and so the undermost branches are not starved as they would be with a shadier foliage or in a climate of greater humidity and less intense illumination*."

"*In general, cedar timber occurs upon all of the hilly or rough parts of the limestone region of Texas from the Palo Pinto country to the Colorado, and thence westward over all of the drainage breaks and the escarpment nearly to the eastern forks of the Devils River. The most extensive bodies of cedar known to the writer are those of the Colorado River breaks from Austin to the San Saba country*."

"*With the exception of cedar, the hill timber finds a market chiefly as fuel, of which enormous quantities are consumed….Cedar likewise is extensively consumed as fuel and in charcoal burning; but its great value lies in its yield of railway ties, poles, posts, sills, and innumerable other articles which utilize its great durability*."

"*Cedar is handled at all points within hauling distance of brakes; but cedar timber large enough to furnish ties and poles is becoming scarce, except in remote districts. Much is still handled at Marble Falls, Kerrville, Boerne, and other points not specifically known to the writer. Locally, cedar furnishes construction material for every possible demand, as for rail fences, slat or picket fences, fence posts, house sills, supports, and joists; so that, altogether, available supplies are constantly drawn upon, often to their temporary exhaustion and to the great detriment of the denuded hillsides*."

"*It was to be expected that most of the timber on the rich bottomlands would be cleared off in order to bring the land into cultivation. This sacrifice of the timber seems, on the whole, to have been advisable and profitable. A considerable amount of level uplands has also been cleared….The cases in which injury has been done are those in which timber has been cleared from thin-soiled, stony slopes in order to cultivate in a slovenly fashion for a few seasons, after which the land is worn out and abandoned*."

"*We have seen that the commercial value of the timber, particularly of the cedar, results in a heavy drain on the supplies*. So long as small owners depend in large measure for their income upon the sale of wood, the temptation will be strong to denude rough, thin-soiled hillsides which would far better be kept with a protective timber covering (Pl. II, fig. 2). While it is not to be expected that the private owner will ever wish to maintain a protective forest cover in behalf of the community at the sacrifice of personal profit, there is nevertheless room to hope that private owners will eventually find they can make more in the long run if they cut conservatively. Under the pressure of public sentiment and with the guidance of a practical object lesson, these timber owners may find it possible both to sell the merchantable timber and at the same time to maintain a protective covering for the hills. In this, fortunately, they will be assisted by the natural tendency of this forest to reoccupy lost ground."

"*It is probable that during the past twenty-five years far more cedar timber has been burned than has been marketed, and vastly greater areas denuded by fire than by the axe….Some hillside has been swept bare, or a whole succession of formerly cedar-covered hills has been denuded of timber*….The most destructive fire reported in several years was that which raged for over two days near Marble Falls, in July, 1901."

"Specific data concerning the growth rate of the various species of trees in the climate of central and western Texas are not at hand. Naturally, however, under the semiarid conditions prevailing on the hills, this rate is slow, and the timber is characteristically hard and stunted."

"During the past two or three years this tract ["on Dry Creek, near Austin, from which the timber was cleared twenty-five years ago"] has again been cut, with a large yield of fuel timber. Fig. 1 of Pl. IV shows the condition of the cedar brake after twenty-five years' growth. Of course there was very little, if any, tie or post timber in this, and no clear heart cedar."

"*The final result of mesquite encroachment is a heavy covering of vegetation, which, however well it might serve as a protector of water supply and soils, is to be regarded as an incubus upon lands which would be vastly more profitable under cultivation or under a good grass cover*."

Bray discusses the influence of forests on soil and water supply and concludes "For all of these reasons, *forests tend to conserve the water supply and to maintain full springs and an even flow of streams*."

"*The effects [of Edwards Plateau forests] as to checking floods, collecting soil, preventing erosion, promoting the entrance of water into the earth, and maintaining a longer and more constant flow of springs and streams would be multiplied many thousandfold. That would be a fact of vast significance for this region in its relation to the activities of human life within it, and still more to those of the rich plain on its coastward side*."

"*Considering all the interests dependent upon the water supply of this region, there would seem to be little ground for opposing the policy of maintaining (and where necessary establishing) a forest cover upon these arid hills*."