UNTWISTING the CEDAR

the myths & culture of the Ashe juniper tree

by Elizabeth McGreevy Seiler

Overview of this talk

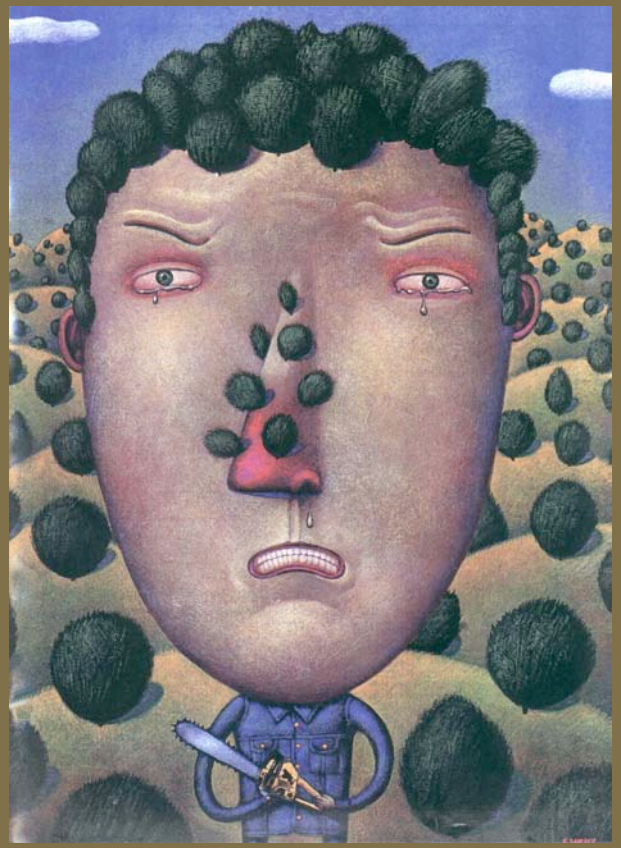
- The Hill Country vegetation 150 years ago
- Historical land use and resulting vegetation changes
- The impact on our soils and springs
- Lessons to be learned and applied

The common belief: Hill Country settlers found oceans of grass and very few junipers

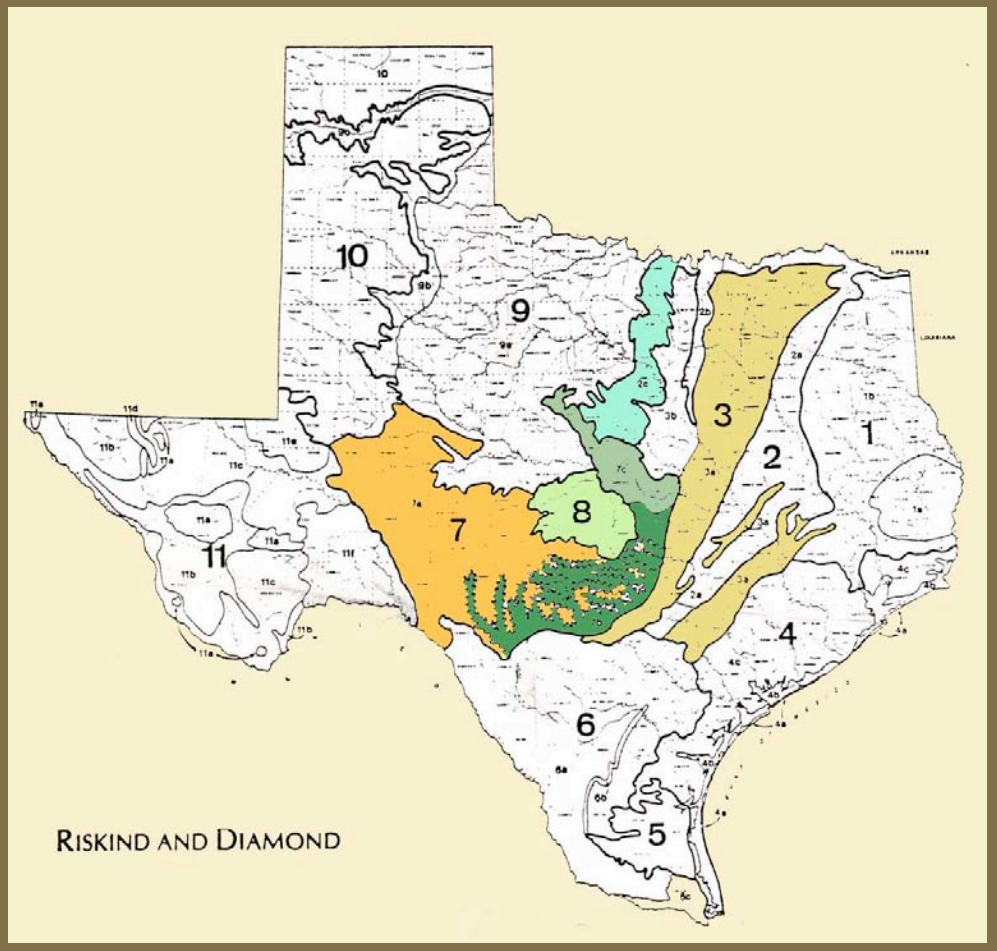
"... its original composition was grassland or savannah ... the uplands, hillsides and plateaus were covered with annual and dense, lush grasses...Cedar brakes and brush thickets...were uncommon until nearly the turn of the century..."
[Nokes , *Austin American Statesman*, 1977]

Why we don't want to believe Ashe junipers were common 150 years ago

- They invade our carefully managed pastures and create impenetrable thickets
- They allow the government to tell us what to do regarding a little endangered bird
- They invade our nostrils to plague us with cedar fever



Extensive grasslands did occur, but they were not common in the Hill Country



The Hill Country defined

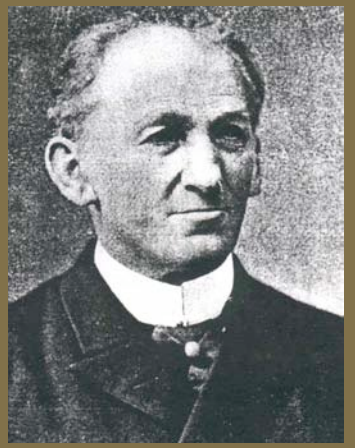
One reason why we misinterpret past descriptions of vegetation

- The word "prairie" was used extensively to describe the Hill Country. It is common belief that this means there were grasslands everywhere.

- However, the word prairie used 150 years ago referred to vegetation that was somewhere between a woodland and a grassland. In short, it was more like a savanna.

Pre-1870's literature describes the Hill Country as a patchy mosaic of vegetation...

- "The hills, which extend all the way from Austin to New Braunfels, are covered with heavy timber." [*Texian Advocate* editor, 1848]
- "The Mountainous Range ... clothed with forests of pine, oak, cedar, and other trees, with a great variety of shrubbery." [western Hill Country, Kennedy, 1841]
- "Upon crossing [Comal Creek], we came to a small, but extremely fertile plain on which dense patches of forests alternated charmingly with small enclosed prairies." [Roemer, 1847]
- "The Agua Fria rises in the valley of the Flowers...[is] about a third prairie, and the remainder woodland." [near Lake Travis; Kennedy, 1841]
- "...small prairies alternating with large cedar forests...there was a cedar forest extending for several miles…" [Wimberly, Krueger, 1870]
- "...cut by ravines, sinking in green valleys, or thick with cedar-covered or bleak and stony mountains...." [above New Braunfels, Taylor, 1860's]



Roemer in 1850's

…where Ashe junipers were abundant

- "Live oak, holly, many kinds of cactus...and the millions of cedar that cover the Comal hills like a mantle... [New Braunfels; Bracht, 1848]
- "There is an abundance of cedar and various types of oak are scattered about in groupings... [Hunt; Berlandier, 1838]
- "The site [for Austin] is...in full view of the Mountains... They are of Limestone formation and are covered with Live Oak and Dwarf Cedar to their summits." [report to Mirabeau Lamar; 1839]
- "the country surrounding Boerne retained the natural beauty of its virgin wilderness...The mountains are cedar bedeckt..." [Claus, 1855]
- "The farmers... afraid that the [passenger] pigeons were going to ruin their crops, decided to burn the beautiful cedar forests. For weeks and even months the sky was black with clouds of smoke...In this way some of the most profitable forests of mountain cedar in our state were forever destroyed." [Krueger, 1976]

Krueger in 1870

The abundance of Ashe junipers: as suggested by the settler's widespread use of the tree

"...[the cypress] together with immense quantities of fine cedar might readily be floated down the stream..."
[Mirabeau Lamar, 1830's]

"about 30,000 cedar trees were rafted down the river from the hills and shipped out via the railroad."
[Austin Daily Statesman, 1875]

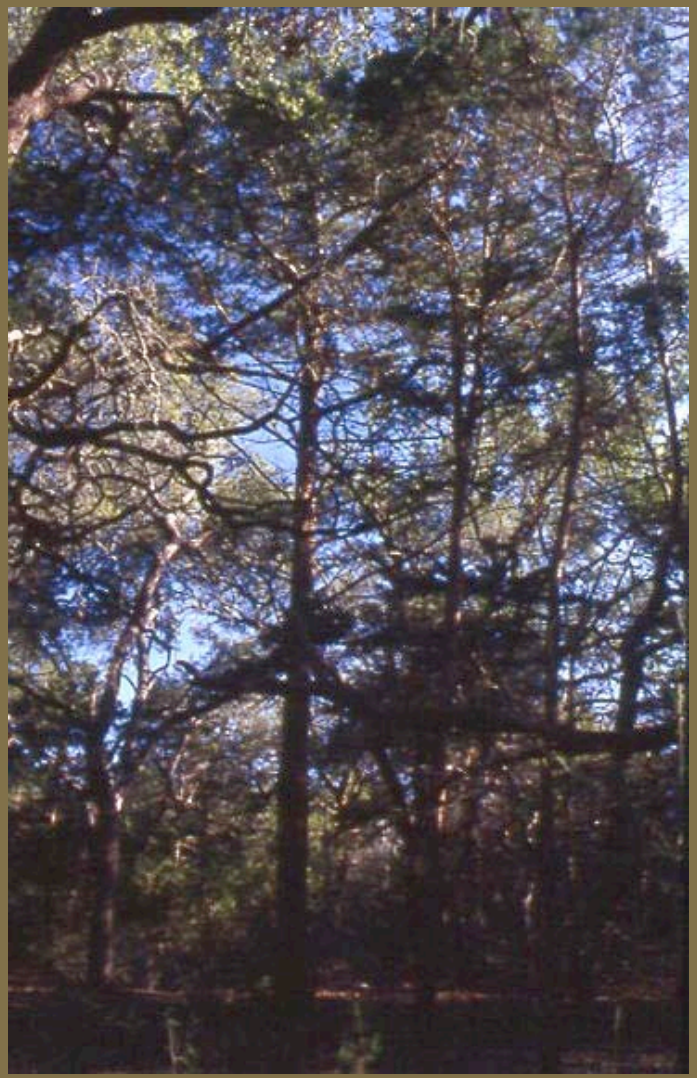
Uses:
buildings and fences
railroad ties
telegraph poles
cedar posts
charcoal (filter,heat,insulation)
gunpowder

The character of the cedar brakes so often mentioned

- Diverse; not 100% junipers. However, junipers were the dominant trees.
- Extensive in size, usually extending for miles (the Colorado River Brakes consisted of about- 500 square miles)
- Discreet from surrounding savannas
- Bushy, sappy junipers grew along brake edges
- Occurred in both bottomlands and uplands, although character and co-dominant trees were different
- Bottomland junipers produced logs 2-3′ in diameter and 40′ long
- Upland junipers were more stout and twisted

How the old-growth cedar brakes were different from today's sappy, bushy thickets of cedar

Standing inside one of these brakes, gave the feeling of being inside one of Nature's Cathedrals. Beneath our feet was a carpet of cedar leaves, inches thick, all about tree trunks rose like columns to support a roof of boughs through which the sun filtered down as a soft light..." Willidell Schawe, in 1963



"The cedar trees which covered the slopes exclusively, formed an impenetrable thicket...The cedars here are...stately trees with straight trunks...twenty to twenty-five feet in height and one and one-half feet thick. They have a uniformly spreading crown." [Roemer, 1847]

How large Ashe junipers can grow

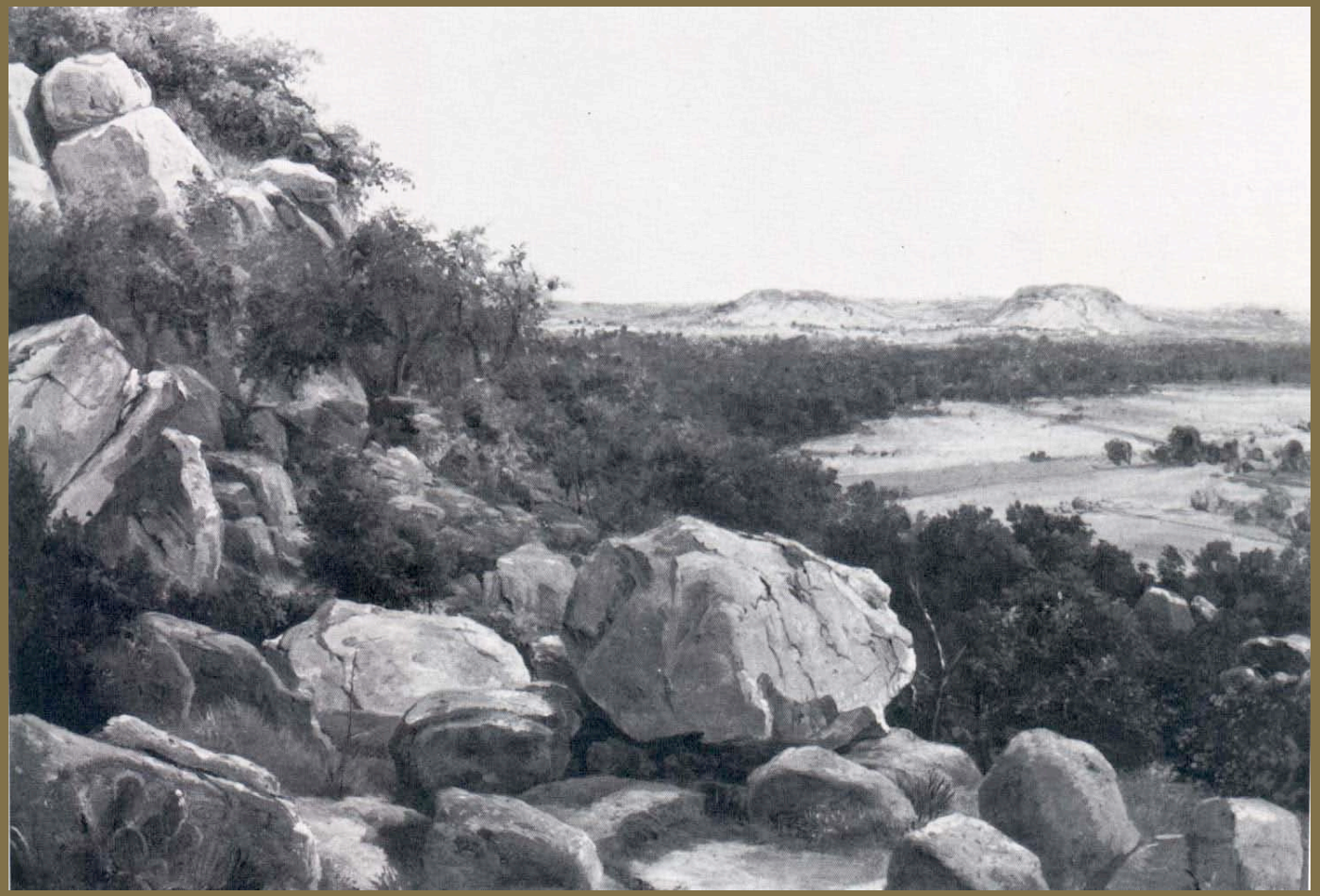
60 foot tall Ashe juniper

45 foot tall Ashe juniper

One historical depiction of the Hill Country's patchy mosaic of vegetation

by Seth Eastman in 1845, between Camp Bullis and Bulverde

Another historical depiction

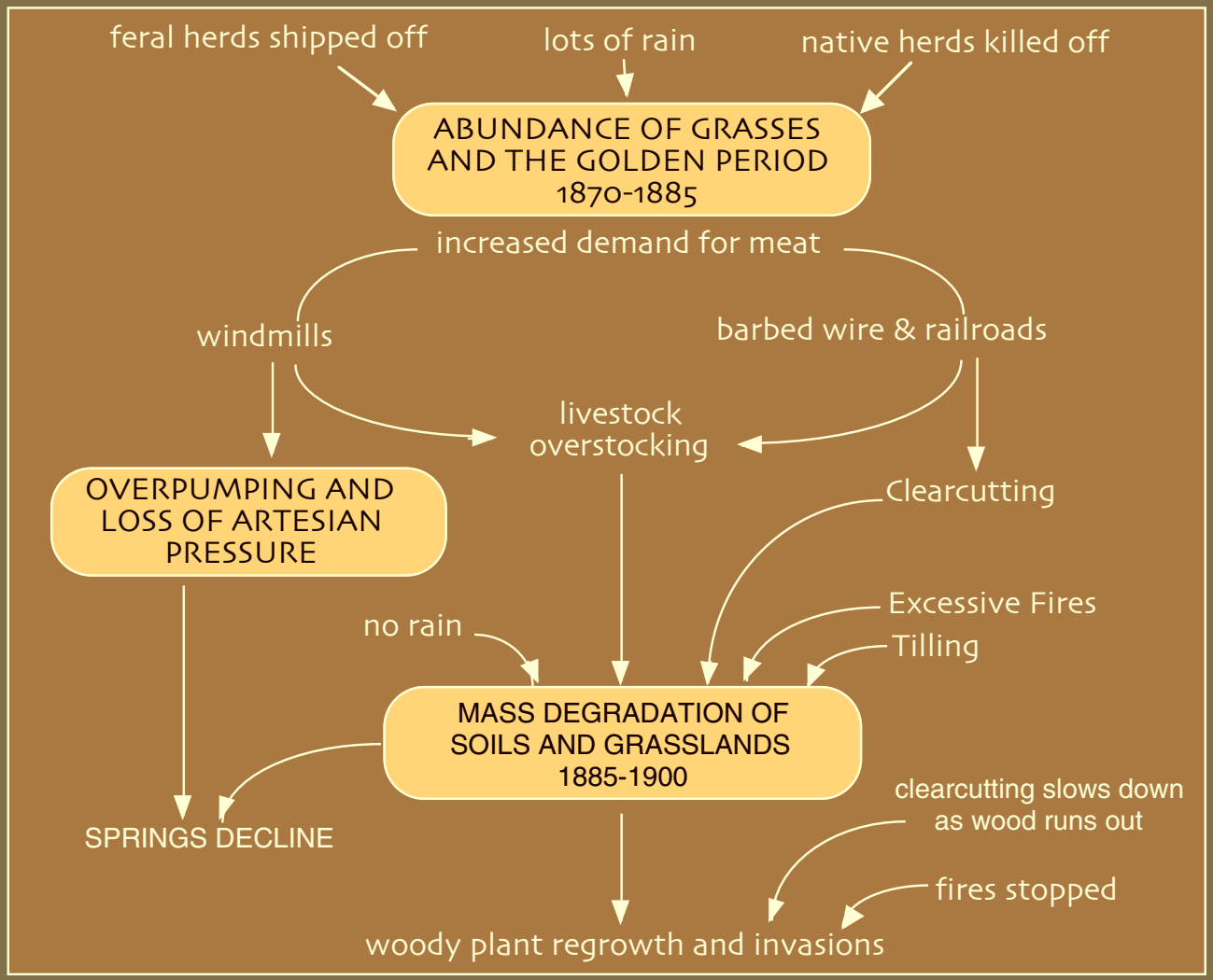


Bear Mountain near Fredericksburg, between 1850 and 1880

A modern example of the patchy mosaic of vegetation

The Balcones Canyonlands National Wildlife Refuge, Doeskin Ranch

The events that caused degradation of the Hill Country's vegetation, soil and springs



The change in vegetation

from this

to this

ending at this

The resulting soils

The impact on spring flows

- Artesian and gravity spring flows had declined by the 1890's
- The decline of artesian flows was mostly due to overpumping [Brunne, 1975]
- Gravity springs declined as a result of soil and vegetation degradation that could no longer detain the rains.
- Ashe junipers "invaded" after the 1900's and therefore did not impact the initial decline observed before the 1890's.
- Spring flow was further impacted by the extensive "invasion" of all woody plants, not just by Ashe junipers. Shallow roots and higher water use of younger plants, coupled with caliche that could not detain waters, were the factors.

How soil and vegetation degradations impacted gravity spring flows

J.H. Foster in 1916 and 1917:

"Streams were clear and siltless [in the past] as compared with those of today...springs and small streams now often shallow or dry three or four months of the year were once deep and everflowing. This is because lands which were heavily forested have now been stripped of their timber and the humus covering of the soil destroyed by repeated fires..."

"The forest vegetation accumulates a covering of humus on the soil which, aided by the root systems of the trees, absorbs rainfall and prevents rapid run-off of water, thus checking erosion and causing a more constant flow of water from springs and streams."

How cedar thickets may further affect gravity spring flows: extent, age, density

The Age Factor :

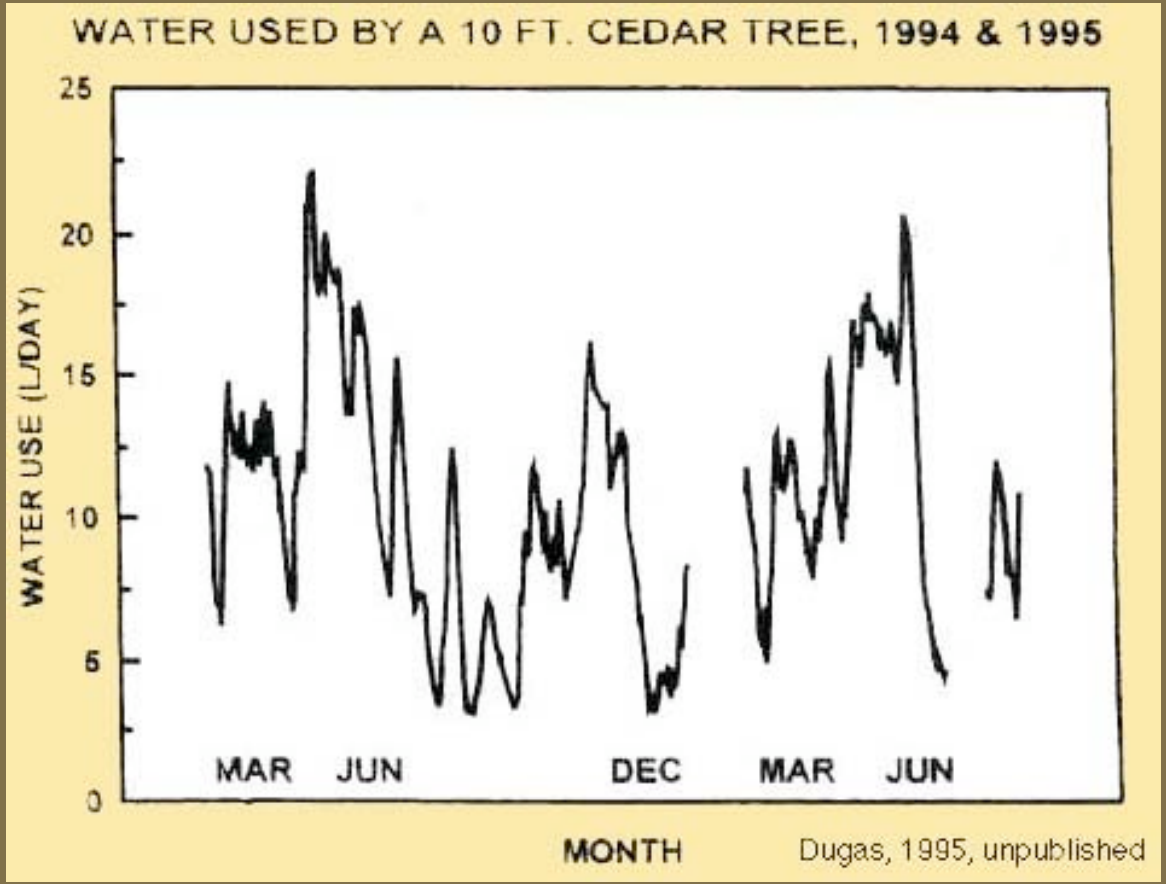
- Younger and more water

- Older and less water

The density factor: the more dense the canopy, the more water it can use

Owens 1992 showed that Ashe juniper foliage uses less water than live oaks (3x less). This suggests trees with proportionally less foliage would not use much water.

Regardless of age or density, juniper water use drops when the rains stop



The conflicting role of Ashe junipers on our degraded landscape

Shallow roots that stabilize soil, also take water from grasses and spring flows

Thick litter that builds soil and detains overland flows, also limits grass seedlings and hides seeps

Dense canopies that detain rainfalls, shade the ground, protect understory plants and provide shelter and food for wildlife, also reduce the growth of grasses and the immediate availability of more water

What we can learn by looking back

- Ashe junipers are not the cause of our problems...they are only a symptom
- Junipers did not occur everywhere; but, where they did grow, they were abundant
- A healthy cover of trees and grass and soil allows for good quality, consistent spring flows
- Clearing too much brush usually results in more soil loss and silting in of recharge cracks…since the 1950's, we have lost over 5.5" of topsoil [Marsh and Marsh, 1992]
- The Hill Country was once a patchy mosaic of vegetation
- Mother Nature cannot be oversimplified and generalized

What we can apply as we look forward

- Restoration will come by helping the soil and managing all vegetation
- Not everything should be junipers…but not every juniper should go
- Put away tools that erode and chemicals kill the soil; promote tools and methods that protect and improve the soil (hydroaxes and hydraulic shears)
- Stop burning brush; mulch it or form windrows and brush piles
- Integrate quick, controlled burns
- Integrate passive wildlife management with active livestock management (HRM)
- Increase economic viability of the Ashe juniper to offset management costs
- Plan for the next drought before it begins

The best way to restore is to focus on the soil

A year after hydroaxing

Ashe junipers with a healthy cover of soil and without overgrazing do not impact grass growth

Four foot high indian grass and little bluestem with basket flower, false gaura and Max. sunflower

Better ways to insure more water than cutting down trees

- Healthier, well vegetated, soils
- Rainwater collection and graywater use systems, using enclosed tanks (stock ponds evaporate more water than Ashe junipers ever could)
- Water conservation
- The Prehn Method

2 10K gallon rainwater collection system

The Prehn Method: milking the springs

"Simple to install, but must be perfectly engineered."
[Kelly Prehn, 2004]

- In the open areas, look for water loving vegetation such as switch grass, bushy bluestem and sycamores
- In the woods, look for armadillo holes, dwarf palmettos and big muhlies
- Insert PVC pipes to collect. Can insert a single into the slope or run a perforated along the slope.
- Channelize to a containment basin

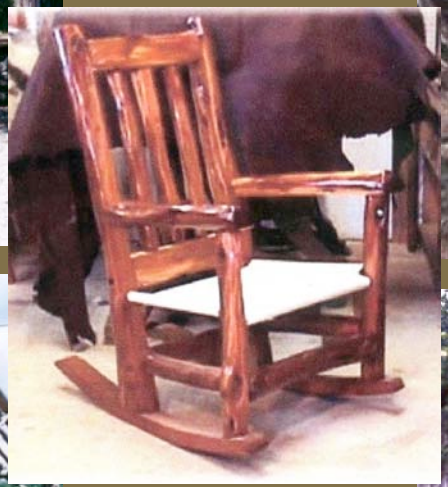
The Prehn sites

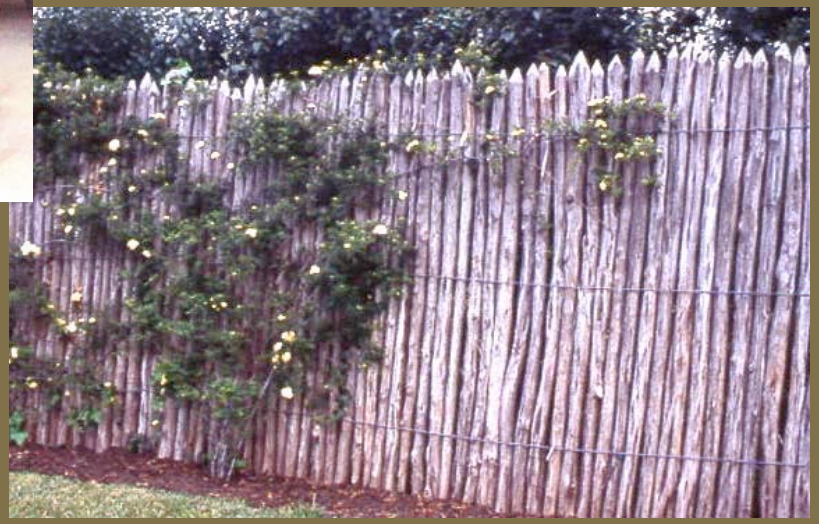
SITE A

SITE D

- SITE A: 500 g/d; top of hill with mostly 75 yr. old junipers; flowed through drought
- SITE B: 100 g/d; midway down hill with mostly savanna
- SITE C: 800 g/d; midway down hill with trees on top and rest open
- SITE D: 2500 g/d; bottom of long slope top woods and open savanna (10K g/d max.)

Increase the economic viability of the Ashe juniper to offset management costs





Research to find more uses for the oil and fruits

Crude Texas Cedarwood Oil
On the decline due to declining old-growth junipers, but leaf oils present new options

Juniper "berries"
Possible treatment for diabetes?

Other Uses of Tree:
Charcoal
Mulch and Bedding
Choicedek
Allergena and Camphor
Spice

Final thought

"You can't denude [Mother Nature's] soil or she'll cover it with something that cattle can't eat and man can't use. "

[C.W. Wimberly, 1997]