MOUNTAIN CEDARS:

JUNIPERS THAT BENEFIT LIMESTONE GROUNDWATERS

by Elizabeth McGreevy

WHAT ARE MOUNTAIN CEDARS?

They are native Texas trees, also called Ashe Junipers.

Ranchers call them “invasive,” and city people curse them for cedar fever.

QUICK BASICS

Female trees produce blue fruits (fleshy cones) with 1-2 seeds.
Male trees produce pollen Dec.-Feb.

They can live for hundreds of years.

State Champion: 44” wide trunk, making it at least 450” years old.

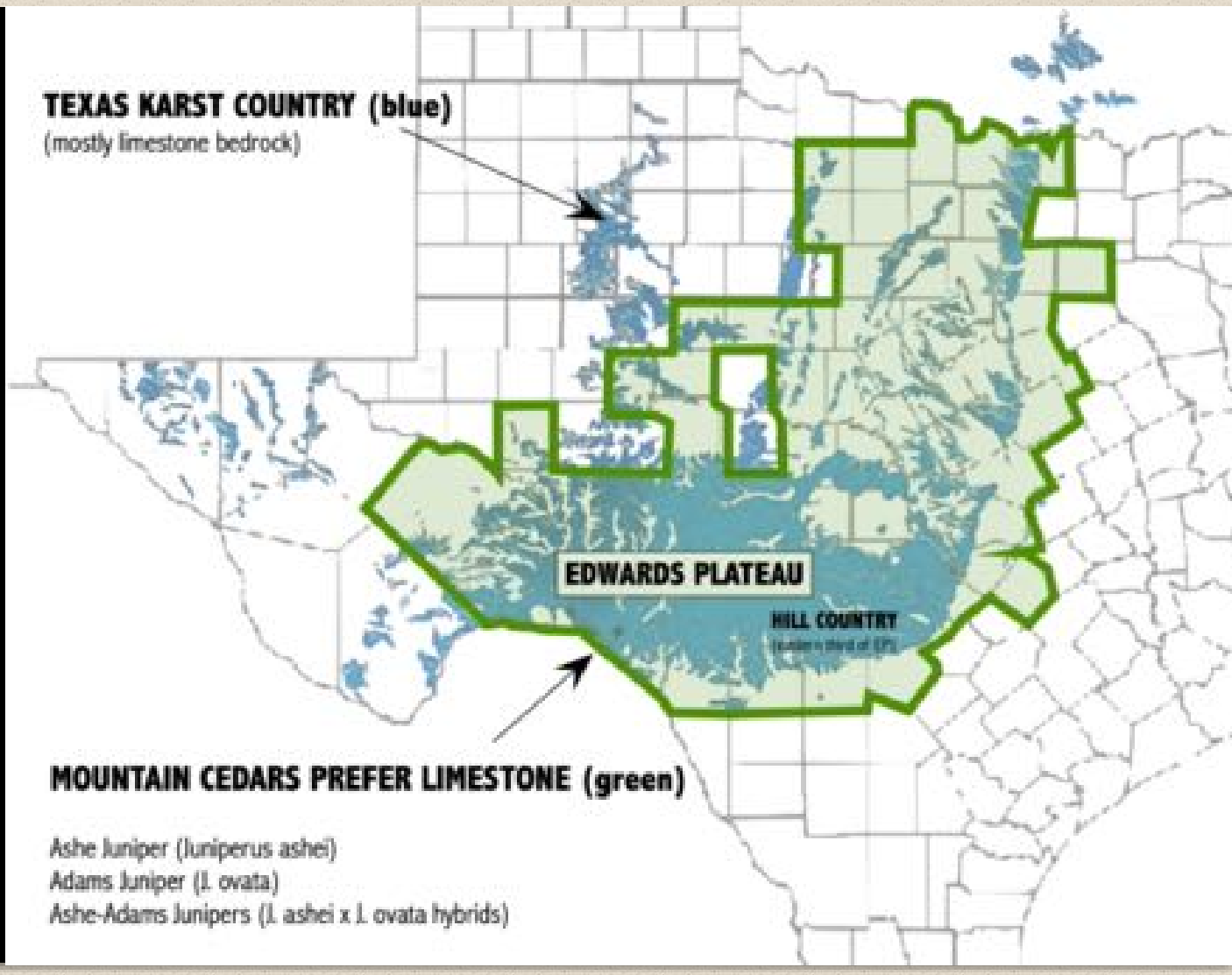
Age range formula:
Trunk width 4.5’ up/.1 and .06

THEY PREFER LIMESTONE SOILS

Limestone soils are shallow and form over limestone bedrock. They take 10-40x longer to rebuild than other soils.

These rocky limestone regions are called karst country.

About 20% of Texas is karst country.



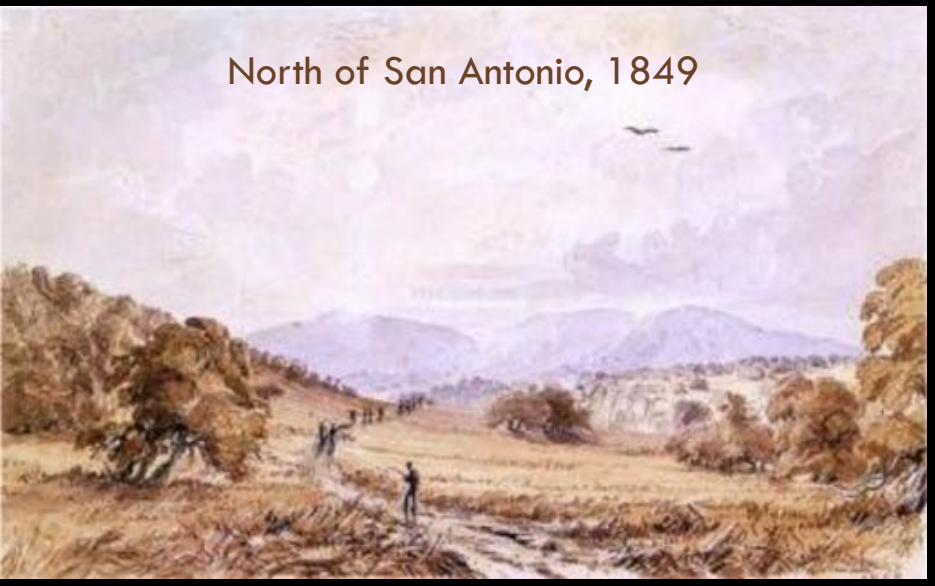
TEXAS KARST COUNTRY ON THE SURFACE

AND UNDERGROUND

HISTORICALLY: MOUNTAIN CEDARS WERE COMMON

They were most abundant on the Balcones Escarpment:

"Live oak, holly, many kinds of cactus…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." -Viktor Bracht 1848



North of San Antonio, 1849

Marble Falls, 1883

THEY GREW LARGE IN CANYONS & ON HILLS


300-500 years old


350-600 years old

THEY HELPED SUSTAIN SPRING FLOWS & PROTECT RICH SOILS

AND PROVIDED RICH HABITAT FOR WILDLIFE

THEY WERE MOST OFTEN DESCRIBED AS SINGLE-TRUNK FOREST TREES

TRUE cedar brake regenerating on a hillside

Riparian forest

NOT THE MULTI-STEM BUSHES WE SEE TODAY

THEN THE TREES BECAME A COMMODITY

Mountain Cedars proved to be valuable as a decay resistant and plentiful source for railroad ties, foundation piers, roof beams, telegraph poles, and fencing.

Railroad construction near Llano using Mountain Cedar ties, 1881

Mountain Cedar barn, built 1852

CLEARCUTTING AND OVERGRAZING ENSUED

Mountain cedars were clearcut by tens of thousands from 1860 to 1900. As demand for beef skyrocketed, ranges were overstocked, fenced-in, and overgrazed.

"Forests in this vicinity will soon be extirpated…the cedar brakes will soon be destroyed." – Daily Democratic Statesman 1875

Newly clearcut hill, 1904

Overgrazing near Fischer, 1900

TEXAS KARST COUNTRY SUFFERED

Because it has shallow soils that take 10 to 40 times longer to rebuild.

AND ROCKY DESSERTICATION BEGAN

NATURE TRIED TO COVER BARE GROUND

Mountain cedars morphed into pioneering thickets of bushy cedars.
They first recolonized hillsides and riparian corridors in the early 1900s.
Then they began spreading into degraded rangelands.

WE CHOSE TO FIGHT IT

We chained, burned, dozed, and sprayed.

The region lost an average of five inches of topsoil and moved even closer to rocky desertification.

WE NOW KNOW THEY ARE TRYING TO HELP

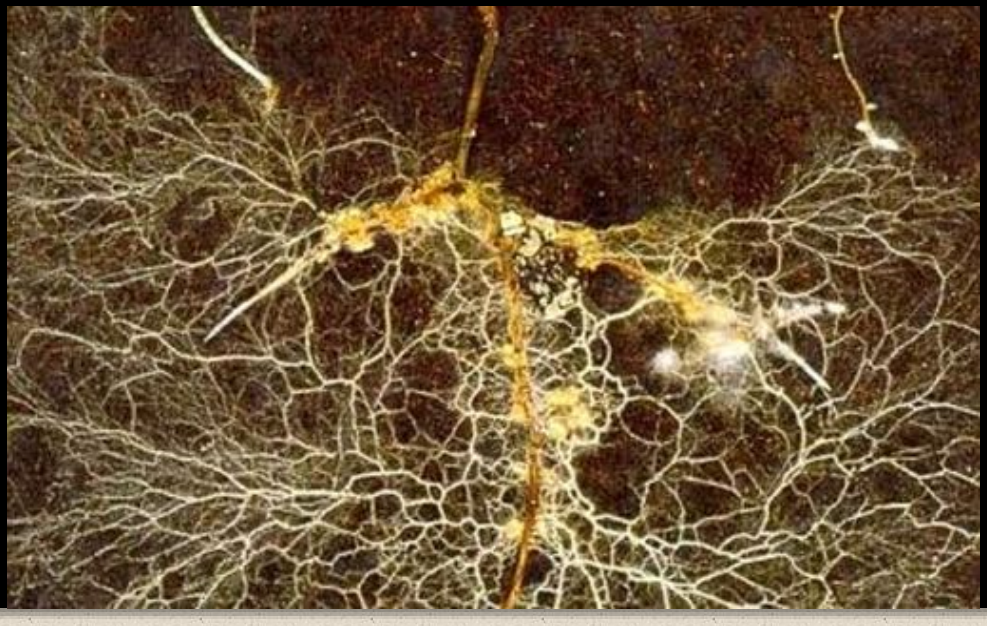
Bushy thickets of mountain cedars are regenerating degraded Texas karst country.

Degraded

Regenerated

THEY ACT AS PIONEERS

They spread fast and prolifically.
They help rebuild and protect soil.
They jumpstart soil fungi.
They protect new plants.
They increase karst porosity.



THAT JUMPSTART BIODIVERSITY

Lower branches protect new native plants.

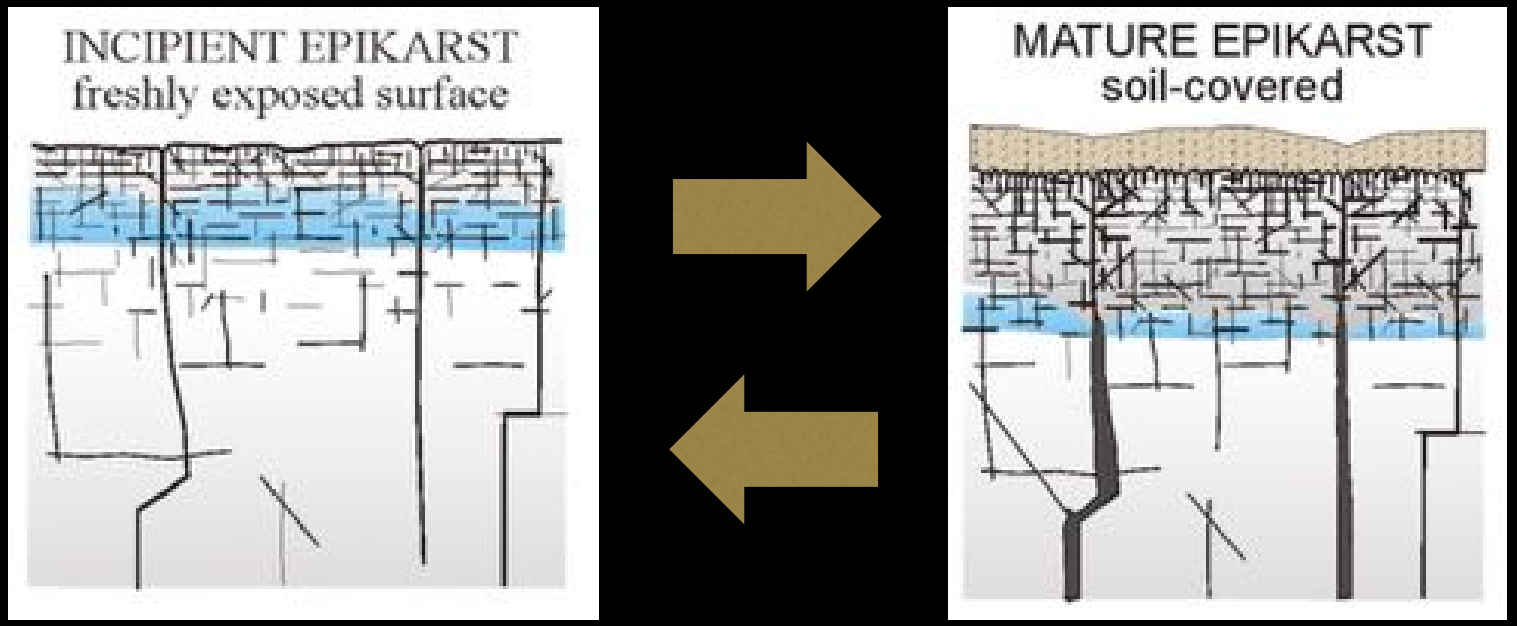
They shelter and feed winter wildlife.

The bark becomes an excellent nesting material once the heartwood matures (after 30-50 years)

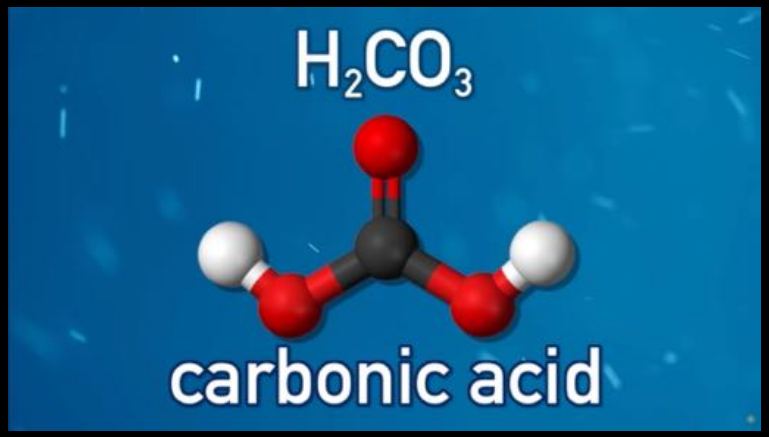
AND INCREASE GROUNDWATER STORAGE

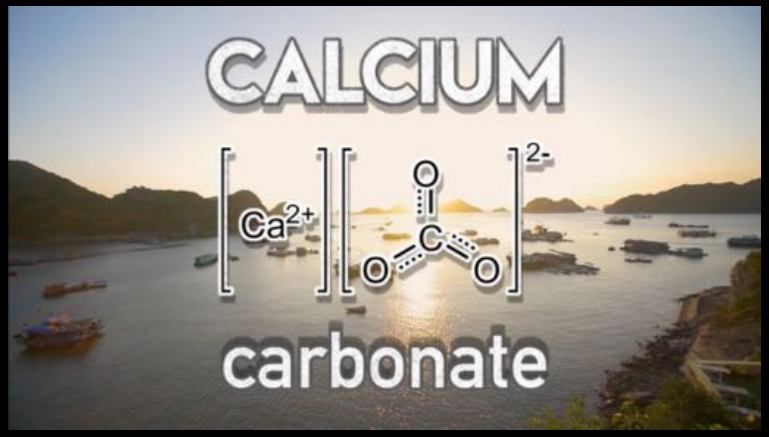
Texas A&M Research under mountain cedars and other woody brush:

3x more rain soaks into the ground than under nearby grass.
20x more groundwater moves through the limestone than under nearby grass.



BECAUSE LIMESTONE DISSOLVES EASILY





Rain + carbon = carbonic acid.
Limestone = calcium carbonate

As rain with carbon falls on karst country, it dissolves the limestone.

Goal: move the carbonic acid INSIDE the limestone to increase bedrock porosity.

More porous = more groundwater storage capacity

DEGRADED LAND NEEDS THIS DENSE COVER

Dense cover rebuilds and protects the soil.
Better soil = more rain enters the ground.

AND WOODY ROOTS

Woody roots exude carbonic acid = more porous limestone

Larger woody roots crack limestone = more porous limestone

WHY OAKS CAN'T DO IT

Because they're not pioneers.

Oaks are not well-suited to spread alone into degraded karst country. They need thickets of mountain cedars to enhance improve soil fungi and protect them from deer.

Once established Plateau Live oaks roots can grow deeper (50-60') than mountain cedar roots to increase deep limestone dissolution.

Durand Oak and mountain cedar entwined.

AND NEITHER CAN GRASS

Because degraded karst country soils are extremely shallow to nonexistent.

It is difficult for soft grass roots to penetrate degraded limestone karst.

WHAT CAN WE START DOING?

Stop managing karst country like the rest of Texas.

Stop focusing on a single tree species—and see the bigger picture and think outside the box—THINK HOLISTIC.

TURN OUR FOCUS TO IMPROVING SOIL

HEALTHY SOIL FROM AN OLDER MOUNTAIN CEDAR

DEGRADED SOIL FROM SPARSE GRASS COVER

START BY NEVER LEAVE THE SOIL EXPOSED

Because we get flash floods and have such shallow soils, we must always use strategies that keep the ground covered.

RETAIN ALL OLD-GROWTH CEDAR FORESTS

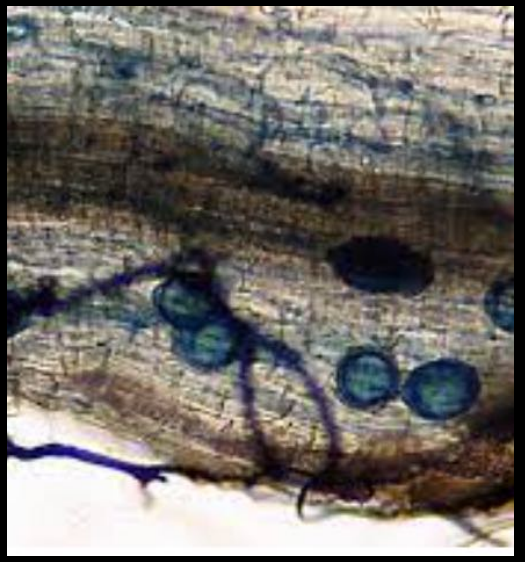
Old-growth forests (250+ years old) help maintain healthy karst country function.

Because they are more humid, they are less of a fire risk.

USE MOUNTAIN CEDAR THICKETS AS NATURE-BASED SOLUTIONS

COVER THE SOIL

SLOW STORMWATER FLOWS



REVIVE THE SOIL

LEARN THE DIFFERENCE BETWEEN BUSHES AND YOUNG TREES

PIONEER BUSHES

Found growing on degraded Texas karst country.

FOREST REGROWTH

Found growing inside woodlands and forests

USE OTHER NATURE-BASED SOLUTIONS

Contour ripping and seeding transformed this old hay field into a native prairie.

THAT SLOW AND SINK WATER

NEW HILLSIDE CONTOUR BIOSWALE

SAME BIOSWALE 3 YEARS LATER

AND IMPROVE SOIL HEALTH

Spray liquid manure compost.
Use rotational + multi-species grazing

WHY? BECAUSE WE LOVE THIS LAND

www.projectbedrocktx.org