

REBUTTAL

By J. David Bamberger

Recently many conservation oriented people received a press release by a Texas A&M University researcher that alarmed and confused them in regard to the management of cedar on their property. I can understand why as the release that came to me was very poorly written, left out important information needed to make land management decisions and, in my opinion, was very misleading. I did later, however, receive other versions that were much better and I have now had the opportunity to read the entire research paper.

There is a proverb that says only fools and children criticize unfinished work. This is analogous to reading the early press release on the subject and criticizing the work before we got to study the full report.

What I believe is so very important and from what I can see in this work that is omitted is: 1) It leaves out the different ecological site types where cedar has been removed; and 2) It assumes that the land will be bare after cedar removal.

There have been dozens of research papers written on the cedar issue, hundreds of hands-on experiences, such as my own, that report the increase in ground water and return of springs and even creeks that resulted from cedar removal and restoration of grasslands. This, while not pure science, is definitely not anecdotal. Here are numbers given to me years ago by the Texas Agriculture Experiment Station as Sonora, Texas showing the amount of water that reaches the soil from a one inch rain under different woody species:

INFLUENCE OF CANOPY COVER ON AMOUNT OF WATER REACHING MINERAL SOIL

Type plant	% interception loss	% litter interception loss	%H2O reaching mineral soil
Shortgrass	10.8	0.0	89.2
Bunchgrass	18.1	0.0	81.9
Live oak	25.4	20.7	53.9
Ashe juniper	36.7	43.0	20.3

It does not take scientific studies to see or accept the obvious – rainfall on bare ground runs off taking away precious soil with it, creating erosion and leaving gullies behind. But establishing grass after cedar removal on sites promotes more underground water and spring flow and more food and shelter not only for cattle but for all wildlife. So it's good economics and good for our quality of life.

I do not claim to be a scientist, but I have spent 41 years on this very subject and my experience is well noted. I have never advocated removal of all the cedar and in fact still have four or five hundred acres of it. My experience with the return of springs and creeks is shared by countless other landowners.

This article appeared in Austin-American Statesman on October 25, 1995:

Study indicates clearing cedar increases water

BY KELLY SHANNON
Associated Press

HUNT – To Hill Country ranchers Travis and Mary Lee, cedar is simple. Clear the stubby trees from your land, and more desirable grasses and oaks thrive.

“Cedar sucks up all your water,” said Travis Lee.

In slightly more technical language, university and government researchers in the region are saying much the same thing about mountain cedar, a native evergreen formally known as ashe juniper.

A five-year study concluding this month has found clearing cedar yields some additional water, which seeps into the soil or becomes runoff, helping to replenish the underground Edwards Aquifer.

Bill Dugas, who has conducted the study for the Texas Agricultural Experiment Station at the Blackland Research Center in Temple, said for

two years, two 40-acre pieces of property in eastern Uvalde County were studied for rainfall and evaporation before any cedar cutting was done.

In September 1992, chain saws were used to clear one of the pieces of land of small cedar trees. Mature cedar and cedar on steep slopes that is considered habitat for the endangered golden-cheeked warbler were not cut.

Then researchers continued to measure rainfall and evaporation.

Scientists expected water loss would be less where the cedar was cleared, and that's what they found. About 60,000 more gallons of water per acre per year was discharged from the site cleared of cedar.

In the past year, more water has still been yielded by the cedar-cleared land, though the amount has dropped to about 15,000 more gallons per acre per year, Dugas said.

“We've had a tremendous flush of growth of grasses and other woody plants. So we're getting less of a savings,” he said. “It's why you can't

do this for one year and know the answer.”

Dugas conducted a similar study on mesquite trees in North Texas but did not detect the same water savings. The soil there is different, and grasses grow in place of mesquite almost immediately.

Dugas’ cedar study is one of several within the state-federal Seco Creek Water Quality Demonstration Project.

Phillip Wright, Seco Creek project manager with the U.S. Department of Agriculture’s Natural Resources Conservation Service, said in a study about 1.5 miles from Dugas’ site, researchers have found spring flow has been enhanced by cedar clearing.

On a 7.9-acre site, about 80 percent of the mountain cedars were cleared. Again, larger trees that might be warbler habitat were left. Through 40 months of collecting data after the clearing, spring flow has increased.

“We’ve seen an increase of about 20 percent in the flow with about 30 percent less rainfall,” Wright said, adding that he has seen no decrease in water savings.

These water findings could have important implications for the Edwards Aquifer recharge zone, a boomerang-shaped region stretching from Austin up through the Hill Country to north of Uvalde.

“There is a potential to increase water yield for these cedar-infested rangelands by doing selective ashe juniper control,” Wright said.

Though it is native to the area, the density of ashe juniper has increased over the years possibly because of grazing and a lack of natural wildfires, researchers say.

Grazing is a big reason rancher Travis Lee wants to remove cedar from his land. With cedar growth, one cow can graze per 50-70 acres; without cedar, that figure increases to one cow per 15 acres, he said.

The Lees’ 1,600-acre ranch used to be owned by Mary Lee’s grandfather. In his days, cedar clearing was a routine chore. “He used to burn all the time and keep all the cedar down,” she said.

Last year, as the Lees were clearing a 36-acre patch of property, the U.S. Fish and Wildlife Service recommended they stop so biological surveys could be done to determine if it is warbler habitat.

Their cedar clearing is on hold, they said, because they were warned that continuing with it could violate the Endangered Species Act. The Lees said they’ve never seen warblers on their property and that they were planning to leave the mature cedars—possible warbler habitat—anyway.

Like the researchers with the Seco Creek Project, Travis Lee said he’s seen a difference in water flow when cedar is cleared.

“We’ve got a couple of gullies, the water production is much improved if you’ve cut the cedar,” he said.

This article was printed in the San Antonio Express News of May 4, 1997:

Managing Junipers May Ease Water Use

John Fohn – Agriculture

This probably isn't going to shock anyone much: Juniper, alias mountain cedar, takes a lot of water out of the ground.

However, researchers working west of San Antonio now know how much water, and they also know that junipers use almost twice as much of it as do oak trees.

Some rather involved measurements, done in northern Uvalde County, indicate that a 15-foot-tall juniper uses about 35 gallons of water per day in a typical Hill Country ranching environment.

According to Keith Owens, range ecology professor at the A&M Research and Extension Center at Uvalde, the research also indicates that a live oak tree of the same size might consume only 19 gallons per day.

In a telephone interview last week, Owens said, "We're developing a water use simulation model.

The computer model could calculate increased water yields as the plant density were reduced for a particular site, he said.

Owens said follow-up research will examine water use by three grass

species: Texas wintergrass, sideoats grama and curlymesquite. It also will look at water-usage changes during regrowth by live oak, persimmon and mountain laurel.

A news release describing the project indicates scientists went to considerable trouble to come up with their water-use numbers. Researchers measured carbon dioxide intake and water loss from individual leaves on six trees – three oaks and three junipers – in each of nine watersheds. After measurements were taken, the leaves were clipped and fed into a meter that determined their exact surface area.

Meanwhile, the nine watershed areas were divided into three groups. All of the juniper and oak canopy was removed from three sites and 70 percent was taken from three more, while the final three were left uncleared.

Finally, runoff was measured for each area, before and after clearing.

The combined data allowed Owens and his colleagues to determine how much water the trees used, how much stayed in the soil and how much ran off into streams, the release stated.

With the information that's been developed, a landowner might manage juniper trees with water use in mind.

However, Owens added that esthetic concerns, as well as federal regulations on endangered-species habitat destruction, could affect juniper removal decisions.

As for total water recovery, Owens said it may vary with location, soil depth and slope.

Research by others near Sonora indicated a gain of 100,000 gallons of water per acre where all vegetation except grasses was removed. Other research in Medina County involved removal only of juniper, leaving oak and other shrubs. That test indicated 60,000 gallons per acre of water. His own results fell between the two, Owens said.

However, he said he's unaware of a means to determine exactly how much water gained through juniper removal could be recharged into the Edwards aquifer. New variables would enter that equation, such as how far water has to travel before it reaches fractured limestone that allows recharge, Owens said.

In the meantime, however, economic and environmental considerations for preserving or removing juniper in the Hill Country now can be tied to a pricetag, expressed in gallons of water.

Joe Fohn covers issues relating to agriculture. Call 250-3245 to leave a message.

The following statements are from a 1994 Juniper Symposium held at the Texas A&M University Research Station at Sonora. Chapter 4 written by Thomas L. Thurow and Deirdre H. Charlson. Their full papers could still be available.

1. In the United States, particularly in the southwest, rangeland watersheds are the source of most of the region's surface flow and aquifer recharge.
2. Raindrops striking bare soil are by far the most important mode of soil erosion. Therefore it is very important that the amount of bare soil be minimized through maintenance of vegetation cover.
3. Water loss per unit area of leaf tissue of herbaceous vegetation such as grass or forbs is usually less than from trees or shrubs.
4. According to the Texas A&M University Research Station at Sonora about 13 inches of the annual 21 inch precipitation would ever get below the canopy if the site is covered with juniper.
5. It is no wonder herbaceous vegetation growing under the canopy of juniper trees is so sparse.

6. Rangeland management practices which affect vegetation cover and composition can affect both on-site and off-site water availability.
7. The invasion of rangelands by juniper and other brush species can have a major impact on the hydrology of the site. The presence of juniper alters the amount and distribution of water reaching the soil. Junipers are highly competitive with the understory vegetation for water and nutrients, often reducing the productivity of grasses and forbs and increasing the amount of bare soil. The increase in bare soil, particularly in the spaces between trees, typically leads to increased runoff and soil loss as the juniper infestation increases. The method and degree of juniper removal can significantly impact the hydrology and erosion on rangeland watersheds. The effect of removal method depends on degree of elimination of brush and associated vegetation, steepness of slope, soil type, precipitation characteristics and vegetation recovery time.

Below is a summary statement on a research paper presented by Thomas L. Thurow and Justin W. Hester at the 1997 Juniper Symposium held at the Texas A&M Research and Extension Center in San Angelo, Texas:

“Juniper increase can have a major impact on rangeland hydrology. The presence of juniper alters the amount and distribution of water reaching the soil. Junipers are highly competitive with the understory vegetation for water and nutrients, often reducing the productivity of grasses and forbs and increasing the amount of bare soil. The increase in bare soil, particularly in the spaces between trees, typically leads to increased runoff and soil loss as the juniper infestation increases. The method and degree of juniper removal can significantly impact the hydrology and erosion on rangeland watersheds. The effect of removal method depends on degree of elimination of brush and associated vegetation, steepness of slope, soil type, precipitation characteristics and vegetation recovery time.

The following statement was taken from the summary of a lengthy paper written by F. E. Smeins, M. K. Owens and S. D. Fuhlendorf. It was titled, “Biology and ecology of Ashe (Blueberry) Juniper” and published by the Texas A&M University Research Station at Sonora - April 14, 1994:

- A dense stand of Ashe juniper can use substantial quantities of soil moisture reducing recharges to aquifers and soil water for growth of other plants.

Once again, I do not claim to be an expert on brush management and most certainly not on soil ecology which could alter the results of cedar removal, but when all the science, research and testimony is studied the net result is clear. Properly managed cedar removal followed up with good grass cover is good for water, for livestock, wildlife and people.

Which side of the fence would you prefer?



Should you want to study the reporting of other scientists you will find the following useful:

- Smeins, F.E. 1990. Ashe juniper, consumer of Edwards Plateau rangeland. Texas Agricultural Experiment Station Technical Report, 90-1.
- Blomquist, K.W. 1990. Selected life history and synecological characteristics of Ashe juniper on the Edwards Plateau of Texas. M.S. Thesis, Dep. Rangeland Ecology and Management, Texas A&M Univ., College Station, TX. 108 p.
- Doescher, P.S., L.E. Eddleman and M. R. Vaitkus 1987. Evaluation of soil nutrients, pH, and organic matter in rangelands dominated by western juniper. Northwest Science 61:97-102
- Fuhlendorf, S.D. 1992. Influence of age/size and grazing history on understory relationships of Ashe juniper. M.S. Thesis, Dep. Rangeland Ecology and Management, Texas A&M Univ., College Station, TX. 79 p.
- Holmstead, G.L. 1989. Water-use and growth of three C4 bunchgrasses: Evaluation under field and controlled environment conditions. M.S. Thesis, Dep. Rangeland Ecology and Management 144 pp.
- Texas State Soil and Water Conservation Board 1991. A comprehensive study of Texas watersheds and their impacts on water quality and water quantity. Texas State Soil and water Conservation Board, Temple, TX. 104 p.
- Wright, H.A., F.M. Churchill, and W.C. Stevens 1975. Effects of prescribed burning on sediment, water yield, and water quality from dozed juniper lands in Central Texas. Journal of Range Management 29:294-298.
- Yager, L. Y. 1993. Canopy, litter and allelopathic effects of Ashe juniper (*Juniperus ashei*, Buchholz) on understory vegetation. M.S. Thesis, Dep. Rangeland Ecology and Management, Texas A&M Univ., College Station, TX. 109 p.