Restoring and Managing the Woodlands of the Texas Hill Country

The Historic Woodlands

The Texas Hill Country is one of the most beautiful and ecologically diverse places in the country. Long before German immigrants began to settle this area in the 1850's, Native Americans had lived here for thousands of years, depending on the abundant natural resources. Historically, the Hill Country was an ecologically complex mosaic of different vegetation types including forests, woodlands, savannas, shrublands, grasslands, and all of the intermediate gradations between these types. The pattern of these natural plant communities was dictated primarily by soils, topography, fire, and climatic extremes.

Large parts of the Hill Country were moderately to heavily wooded in historic times prior to the arrival of European man. The evidence for this is clear and compelling. Many of the earliest explorers left first-hand written accounts of their journeys through the area in the late 1700's and early to mid-1800's. Numerous eyewitness accounts prior to 1860 provide confirmation that woodlands were common and widely distributed. Readers are referred to a well-researched compilation of these accounts in Chapter 5 of ***The Explorers Texas***, by Del Weniger for a more compete discussion of the extent of early Hill Country woodlands.

No one can say with accuracy what percentage of the Hill Country was wooded in historic times, but there can be no doubt that the coverage of woodlands was significant. The woodlands were considered a valuable resource by the early settlers, who used it extensively for building material and fuel. The rich and expansive wooded areas are one reason why the settlers chose to stay in the region.

The Grassland Myth

Many people are surprised to learn that much of the Hill Country was significantly wooded in historic times. Due to decades of misinformation, many people believe that the Hill Country was once a vast open grassland with only a light to modest density of trees and shrubs in most places. There are several reasons why this myth has been perpetuated, but for the most part, people are just repeating what they have heard. Sadly, some state and federal natural resource agencies have remained confused about this and are among the promoters of this myth.

In many cases, people who insist that the region was historically a grassland are citing what conditions were like in the late 1800's and early 1900's after much of the woodland had already been cut and cleared by the first and second generation of settlers. The vast open grasslands spoken of so often from that time period were, in many cases, simply the aftermath of the timber harvest. Houses, barns, fences, buildings and entire

towns were dependent on lumber and posts harvested from Hill Country woodlands. Crops had to be grown to sustain the growing human population and grassland forage was needed to support the increasing livestock population. Furthermore, a large supply of wood was needed as fuel for cooking and heating. All of this contributed to the reduction of woodlands.

As with most myths, there are threads of truth. The Hill Country did historically have areas of grassland mixed with the savanna, shrubland and woodland prior to settlement. Some of those grassland and savanna areas were expansive, especially on the broad rolling divides along the western edge of the Hill Country. Recurring natural and man-made fire kept the original grassland areas from becoming heavily wooded. When unusually severe fires burned through the woodlands as a canopy fire, the vegetation shifted at least temporarily to a grassland or shrubland.

Healthy and Unhealthy Woodlands

One of the primary characteristics of healthy Hill Country woodlands is a large diversity of tree and shrub species. Healthy natural woodlands in this region will often contain in excess of 25 species of trees and shrubs. Table 1 provides a listing of most of the common trees and shrubs of the region. Where sunlight can reach the ground and at the perimeter of the woodland there will also be many kinds of grasses, forbs and vines.

Another trait of healthy woodlands is a diversity of age classes including young, middle age and mature trees and shrubs of all species. There must be reproduction taking place and the replacement of old dying trees with younger trees. The presence of very young seedlings does not necessarily constitute successful reproduction, since many of these young trees will not survive past one or two years of age.

Woodlands with only a few species are generally considered to be impaired or degraded. Across much of the region, there now exists nearly a monoculture of live oak or cedar. In other cases, woodland areas have only 5 or 10 species of woody plants instead of the expected number of species.

Another sign of a degraded woodland is a lack of successful reproduction. Many areas in the Hill Country still have a decent number of tree and shrub species, but most of the trees are larger mature trees with few if any young or middle age trees. The natural death of older trees and shrubs without young plants to replace them results in the gradual loss of diversity.

The Decline of Woodlands

Some areas within the Hill Country still maintain the natural diversity of species and age classes that characterize a healthy woodland. However, most of the woodlands of this region are in varying stages of decline.

Some forms of woodland damage and decline happen suddenly and are very obvious. Examples include severe drought, oak wilt, hypoxylon canker, large scale clearing and brush control, tornados, ice storms, wildfire or a combination of these. These forms of

damage may be localized or widespread and may affect only one or two species, or may affect multiple species. In some cases, woodlands will be able to recover from these forms of damage, while in other cases, the damage may be lasting. The degree to which climate change may be contributing to these causes is unknown.

The most damaging type of decline in woodland health is the gradual process of degradation that occurs over many years. It happens so slowly that it is often not recognized until it is too late. Casual observation may reveal what looks to be the normal density of trees and shrubs, but upon closer examination, species which should be present can no longer be found. This slow, long term loss of tree and shrub diversity is the most damaging form of woodland decline.

Deer - The Greatest Threat

The primary cause of this slow, cumulative loss of diversity is over-browsing by deer. The single greatest threat to woodlands in the Hill Country is the overpopulation of white-tailed deer and other browsing animals. White-tailed deer consume about 3.5% of their body weight in food each day, or about 1300 pounds annually for a 100 pound deer. Browse (leaves and twigs of woody plants) usually makes up about 60 to 70% of their diet; therefore, each deer is consuming about 800 to 900 pounds of woody plant growth annually.

The overpopulation of deer in the Hill Country has been a problem for over 50 years. After the eradication of the flesh eating screw worm fly in the 1960's, the deer population exploded and has remained high ever since. It is not uncommon in the Hill Country to have deer densities as high as 3 - 5 acres per deer which is at least three times more deer than the habitat will safely support.

Young shrubs and trees, less than four feet in height, are the most vulnerable since all of their growth is accessible to a deer. Many shrubs and young trees remain in a state of extreme stunting due to excessive browsing. In this arrested state, the plants may survive for many years and can resemble a bonsai plant. These weakened plants are the first to succumb to drought, disease or other kinds of stress. Over-browsing nearly eliminates successful reproduction for the more palatable species of trees and shrubs. The less palatable species, including cedar, algerita, persimmon, mountain laurel, and whitebrush can reproduce and thrive even with an overpopulation of deer.

In many places, the over-browsing threat is aggravated by the overpopulation of exotic ungulates, especially axis deer. Free ranging exotics are now common across much of the Hill Country. Although goats and sheep also contribute to the browsing problem on some ranches, their numbers have declined significantly over the past 30 years. Livestock are no longer the greatest cause of over-browsing, although in some places, they are still a problem.

The great American conservationist, Aldo Leopold, noted the problem of deer overpopulation in the U. S. and in Germany and the problems it causes in plant diversity:

"Every woodsman knows that deer in many places are exterminating the plants on which they depend for food. Something is out of kilter." 1939

After the population of mule deer exploded in the Kaibab Plateau of Arizona, Leopold wrote the following description: "I have seen the slopes wrinkle with a maze of deer trails. I have seen every edible bush and seedling browsed, first to anemic desuetude, and then to death. I have seen every edible tree defoliated to a height of a saddle horn." 1944

In the forests of Germany, Leopold described the population of deer as so excessive that they destroyed their natural foods. In an attempt to restore woodland diversity he noted, "The German foresters now wish to restore a natural mixture of hardwoods, but the deer won't let them." 1936

Restoring Healthy Woodlands

Restoring a woodland that has been degraded is much more difficult than maintaining and managing a relatively healthy woodland. The restoration process will take many years of hard work and dedication using a combination of the techniques described below.

Aggressive Hunting

The primary way that woodland health can be restored in the Hill Country is to substantially reduce the number of deer and other browsing animals. A long term commitment to the aggressive harvest of deer and exotics is necessary to bring the population down to a sustainable level that will allow successful reproduction of woody plants. The removal of 40% or more of females each year is needed to make a significant difference in deer numbers. Hunting is the most logical and most effective way to reduce the population of deer and exotics. Texas Parks and Wildlife Department offers flexible, landowner-friendly programs which encourage very high harvest rates for white-tailed deer in order to improve ecological conditions. Exotic game may be hunted any time of the year and there are no limits on the number that can be removed.

High Fencing and Exclosures

High fencing is one of the best ways to allow landowners to take control of their deer population and woodland health. On smaller ranches (less than 5000 acres) reducing the population is extremely difficult due to the constant movement of deer back and forth across several properties. A high fence allows a landowner to apply an aggressive harvest and keep the population at a level that will allow the regeneration of woodland species.

If a landowner is not able to high fence the entire property, high fenced exclosures can be established to allow declining tree and shrub species to grow and reproduce. Exclosures can be any size but larger ones will be more effective at restoring woodland health. All deer should be removed from these high fenced exclosure areas.

Brush Control and Slash

Selective brush control can play an important role in woodland restoration in two different ways. Small cedar should usually be reduced or removed when it is growing under or adjacent to

desired trees and shrubs. The growth rate of cedar usually exceeds that of other species and the cedar will sometimes “smother” young trees and shrubs, inhibiting their growth. Some tree experts say it is better to thin out such cedar in two or three stages rather than all at the same time. Cedar that is removed from around other trees should be dragged away to reduce the likelihood of a damaging fire.

The second way that brush control can help restore woodland diversity is to leave the dead cedar slash laying on the ground. This layer of slash provides a safe haven for the germination and establishment of many species that would not otherwise survive. Instead of creating piles of dead trees and brush, the better approach is to leave a blanket of slash scattered on the ground. The layer of slash should be dense enough and tall enough to provide a physical deterrent to deer and livestock. The retention of slash across large areas is the most effective way to enhance plant diversity where the deer population is high. The micro-environment created by the slash (shade, windbreak, organic material) also provides benefit to young seedlings.

Where it is not possible to leave this blanket of dead slash on the ground, the creation of many smaller brush piles is much preferred to having fewer large piles. Many desirable species of trees and shrubs will find protection in these protective nursery areas.

Seedling Protection

Another approach for increasing the survival of young trees and shrubs is to diligently search for new seedlings of desired species and erect temporary cages around them. The cages can be net wire or can be made of dead brush stacked in a manner to provide protection.

Re-Planting

Some landowners have taken the extraordinary step of re-planting some of the species that have declined. There are now many native nurseries that provide a good variety of native Hill Country trees and shrubs. For satisfactory success, seedlings and saplings will need to be protected with a wire cage and will need to be watered regularly for at least the first two or three years.

The Paradox of Cedar

Blueberry juniper, often called mountain cedar is a key part of Hill Country woodland. Although cedar plays a special and important role in the ecology of the region, it is also a troublesome species for many landowners. Historically the woodlands contained many species of oaks, other hardwoods and understory shrubs mixed with cedar. The common cedar of those early day woodlands were mostly large old growth cedar, with very large main trunks and a height of 30 feet or taller.

Nowadays, due to common misunderstandings, cedar is usually regarded as “brush” and is considered undesirable, noxious and invasive. To the early settlers, cedar was a treasure and old growth cedar brakes were highly regarded and valuable.

Research has shown that after the old growth woodlands were cut, and as the ensuing grasslands were overgrazed, massive soil erosion took place across the region. Millions of acres that once supported rich woodland soils were long ago scoured away, exposing bare rock or infertile subsoil. On these severely eroded and degraded sites, cedar is one of the few species that will thrive. That same research shows that as the cedar re-establishes on the barren, denuded soil, it gradually rebuilds a layer of dark, organically enriched topsoil. Over a

long period of time, soils can be at least partially rebuilt underneath a canopy of cedar. The species that will readily encroach where it is not wanted is the same species that has the capacity to help rebuild the eroded soils of the region, enabling them to once again support diverse woodlands, savannas and grasslands.

The paradox of cedar is that it is such a highly successful species. Not only is it a natural component of diverse Hill Country woodland, but, in the absence of frequent fire, it also encroaches into grasslands and dominates the landscape to the detriment of ranching, grassland health and wildlife habitat. There are no easy answers to the cedar issue in the Hill Country, but seeking to better understand its natural role in the woodlands is a good starting place.

For additional information regarding the management of cedar, readers are referred to our "Managing Cedar" video and accompanying handout found on the Videos Page of www.HillCountryLandTrust.org or by following these specific links: http://www.hillcountrylandtrust.org/hclt-videos.html?itemid=12055 and http://www.hillcountrylandtrust.org/pdf_files/FAQ-Managing-Ashe-Juniper_v2.pdf

Table 1. Common Native Trees and Shrubs of the Hill Country Woodlands

Common Trees	Common Shrubs
Live oak	Flameleaf sumac
Spanish oak	Evergreen sumac
Post oak	Skunkbush sumac
Blackjack oak	Rough-leaf dogwood
Lacey oak	White honeysuckle
White shin oak	Rusty blackhaw
Chinquapin oak *	Possumhaw
American elm *	Creek plum
Slippery elm *	Lindheimer silktassell
Cedar elm	Carolina buckthorn
Net-leaf hackberry	Elbowbush
Sugar hackberry	Net-leaf forestiera
Mesquite	Spicebush *
Texas redbud	Texas persimmon
Huisache	Mountain laurel
Golden ball lead tree	Algerita
Texas sophora	Whitebrush
Escarpment black cherry	Mexican buckeye
Mexican plum	Ohio buckeye
Hawthorne	Texas buckeye
Texas madrone	Kidneywood
Chittam (Bumelia)	Roemer acacia
Ashe juniper	Baccharis *
Bald cypress *	Indigo bush amorpha *
Box elder maple *	Button bush *
Bigtooth maple *	Wafer ash
Pecan *	Prickly ash
Black walnut *	American elder *
Little walnut *	Shrubby blue sage
Black Hickory	
Sycamore *	
Black willow *	
Cottonwood *	
Carolina basswood *	
Red mulberry *	
Texas mulberry	
Bois d arc	
Western soapberry	
Texas Ash	

* Trees and shrubs of riparian woodlands

Notation: This is not a complete list of all woody plants of the region. It includes the more common trees and shrubs which are often found growing together in woodlands. It does not include many of the small shrubland species or the woody vines that grow in the region.