Texas Cattlemen and Shrubland Know-How

By Bill E. Dahl, Henry A. Wright, and Fred S. Guthery

Before 1850, the western three-quarters of Texas was less wooded than it is today. Shortgrass prairie in west Texas was "boundless as the ocean . . . not a tree, shrub or any other object . . ." By contrast, the Rolling Plains always had honey mesquite, but the "mesquite timber" was open enough that traveling was easy through lush grass from Big Springs to the junction of the Clear Fork of the Brazos River.

The Edwards Plateau consisted of prairies mixed with cedar brakes, oak savannas, thickets, and mesquite savannas. The Rio Grande Plain could be described in a similar manner. The Blackland Prairie on clay loam soils in east-central Texas alternated with a mixture of post and blackjack oak savanna on sandy soils. The Coastal Prairie consisted of grasslands rimmed by woodlands. The Pineywoods in east Texas had longleaf and slash pine with an excellent understory of grasses, except along river bottoms where hardwoods dominated.

Thus, historically, Texas was a land of grass, rich in beauty with a variety of landscapes and shrub mixtures. Following the control of wildfires and the introduction of heavy livestock grazing, density of shrubs and trees has multiplied, even in the relatively treeless shortgrass prairie. Some areas of the State are thickets with few understory herbs.

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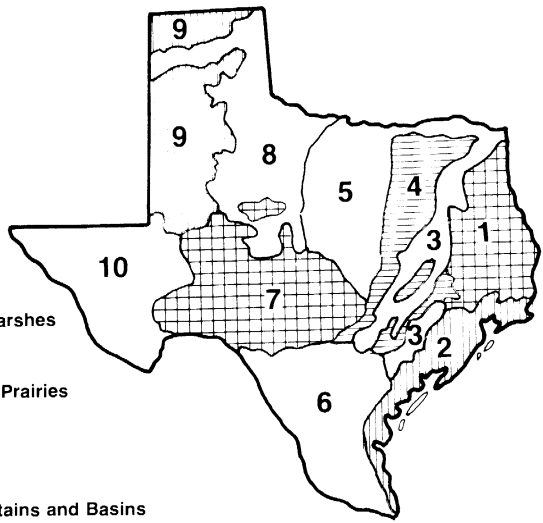
Vegetation Areas of Texas



1. Pineywoods
2. Gulf Prairies and Marshes
3. Post Oak Savannah
4. Blackland Prairies
5. Cross Timbers and Prairies
6. South Texas Plains
7. Edwards Plateau
8. Rolling Plains
9. High Plains
10. Trans-Pecos, Mountains and Basins

Of the 157 million acres of agricultural land in Texas, 95 million are rangeland, 16 million are pastureland, and 10 million are forested. These are all extensively grazed by domestic livestock. In addition, many of the cropland acres are seasonally grazed. Thus livestock is the major agricultural commodity in Texas. Also, fee hunting provides significant income to landowners with the bulk of it on the brush-infested rangelands of the State. Increasingly, enjoyment of nongame wildlife, such as bird watching and wildlife photography, make the State's rangelands valuable for nonlivestock enterprises.

Because the shrubs infesting most of the State's rangelands have value as wildlife habitat, the removal of brush to enhance livestock management must be planned to maintain a valuable wildlife and recreational resource. Thus, most managers deal in "brush management" rather than "brush eradication."

Differences in climate, soil, and topography provide 10 distinctly different vegetation groupings. The Pineywoods of east Texas has low elevations and high rainfall (35 to 50 inches). On the other extreme is the westernmost region, the Trans-Pecos Mountains and Basins, with high elevations and less than 12 inches of annual precipitation.

Major Texas Shrubs

Of the many economically important Texas shrubs, honey mesquite is the most widespread, especially in the Rolling Plains, and is regarded as a pest in all vegetation regions except the Pineywoods. It grows on all soils but is poorly adapted to deep sands. Its forage is little used by animals but all animals relish the ripening beans. Junipers, known as "cedars," occur mostly in central (Edwards Plateau) and west Texas on limestone soils and areas with rough topography. They tend to spread into the more level grasslands if fire is suppressed for long periods.

Only five of the more than 76 species of cacti in the State occur so densely that they become a problem. These are Texas, Engelmann and plains prickly pear; tasajillo; and cholla. Although they occur throughout the State except for east Texas, they become a problem primarily in the South Texas Plains and the Edwards Plateau.

Liveoak, post oak, and blackjack oak are trees that grow mostly in central and east Texas. Pygmy oaks called "shinnery" are low in stature; one form grows in the finer textured soils of the Edwards Plateau and the other grows in sandy soils of the High and Rolling Plains. Acorns provide important feed for livestock and wildlife. However, the new young leaves of all oak species are toxic to livestock, often necessitating animal removal from infested pastures during spring green-up.

Huisache, guajillo, and blackbrush are acacias that form dense thickets in the South Texas Plains and Coastal Bend areas of south Texas. Whitebrush or beebrush infests the Edwards Plateau and the South Texas Plains. Saltcedar, a water-consuming phreatophyte, forms dense thickets along streams and reservoirs in the High and Rolling Plains and in the Trans-Pecos. Sand sagebrush is a low growing shrub of sandy soils on the High Plains. Creosote bush and tarbush form dense stands in the Trans-Pecos region. In east Texas, pest shrubs are yaupon and winged elm.

While the shrubs mentioned are the most commonly encountered, many others such as the various yuccas, catclaw species, persimmon, lotebush, and ceniza become abundant enough in some regions to be the objects of control efforts.

Water Use by Vegetation

Southwesterners worry about water use by undesirable vegetation, particularly when it is reported that 10 million acre-feet of water is transpired into the air by Texas brush. This reportedly exceeds that used by all the towns, factories, farms, and people in Texas. There are many examples of springs drying up as shrub density increases.

In the Edwards Plateau, the Rocky Creek (a tributary of the Concho River) watershed had several thousand acres cleared

of mesquite during the late 1950's and the early 1960's. This creek had not flowed except during floods for many years. Within five years after clearing the mesquite, it became a perennial stream which flows year-round through wet and dry years alike. Thus, judicious, well-chosen shrub control can yield extra water to landowners as well as downstream users, including municipalities.

Shrubs make gathering livestock extremely difficult as livestock soon learn they can hide in dense thickets. Shrubs compete with herbaceous plants, depressing forage yields usually in proportion to the foliage they produce. Thus, methods to control brush have been vigorously pursued in Texas. Approximately 2 million acres of brush are treated each year in Texas.

Shrub Control

Choosing the proper control technique for management of shrubs is more complex than most realize. Control of one species often releases another which could be equally detrimental; a herbicide that suppresses a species on one soil often is ineffective on another. More commonly, what controls one species will not control another. The effective rate of herbicide application also varies among species and the timing of application must be fit to the problem species. Often an effective herbicide cannot be used because it reduces yields of desirable herbaceous understory species.

Management of shrubs with chemicals requires one to choose between foliar or soil-applied herbicides. Dangers to nontarget crops, ornamentals, and water supplies are real and these are reasons why pelleted herbicides are often used instead of foliar sprays (applied to foliage). Chemical uptake by plants from pelleted herbicides is via the roots. However, as of this writing, pelleted herbicides are not

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effective on all troublesome shrubs.

Foliar-applied herbicides must be translocated within the plant to the roots and site of basal buds from which resprouting occurs. Translocation from leaf to below-ground plant parts must be done within 42 to 85 days after spring leaves emerge on most shrubs. Best kills from herbicides have been obtained 72 to 80 days after budbreak. Further complicating chemical control is the fact that soil temperature must be optimum for active below-ground metabolic processes. This is usually between 75° and 85° F for Texas shrubs.

If mechanical means are to be used to control shrubs, one again has several choices. When areas to be mechanically cleared of shrubs are in poor range condition and need to be seeded, only rootplowing (which is a large blade pulled behind a crawler tractor about 12–18 inches deep to sever brush roots) and disking will destroy the understory herbaceous vegetation well enough to allow reseeding. Cost of mechanical control choices becomes another major reason to choose one technique over another. Number of plants per acre usually dictates feasibility of mechanically grubbing trees or shrubs.

Shredding or mowing effectively removes top growth of much brush, but it kills few plants and basal sprouting species resume growth with more stems per unit area.

Combinations of Tools

Increasingly, managers of shrub-infested rangelands use combinations of tools to increase degree and longevity of control. For example, mesquite infestations needing control where seeding is not desirable or feasible are mostly controlled initially with aerially applied herbicides. In two or three years some of the plants' roots will be dead and commonly 50 to 75 percent of the plants will be sprouting from the tree trunk near the ground. With moist soil, chaining (an anchor chain up to 300 feet long pulled between two crawler type tractors) two ways can topple the standing mesquite trees, pulling many of them out of the ground—sprouts and all.

Fire is a popular alternative to chaining following herbicidal control on sites having adequate fine herbaceous fuel. In west Texas, many mesquite stands have a tobosagrass understory with more than 3,000 pounds of fine fuel per acre. Using prescriptions worked out for such areas, managers can dictate the degree of burndown of herbicidally controlled mesquite trees to satisfy management goals.

Managers also use fire following a herbicide-chaining program to suppress any surviving sprouts, reduce cactus populations, reduce annual weeds, and remove the wood left from chaining. Juniper is most successfully treated by chaining with a burn three or four years later. Note that each control technique is

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Chaining is used in combination with aerially applied herbicides to control mesquite. Several years after the herbicide application, most plants are dead or sprouting only from the trunk. An anchor chain, pulled between two tractors, topples the standing mesquite trees.

chosen for a specific purpose and to complement the action of others.

Wildlife Habitat

Rangeland shrubs provide essential habitat to game and nongame wildlife. Browse, the foliage of brush plants, is a dietary staple for white-tailed deer. Scaled quail depend on the seeds of mesquite and other woody plants. Bobwhites, the most popular gamebird in Texas, require

dense brush canopy for loafing cover between morning and evening feeding periods. Cardinals, lark sparrows, mockingbirds, and other nongame birds nest, rest, and feed in brush. No brush, quite simply, means limited wildlife populations. Fortunately, wildlife management can be integrated with brush management to meet multiple objectives.

When the primary objective of brush management is to increase forage production for livestock, key brush communities and species can be preserved to maintain or improve wildlife populations. A typical approach is to control brush in strips alternated with untreated strips. For bobwhites, the treated strips can be up to 400 yards wide and the untreated strips can be about 30 yards wide. Deer and wild turkeys require more brush. At least 40 percent of a pasture should be maintained in communities of woody plants for these animals. The coverage of shrub communities has to be higher—up to 70 percent—the more level the terrain. The diversity of nongame birds can be increased by treating brush-infested areas with strip patterns, because physical and compositional diversity of the habitat will be increased.

In some cases it may not be feasible to control brush in strips, so block patterns become necessary. Block patterns—treating large acreages in square or rectangular blocks—usually should be avoided if the landowner desires maximum returns from wildlife. However, by treating areas of 200 to 500 acres (the smaller the better for wildlife) and by intermingling older treated areas with newer treated areas and untreated areas, the landowner can maintain respectable wildlife populations.

Whether strip or block patterns are used, the method of brush control influences wildlife response to brush management. Game managers like to use highly selective mechanical techniques, such as bulldozing. The cost of this approach limits its application.

Herbicides depress forbs (herbs other than grass) for one to three growing season post-

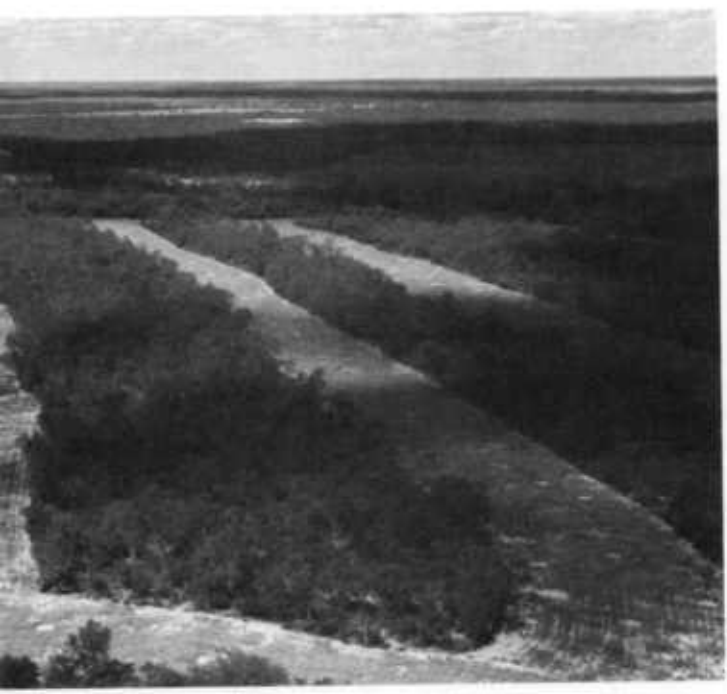
treatment, and this may depress wildlife populations for a similar period. Forbs are steak and potatoes to many species of wildlife because they are high in protein and phosphorus. If, however, the herbicide treatment suppresses a highly competitive species like mesquite, both forb and wildlife populations may bloom after the initial period of shock.

Prescribed burning has been used to manage bobwhite habitat in the Southeast since the 1930's, so it is not surprising that fire can be readily incorporated into livestock-wildlife programs. Prescribed burning generally must be considered a low-priority management tool on the arid peripheries of a species' range. Burning is most attractive where annual precipitation exceeds 30 inches, grazing is light, or brush densities are excessive.

Grazing Systems

Traditionally, Texas ranchers have grazed their shrub ranges continuously because we have been unable to consistently show that other management alternatives provide higher net returns. Consequently, most range management principles and range improvement practices have evolved to complement continuous grazing. These basic principles are:

1) Balance animal numbers with the forage resource or "don't overstock"



R. J. Nail

By controlling brush in strips alternated with untreated strips, a Texas rancher provides increased forage production for livestock while preserving key brush communities and species for wildlife populations—in this case, deer and wild turkey.

2) Graze the range with the proper kind(s) of animal (with a good mix of palatable shrubs, grasses and forbs, such as the Edwards Plateau, where cattle, sheep, goats and deer often graze in common)

3) Graze at the correct season of the year for the sake of both forage and animal health, and

4) Properly distribute livestock over the range.

Within 20 years after the expansion of cattle from south Texas into west Texas (late 1850's), observers noted that the ranges were rapidly deteriorating. Along with overstocking, blame was attributed to restraining the domestic animals yearround to a fixed area. Buffalo were free roaming and while they concentrated in large numbers on the open range, no one area had them for an extended period. Thus, the concept of providing periodic non-use or deferment was suggested.

Despite many attempts to find ways to defer ranges for improvement, no one devised a scheme that was as acceptable to ranchers as continuous grazing. Although most attempts to simulate wild animal grazing through rotation management provided range improvement, none gave individual livestock performance comparable to continuous yearlong grazing.

In the western U.S. it remained for Dr. Leo Merrill to demonstrate (around 1950) that distributing animals throughout three pastures and leaving one seasonally deferred could provide both good range improvement plus excellent livestock performance. This also proved highly desirable for wildlife management.

Probably the most common forms of deferment management have been simply to switch livestock back and forth between two pastures. These programs helped, but range improvement was slower than many desired.

Short Duration Grazing

During the last 15 years, several forms of management collectively called short duration grazing have been tested. These involve six or more pastures (often as many as 15 to 20) and usually one herd; and the animals are rotated from pasture to pasture at intervals dictated by the manager's goals.

In Texas, such programs initially provided 15 to 30 days grazing in a pasture and 3 to 6 months deferment before regrazing that same pasture. This provided excellent range improvement, ample time for browsed shrubs to recover, and increased stocking rates. However, most ranchers found livestock performance less than optimum because the animals ran out of preferred forage before movement to the next pasture, and the long deferment period allowed forage to become over mature and of little nutritional value.

More recently, Texas ranchers are rapidly adopting short duration grazing programs where animals are rotated among several pastures every 2 to 3 days and

the deferment period is from 30 to 60 days, depending on the rate of forage growth. The longer deferment is used when the forage is growing slowly or is dormant. This allows animals to be selective as they are in and out of a given pasture quickly and then they return to the pasture before the forage is overmature.

This rapid movement among pastures is much easier if pastures are arranged in a cell or pie shape with water and mineral supplement usually in the cell center. Thus, animals return to the same watering facility regardless of the pasture grazed. This has also allowed plant deferment at critical times. The most important time to rest pastures is 6 to 8 weeks before frost.

Cell systems increase harvesting efficiency, because formerly large pastures were divided into 8 to 16 or more smaller ones, thus correcting many distribution problems. Several ranchers with 3,000 to 10,000 acres in a pasture have found it possible to more than double stocking rates using this approach.

The large numbers of pastures in these short duration grazing programs have made shrub management much more flexible. Pastures with severe brush problems can be skipped by grazing animals and the shrubs treated chemically, mechanically, or with fire. Thus, any given pasture can be deferred to allow range recovery or to build up fine fuel to carry fire for brush management and control. The multi-pasture single herd grazing programs have great potential for integrating grazing and game management.

Integrating Grazing, Wildlife

Wildlife species respond uniquely to grazing programs. Depending on the area, heavy yearlong grazing may result in habitat favored by killdeers and jackrabbits. Prairie chickens, on the other hand, need the high range condition promoted by a carefully designed grazing system. Requirements of most species will be met by grazing practices that fall somewhere between these two extremes.

We believe that grazing programs similar to the Merrill four-pasture, three-herd system presently represent the best complementary approach between grazing and wildlife production. On the Edwards Plateau of Texas, the Merrill system yields the best response by forbs, grasses, and browse plants for favoring diverse wildlife populations when compared to other methods of grazing.

Little is known about wildlife responses to short-duration grazing. However, concern that the concentration of livestock in smaller pastures will increase trampling losses of ground nests appears to be ill founded. Future research will have to pinpoint the role of short-duration grazing in livestock-wildlife management on the shrublands of Texas.