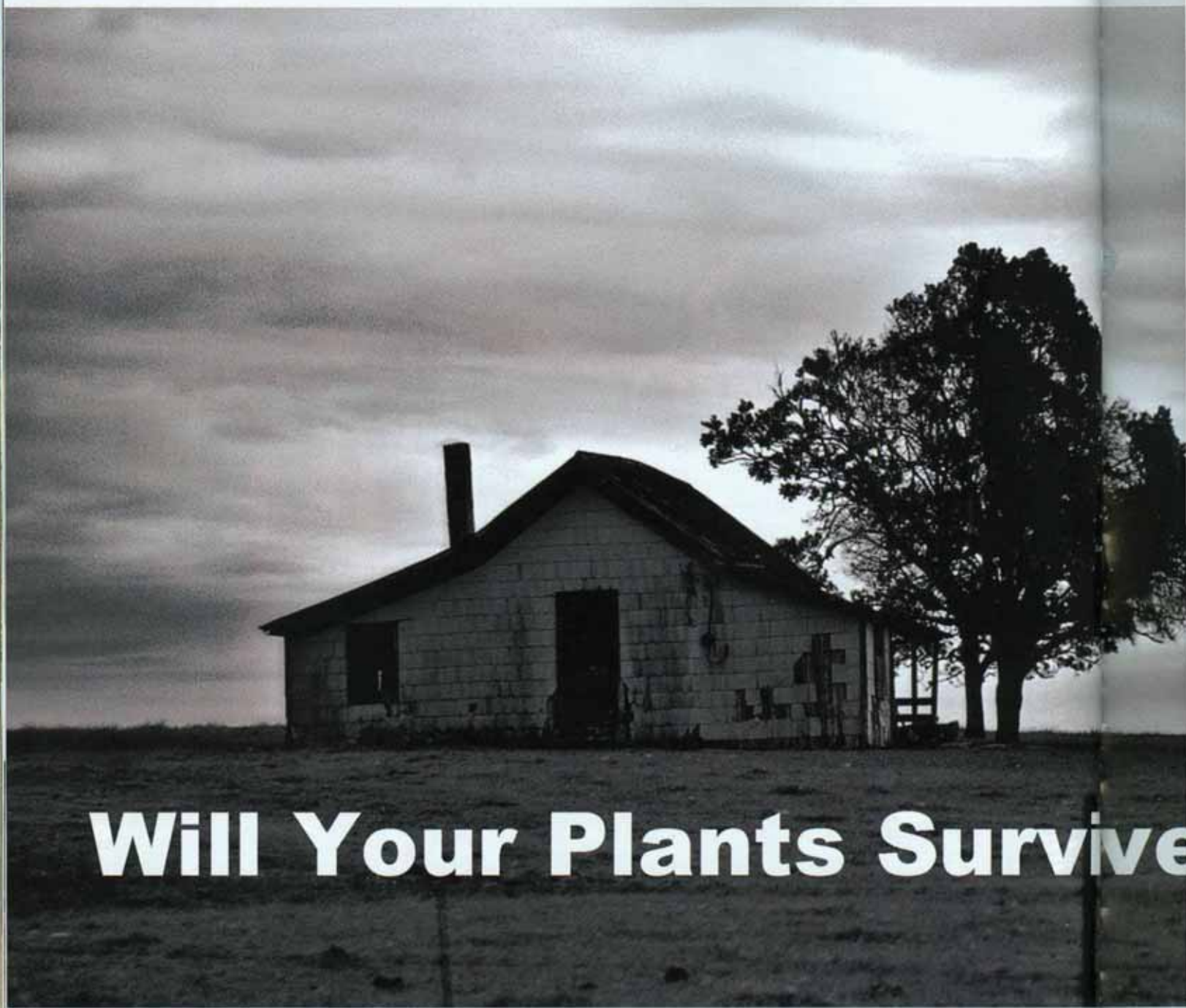
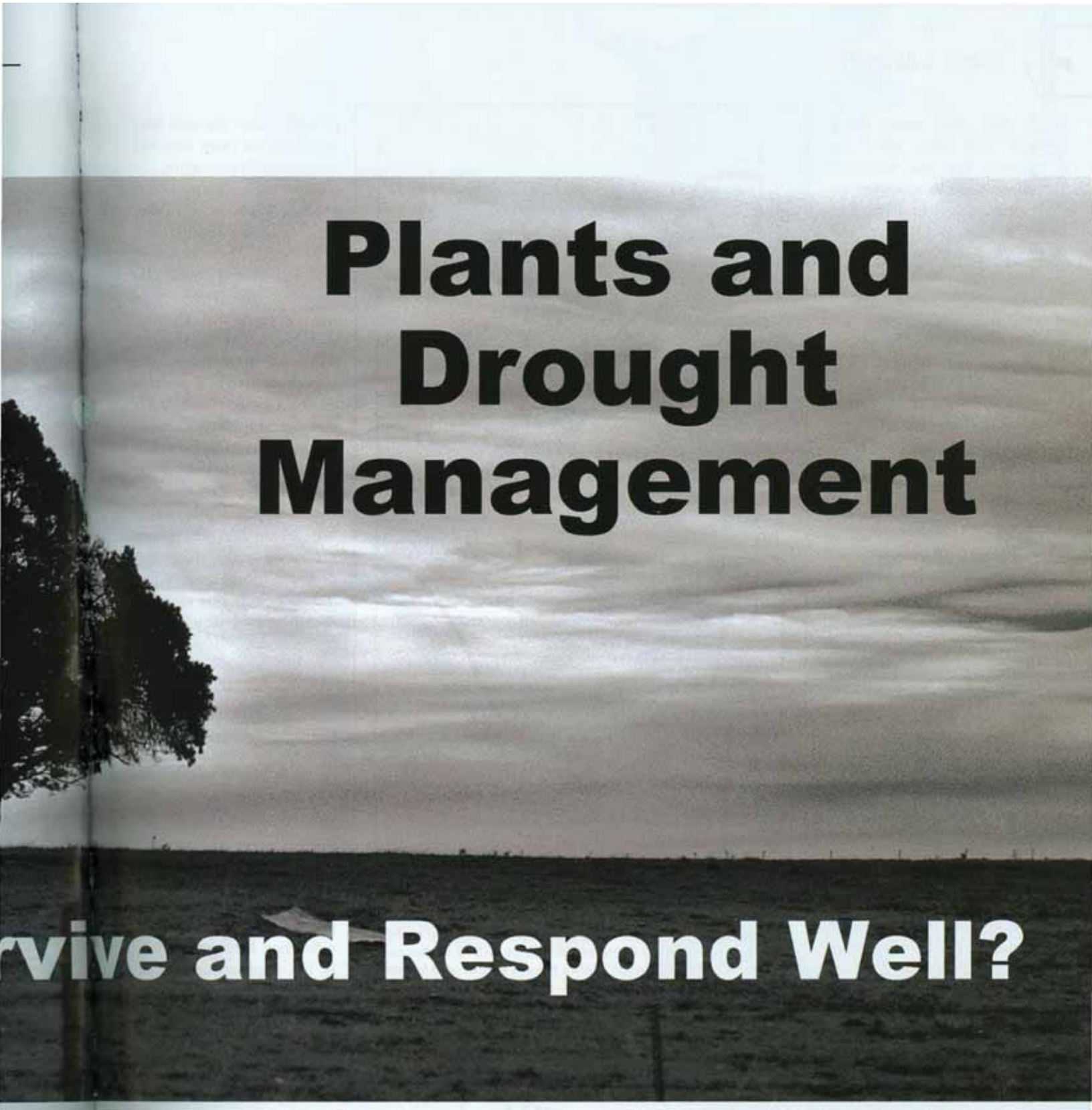


Will Your Plants Survive

Drought has been with us for at least 10 to 17 years depending on which meteorologist you listen to. Central and South Texas have often been the driest regions. Based on the Drought Monitor archive beginning in 2000, the drought was regional until about 2008. Drought conditions covered much of the state until early 2010 when it again became regional. In 2011, drought was statewide. Starting in January 2012 most of the state has been in some level of drought. The pattern generally has been a few weeks of average to above rain followed by longer periods of well below average rain. That pattern plays havoc with plants trying to make their annual growth cycle!

The drought has been changing the vegetation in many ways. In many areas, trees of all sizes have died. Wildflowers have been sporadic. After rains, annual plants often appear, flower and die. In 2011, some of the largest wildfires ever



Plants and Drought Management

rvive and Respond Well?

occurred. In burned areas, the grasses and forbs are mostly recovering as rain allows, but the tree growth may be another story.

PLANTS AND ANIMALS

So what is the vegetation going through? When plants go through stress from drought, flooding, over use overuse, competition or any other stress, their ability to respond and continue growth depends on the kind of plant and how it functions. There are four basic kinds of plants: woody, forbs, grass, and sedges (grass-like plants normally found in wet areas). There are three life span types: annual, perennial and biennial. Understanding how each functions and grows is important.

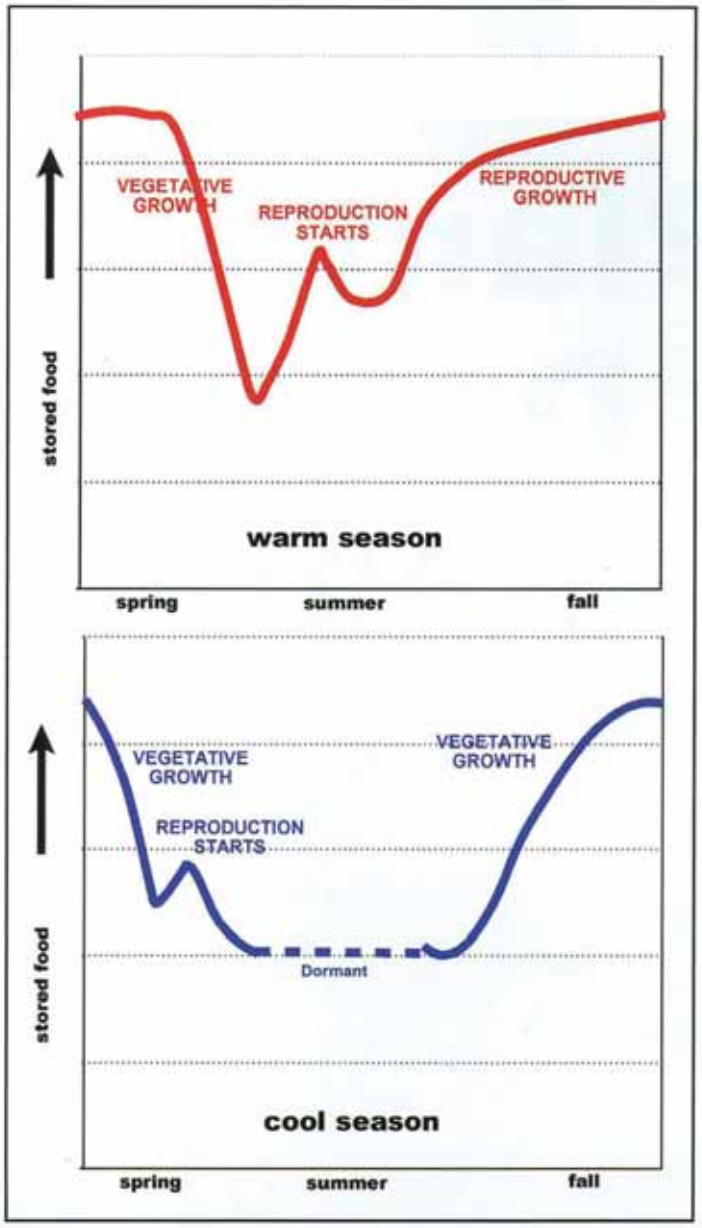
The function of plants that separates them from animals

is that they must make the food they need for growth. The basic function, photosynthesis, does this by extracting carbon dioxide from the air, water and nutrients from the soil and using sunlight and the chlorophyll in their leaves to provide energy for photosynthesis. Oxygen is then released to the air. The products of photosynthesis, carbohydrates, are used to build the materials for leaves, stems, roots and other plant parts. Most perennial plants lose part of their root system and must replace it each year.

Animals harvest their food, often from plants, and convert it for growth and development. In contrast, a plant is anchored in place by its root system while an animal can move to find food.

LIFE SPAN

All plants start from seed at some point. Annual plants complete their life cycle when they produce seed and die. Once perennials and many biennials become established, they will continue their growth with the root system as the base. How each type of plant functions is important to understand what it requires to survive.



A general diagram of the food storage in perennial plants. Warm season plants complete the cycle with a winter dormancy while cool season plants have a winter and summer dormancy.

Annual Plants. An annual plant starts from a seed. For annuals, the stored food is the endosperm in the seed. When temperature and moisture are correct, the seed germinates and begins the development of a root system and top growth from the endosperm. As long as the required conditions continue, the plant will develop and grow. When the plant reaches a predetermined stage, it begins the reproductive process of producing seed. Once the seed are mature, they are shed to the soil to continue the species.

Biennial Plants. Biennial plants begin the same as an annual until they form a rosette of leaves in the fall. They become dormant overwinter and produce flowers and seed in the spring. They store some foods in the fall to begin the spring growth. Once the seed have matured, the plant dies and the process begins again.

Perennial Plants. After perennial plants complete their initial development from seed, they begin to develop stored food for growing new leaves and stems when needed. The food is stored in the lower stem, crown or root collar, and upper root system depending on the type of plant. After the establishment year, warm season perennials start new growth from stored food before any new shoots appear. The rate of use declines as new leaves are produced that can produce more food. When food production in excess of current growth requirements is reached, the food is moved to storage. When reproductive structures are initiated, stored foods are utilized for a short period as leaf production is completed. In some plants, storage can continue after the plant has entered dormancy for the winter.

Figure 1 shows the general stored food level changes in warm and cool season plants over a year. One basic difference between the two is the cool season species normally becomes dormant in the summer and needs moisture to replace the stored foods for new growth in late winter to early spring.

The warm season species will replace stored food from shortly after reproduction starts through the fall. Also, many warm season species seed during the storage time. Grasses such as blue grama and buffalo grass can become dormant and when good rains falls, grow new leaves and seed quickly.

Cool season plants have a similar pattern as warm season, but primary storage is in the fall before winter dormancy. They overwinter on stored food. In late winter, they break dormancy and use stored foods to grow new leaves. The plant normally also becomes dormant during the hot summer months.

Continued on page 82

The dead junipers or cedar probably died from the drought conditions in 2011. Competition probably helped due to the dense stand.

MUCH OF THE TREE DEATH DURING THE EXTREMES OF 2011 APPEARS TO BE FROM A COMBINATION OF COMPETITION AND DROUGHT. COMPETITION (BOTH ABOVE AND BELOW THE SOIL SURFACE), WATER, LIGHT AND NUTRIENTS IS IMPORTANT.

In both types of plants, stored foods allow a plant to grow new leaves and stems each year, in response to excessive defoliation (mowing, grazing, browsing), or weather events (hail, freezing, drought). Any time the plant has less leaf area than it needs to produce food for current requirements, it uses stored food to grow the leaves and other plant parts. Maintaining the stored food levels is the key to maintaining good plant growth and survival.

MANAGING PLANTS DURING AND AFTER DROUGHT

What happens to plants when drought interrupts the normal growth process determines how the plants will produce and survive. The important part of the plant's growth cycle is replacing stored food every year. If a perennial plant has the ability to store each year, it can survive drought.

DROUGHT MANAGEMENT

Two primary factors are involved in maintaining a plant's ability to survive drought. First, having water for plants and animals is critical. Second, allowing plants to have enough leaf area to grow and survive competition with other species is the primary consideration. Managing vegetation during drought requires allowing the plants the opportunity to have the leaf area to make normal growth early and continue during the mid-summer into fall period for storing food.

Leaf Area. Removing leaves by browsing, grazing, or

mowing can slow or stop the storage process. The plant uses any reserves left to produce more leaves to meet its needs. If the plant is not able to store adequate food for several years, it will potentially die. Continually keeping the plant's leaf area too short can result in the plant dying.

Competition. Competition for space (both above and below the soil surface), water, light and nutrients is important. Much of the tree death during the extremes of 2011 appears to be from a combination of competition and drought (Figure 2). A large number of plants like the juniper or cedar are growing in a small area probably due to a good moisture period in the past. An extreme drought period like 2011 that is preceded by several years of intermittent dry periods will often produce a high die off.

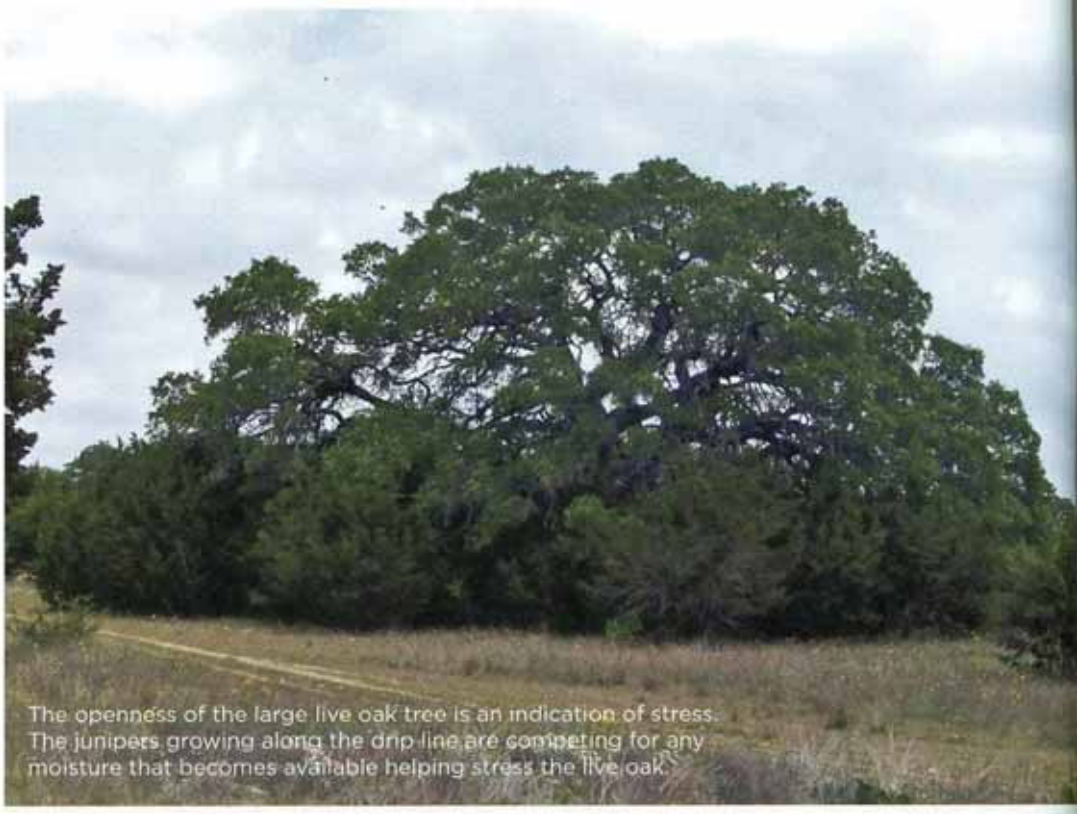
A similar form of competition is shown in Figure 3. Large deciduous trees have a structure that tends to shed rain to the outer edge or drip line and their roots are concentrated near that area. The juniper is thriving in the drip line area because of the higher moisture. Removal of the juniper should improve the growth and survival of the tree. If the juniper is left, the tree may die.

WHAT DOES RECOVERY LOOK LIKE?

Recovery of drought stressed vegetation often exhibits itself in ways we might think are negative. Figure 4 is an example. This grass stand has been heavily stressed from drought and late winter and early spring rains have initiated many plants. The initial plants to dominate are often the annual forbs or 'weeds' that we might want to eliminate. Common sunflower, annual croton, and other species that provide open shade to the soil surface are considered beneficial. The shade reduces the soil temperature, reduces water evaporation from the soil, and lifts the wind above the plants modifying the microclimate. The result is the grasses and perennial forbs have more moderate growing conditions to begin their recovery.

Another way of helping the vegetation recover is to reduce the harvesting of the early plant growth, particularly the leaves, during the first 60-90 days of the growing season. This allows the perennial plants to begin the recovery process quickly, particularly in the lower rainfall areas of the state.

ANOTHER WAY OF HELPING THE VEGETATION RECOVER IS TO REDUCE THE HARVESTING OF THE EARLY PLANT GROWTH, PARTICULARLY THE LEAVES, DURING THE FIRST 60-90 DAYS OF THE GROWING SEASON.



The openness of the large live oak tree is an indication of stress. The junipers growing along the drip line are competing for any moisture that becomes available helping stress the live oak.

WHY DROUGHT MANAGEMENT IS SO DIFFICULT

Managing vegetation after drought is one of the most difficult processes. We get impatient and want everything to recover quickly and the problems to disappear. The most common desire is to increase production and income as quickly as possible. Yet the land and the vegetation cannot respond as fast as we would like.

Drought recovery planning should start before, not after the drought starts. But it may have to start during the drought in many cases. The decision that has to be made is often to down size with the plan to recover over time. One landowner I had the privilege working with went through the drought of the 50's in good shape. He reduced his animals each year until he had only his desired genetic base animals left. As the drought broke, he chose to rebuild his animals from his base

Annual forbs (broadleaf plants) are often the first spring plants to dominate following drought. They help stabilize the plant system.

ONE MUST WORK WITHIN THE LAND'S AND VEGETATION'S ABILITY TO RECOVER AND PRODUCE, THE AVAILABLE CAPITAL TO MAINTAIN THE BUSINESS, THE REQUIRED AND AVAILABLE LABOR, ONE'S OWN MANAGEMENT SKILLS, AND OR COURSE, WHAT THE WEATHER GIVES.

genetics rather than buy the expensive animals, often with lower genetics, that were available. As a result, he ended up with his rangeland recovering faster than his neighbors. The weed problems others had were avoided. His animal genetics were what he wanted. The result was a very profitable operation. But he did maintain an outside job during the drought and for a while after to help with expenses.

DROUGHT RECOVERY IS REALLY REBUILDING THE VEGETATION

Drought recovery is a personal decision process. One must work within the land's and vegetation's ability to recover and produce, the available capital to maintain the business, the required and available labor , one's own management skills, and of course, what the weather gives. How the vegetation is managed before, during, and after drought will determine what will happen.

The question is what will your vegetation look like a few years after the drought is over? Figure out how you need to manage during and after drought to stay in business and bring your vegetation back. The plan needs to fit you. If you have someone tell you how to do it, will it fit you!