Benefits of proper range management and planning should be used to maximize net returns per acre. The ratio of grazed to rested land must be finely balanced, with strict adherence to proper stocking rates. A free choice mixture of minerals, proteins, and vitamins is advised. Good management techniques of the range have definite economic superiority over improved pasture methods. High interest rates, possible lack of usable capital, cost of fossil fuels and irrigation, and the colossal price of heavy farm equipment make range a common-sense approach to farming in Florida in the twentieth century, and the approach must be convincing if range programs are to continue into the twenty-first century.

**The evidence is all around us that** our native range resources are neither limitless nor immutable. It is clear to everyone that careful management is necessary because the penalty for failing is great. A proper management job is like walking a tight rope requiring resolution and determination, modern knowledge and modern technology, but human ingenuity is equal to the task. The Florida rancher is well known to have these characteristics; he recognizes that his primary occupation is husbandry of the range and that tending his livestock is secondary. Thus has the spirited cowboy, famous in both legend and song, become, in the end, a humble grower of grass. He is a practicing ecologist and an avid economist. He follows ecological principles but is limited to low cost measures as dictated by today's economics. Florida is number 8 on the list of beef producers in our great nation. Success *is* written in statistics.

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# Prescribed Burning in California Brushlands

**Mary Kimball**

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The Huey helicopter swept low over the ridge, the engine noise reverberating up the canyon, shattering the stillness of the afternoon. As it reached the crest of the skyline, it dumped its explosive cargo of napalm into the vegetation, quickly turning the canopy into a blazing inferno. This wasn't a scene from the movie "Rambo," nor news footage from Vietnam, but a common range management practice used every year in California's brushlands, the prescribed burn.

**Fire is a natural factor** on California brushlands. In fact, there's probably no range site in California that has developed without being influenced by fire. Due to California's hot, dry climate, various brush species such as manzanita and ceanothus have developed with fire being an important part of their life cycle. Biswell, a noted range scientist, considers fire as nature's way of keeping rangelands open and in a stable equilibrium, and less susceptible to intense, out-of-control fires. Biswell further concluded that fire exclusion is something new and unnatural in brushland environments.

Burning is the oldest known practice used by man to manipulate the vegetation on grazing lands. Fire has been used as a tool for at least a quarter of a million years. The Peking man is the earliest known man to have controlled fire, 500,000 years ago. Deliberate burning was used by primitive man for hunting by increasing the visibility for finding game animals, and to attract them after the burning by vegetative resprouting.

Burning was also used to reduce woody plants for improved pasture for livestock grazing, and for clearing land for cultivation of crops. The California Indian was a prime example of man using fire for his advantage. As a result, equilibrium was maintained in the California brushlands, with both naturally and Indian set fires. This continued until the 1950's when fire exclusion, also known as the "Smokey Bear Mentality", greatly decreased the occurrence of fires in the brushland ecosystem, thereby upsetting the delicate ecological balance. The result was a fuel accumulation and an increase in the severity of wildfires. This, coupled with a decrease in accessibility for grazing animals, adversely affected California's brushlands. This has caused a shift back to the use of periodic burning by range conservationists. Although fire is not a cure-all for all range problems, burning can be an effective and practical tool in range improvement.

**What is prescribed fire?** Prescribed fire can be defined as fire used under particular conditions of weather and fuel to achieve specific management objectives in the California brushlands. These management objectives are numerous, and affect many sectors of the public. One objective, which affects all of us, is to decrease the fuel buildup that occurs in brushland where fire has been excluded. The resulting accumulation of tinder dry brush makes for severe wildfires that cause not only millions of dollars in damage to buildings and property, but also the loss of human lives. For example, in 1968, the Canyon Fire in Los Angeles County killed 20 firefighters and caused 10 million dollars in damages. It is more advantageous to have numerous prescribed burns than to risk one out-of-control wildfire. Another objective, which is most important to the livestock industry, is improving the grazing capacity of the lands. California's rapidly growing population has created an increased demand for food. As a result, the livestock industry has to more effectively utilize previously unproductive brushland. One efficient way to improve this brushland, and thus the grazing, is through prescribed burning.

**Prescribed burning accomplishes this goal** in several ways. It removes old, dead material and increases the palatability of forages. It also reduces the size of undergrazed areas. By decreasing the amount of brush, prescribed burning improves the access and availability of forage to grazing animals. Also, the total amount of forage is increased. In a study done by Biswell, brushlands will only produce from 13 to 106 pounds of browse per acre before burning, whereas after burning these same communities produce from 750 to 3,000 pounds per acre. Often times dramatic increases in grazing capacity are realized when prescribed burning is combined with other management practices, such as reseeding to annual or perennial grasses to increase forage production. The end result is more productive rangeland, producing a larger number of lambs and steers for an ever increasing population.

For millions of years, fire has been an important part of California's brushland communities. Due to fire's presence in the ecosystem, from naturally occurring and man caused, brush communities have evolved with fire being an important factor in maintaining the balance of the climax system. This balance was upset with the fire exclusion practices of the 1950's. As a result, the brushlands grew unchecked and accumulated vast amounts of highly combustible fuel which contributed to wildfires that were extremely expensive and hard to stop. So man, with his advanced technology and expensive machinery, went back to one of the oldest tools known to man, fire. Through the use of prescribed fire, man has decreased this fuel accumulation and lessened the severity of wildfires. Stockmen have used this tool, the prescribed burn, to open up previously unproductive brushlands to be used for the grazing of sheep and cattle. Whether by heli-torch or with a simple match, prescribed fires are an important management tool utilized in California's brushlands.

# The Methuselah Bush

**Sarah Steinberg Gustafson**

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When Frank Vasek first encountered the ring of scrubby-looking plants, he didn't know he might be looking at the oldest thing alive. At that time scientists believed that a 4,900-year-old-bristlecone pine was the modern-day Methuselah. But after studying circular clumps of creosote bushes, Vasek, a botanist at the University of California at Riverside, discovered that one such creosote clump began growing in the Mojave Desert northeast of Los Angeles almost 12,000 years ago. If Vasek's arithmetic is right, this ring, dubbed King Clone, may be the oldest living plant on Earth and may help explain how desert vegetation rebounded after the last ice age.

A creosote ring begins with a single seed. The seedling's lower stems send out new branches that develop their own roots. The original seedling diets and decays, and the process repeats itself. Over thousands of years, the ring expands like ripples in a pond—leaving a middle area of bare soil surrounded by a ring of genetically identical bushes.

Such propagation can creep over a large area. Vasek has found hundreds of creosote rings exceeding 30 feet in diameter. King Clone, a rough ellipse, spans 70 feet across its longest dimension. As a rings spreads, it breaks the soil into fine sand, which stores water more efficiently than the coarser soil outside the ring, thereby helping the clone weather droughts. "Although each bush in the ring can survive on its own," says Vasek, "the entire clone functions as a unit."

Vasek first became interested in the clones' age a decade ago when he was on an archeological tour. After noticing a number of creosote bushes that had been crushed by motorcycles, a tour member asked Vasek how old the destroyed bushes were. "I started to answer 300 or 400 years when it dawned on me that I simply did not know," says Vasek. That's when I decided to look into it."

Like trees, young creosote bushes can be dated by counting their annual growth rings. But after 100 years or so, a creosote clone grows by making more bushes rather than by adding bulk to a single bush. Rooting around in the sandy center of older clones, Vasek uncovered chunks of dead wood, which he radiocarbon dated. Dividing a chunk's age by its distance from living bushes yielded a rate of growth for each clone. Averaging the growth rates from a number of clones and applying the result, Vasek estimated King Clone to be 11,700 years old. "This is the oldest living clone we know of," he says. "There may be older ones, but nobody's made the case for them."

Because of its age, King Clone offers clues about how today's Mojave Desert evolved. The highest and northernmost desert of the American Southwest, the Mojave was slow to recover after each ice age. During the last major freeze, which ended about 10,000 years ago, ice covered the mountains of southern California, forcing piñon and junipers to migrate down onto the Mojave plateau. When the Earth warmed, the conifers returned to the hills, and desert plants reclaimed the plateau.

Now the dominant plant of the Southwestern deserts, creosote bushes originated in South America. For years botanists have wondered how long the ubiquitous bushes have been in the Mojave Desert. If they arrived before the last glaciation, did they retreat to a warmer desert when the climate cooled? Or did some, perhaps King Clone's predecessors, remain in the Mojave during the last advance of cold, ready to spread when conditions improved?

Until now pack rats provided most of the answers. Based on examination of seeds and other fossils found—or not found—in pack rat nests, some scientists believe creosote bushes didn't reach the Mojave until 9,000 years ago. "When you deal with fossils," says Vasek, "you take your chances on