

Glade Grasslands in Southwest Missouri

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As early settlers reached southwest Missouri, which is now Ozark, Taney, and Stone counties, they found large natural openings, 500 acres and larger, among the xeric oak-hickory woodlands (Figure 1). Appearing as "sunlight islands", glades were first described in 1818 by Henry Rowe Schoolcraft as follows:

The country....presented a character of varied sterility, consisting of a succession of limestone ridges, skirted with a feeble growth of oaks, with no depth of soil, often bare rocks upon the surface, and covered with coarse wild grass; and sometimes we crossed patches of ground of considerable extent without trees or brush of any kind, resembling the Illinois prairies in appearance, but lacking their fertility and extent. Frequently these prairies occupied the tops of hills, or extended ridges, while the intervening valleys were covered with oaks, giving the face of the country a very novel aspect, resembling, when viewed in perspective, enormous sand-hills promiscuously piled up by the winds.

A striking feature of the landscape, these edaphic grasslands locally referred to as "balds", proved to be a

valuable source of forage for livestock. William Monk (1907), in his writings about life in the area in the mid 1800's stated:

A man could raise all the stock in the way of horses and cattle that he could possible look after. The only expense was salting and caring for them-didn't have to feed, winter or summer, except the horse in use and the cows used for milking purposes.

From the late 1800's until the 1960's, any area not fenced in southwest Missouri was considered "open range". During this period, the glades were heavily grazed by large number of horses, cattle and hogs. Stock was driven from Texas and Arkansas to the "glade country" for "fattening" before being taken to local railheads at Chadwick and Springfield, Missouri.

Of the almost 1/2 million acres of glades which existed in Missouri prior to settlement, the 20 percent now found on public lands retains the best biotic diversity. Most of the private land glades are covered by introduced grasses and/or woody vegetation. An excellent example of glade management using livestock grazing and prescribed

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Fig. 1. An aerial photo from southwest Missouri showing how the glades ("balds") appear as "sunlit islands" among the oak-hickory forest of the area (USFS photo).

burning for glade restoration can be seen on the Ava Ranger District of the Mark Twain National Forest.

The Basic Influence—Soil, Plants, and Animals

Most of the glade soils of southwest Missouri are from a dolomitic bedrock, high in magnesium. Dolomitic glades also tend to be acidic. Since dolomitic bedrock weathers slowly, the soils are very shallow (0–15 inches). However, these shallow soils can and do support a prairie grass community. With the presence of magnesium and an acid condition, a number of endemic plants are added to the community.

Little bluestem, Indian grass, bluets, calamint and bald grass predominate their prairie community. Other grasses include side-oats grama and prairie dropseed. Other plants which add color to the glades are: purple and yellow coneflowers, Missouri black-eyed susan, Missouri evening primrose and purple beard-tongue. Some unusual species restricted in Missouri to the acidic dolomitic glades are: prairie acacia, smoke tree, Ashe's juniper, and centaury.

While most animals seen on the glades are visitors from adjacent forests, several are at home on this parched habitat. The brush mouse, normally inhabiting sage, grass, and brush of the southwestern deserts and plains, can be found on these prairie glades. Other xeric adapted animals found are the collared lizard (Figure 2), pigmy rattlesnake, roadrunner, and the Bachman's sparrow.

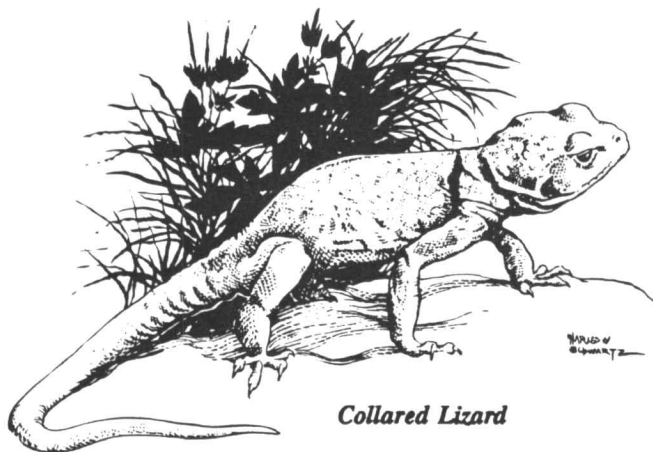


Fig. 2. The glade soils derived from a dolomitic bedrock provide a diverse condition for a number of endemic and unique species—such as the collared lizard.

Bison and elk, as large herbivores, played a role in maintaining the glades. Unfortunately, they have been extirpated from southwest Missouri.

A Necessary Influence—Climate and Fire

Looking at the structural and behavioral adaptations of glade plants and animals will quickly lead one to conclude such species evolved with a low rainfall pattern and fire. Most glade plants are either deep-rooted perennials having a large part of their mass underground as corms, rhizomes, or bulbs, or ephemeral annuals which complete their life cycles in the early spring when moisture is available. While animals avoid the intense solar radiation

on the glades by burrowing under rocks, plants are adapted by being lighter or more silvery in color, with narrowed leaves to reduce dessication.

Annual growth of glade plants, except for woody species, dies back yearly and has next year's growing point at or below the soil surface. While this annual die back provides a fuel highly suitable for ignition and spread of fire, a plant having its growing point near the soil surface also avoid the most intense heat of the fire. Since the growing points of woody species are exposed above ground, they are more likely killed or damaged by a fire.

With the establishment in the mid 1930's of two government agencies, the Missouri Department of Conservation and the U.S. Forest Service, fire protection became more effective. The natural openness of the glades began to disappear as grass vegetation gave way to woody plants, the most serious being eastern red cedar.

A Needed Influence—Livestock Grazing

As a result of William Monk and others who wrote about the unlimited forage resource, more people and their livestock were attracted to the glades than could be supported. By early accounts, every 40 acres with a "good spring" (as a source of water) soon had a family homestead which grazed stock on the glades.

The glades could not support the unlimited year-long grazing. By the 1930's on "open range" the composition of the once productive prairie glades had changed to a community of annual bald grass and black-eyed susan intermingled with some scattered clumps of side-oats grama or little bluestem. Overgrazing more significantly contributed towards an increase in invading plants like eastern red cedar (Figure 3).



Fig. 3. Unlimited yearlong grazing led to an invasion of eastern red cedar and a loss of forage productivity on the glades. (USFS photo)

When "open range" ended in the early 1960's, it finally allowed the Forest Service to begin a range management program. The first task was to confine the traditional user to an allotment with a set number of stock for a specified time period. This change, although basic in nature, was

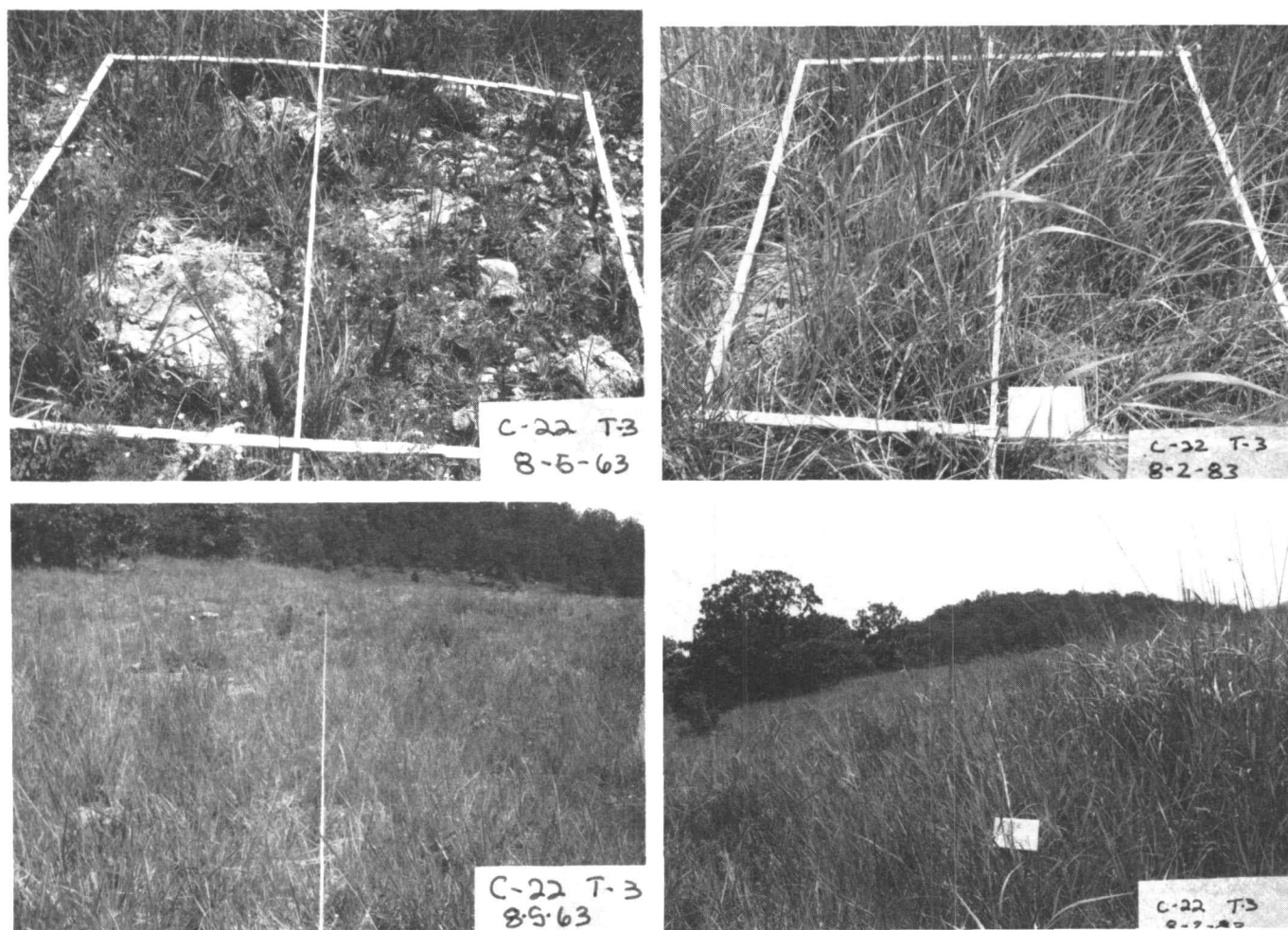


Fig. 4. The same location in 1963 and 1983 taken along a Parker two-step transect illustrates an increase in desirable plant species when glades are prescribe burned and properly grazed. (USFS Photo)

undoubtedly the most difficult. Local opposition to government control was outspoken and exceedingly strong.

During the early 1970's rest rotation and deferred rest

rotation grazing systems were instituted. The benefit from these management schemes was not fully realized until prescribed burning was added to the range man-



Fig. 5. Photo on left is a grazing allotment prior to Forest Service understanding the role of fire in the glade ecosystem. Photo on the right shows the glade as it looks today.

agement program. Not until fire was once again part of this ecosystem did the full potential of plant responses become evident.

In 1988, after a decade of prescribed burning, some 6,000 acres of range surveys (Parker two-step method) were completed on the glades of the Ava Ranger District. The surveys showed the average yield of herbaceous vegetation had doubled from 549 pounds per acre (dry weight) to 1,147 when prescribed burned. Prescribed burning also had the effect of increasing the percent of desirable plants [desirable plants were defined as those used for food by livestock and wildlife] while decreasing the undesirable ones (Figure 4). Although caution is needed in drawing conclusions from non-research data, a certain confidence is felt in the following:

1. Cutting of the cedar and burning can double the herbaceous vegetation.
2. Desirable plants increase and least desirable plants decrease with burning.
3. Herbaceous production rapidly declines when a glade starts to exceed more than a 1/3 cedar cover.

Conclusion

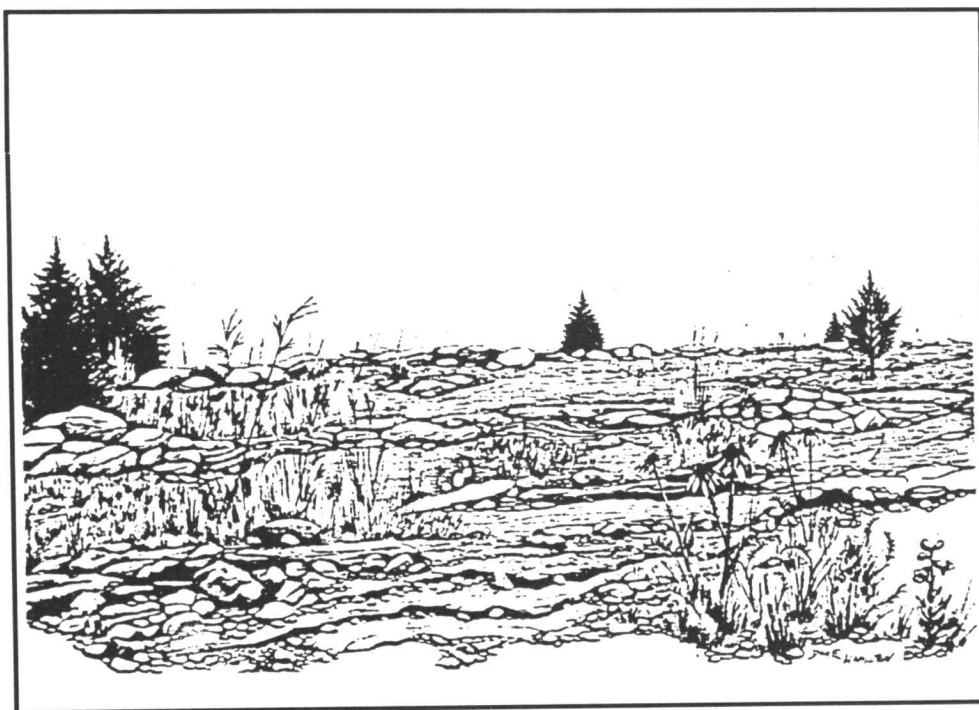
The production and health of the glades of southwest Missouri require not only knowledge of how the soil, plants, and animals (basic influences) interact, but an understanding of the other influences of fire and grazing (Figure 5). To keep the thousands of "sunlight" islands" also requires them to be "fire lit" islands too.

Unfortunately, having evolved under the influence of shallow soils, low annual rainfall, fire, and grazing by native bison and elk, a large number of the glades communities on private lands will remain destroyed or damaged because the basic, necessary, and the needed influences will not be considered in their management.

Aldo Leopold stated it best—"A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it does otherwise".

Literature Cited

- Henry Rowe Schoolcraft. 1821.** Journal of a Tour into the Interior of Missouri and Arkansas ...performed in the Years 1818 and 1819, London: Richard Phillips and Company.
- William Monks. 1907.** A History of Southern Missouri and Northern Arkansas. West Plains, Missouri: West Plains Journal Company.



Typical glade in southwest Missouri as drawn by Missouri artist David Hamilton.