

Exploring Options to Restore Wisconsin's

Oak Savanna



The word “savanna” generally refers to scattered trees growing in a landscape dominated by grasses and wildflowers.

Oak savanna was once widespread across southern Wisconsin. Today, true oak savanna is rare. One factor in this loss is the elimination of wildfires that swept the landscape, suppressing brush while maintaining prairie grasses and fire-resistant oaks. Browsing and grazing by most native herbivores no longer occurs, and our understanding of their impact on savannas is still developing.

But a group of researchers is taking a fresh look at savanna remnants, and exploring whether controlled livestock grazing and burning can help restore oak savanna.

In the 1800s, oak savanna (or *oak openings*) once covered more than 5,000,000 acres in Wisconsin. Savanna was a transition zone between the eastern forests and the prairies to the west. Now, only a few thousand acres of this native landscape remain, mostly on private land.

Unfortunately, where remnants of oak savanna remain, invasive plant species have replaced the native groundlayer vegetation. These degraded areas are usually overgrown with trees and shrubs.

An important first step in conserving these native ecosystems is removing brush from degraded

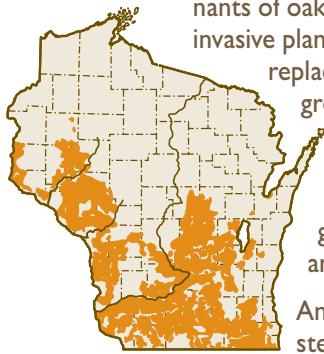
oak savanna remnants to restore their original open vegetative structure. At present, some agricultural land managers in Southwest Wisconsin are using Scottish Highland cattle in a system of rotational grazing (see sidebar). The cattle fill a niche market for lean red meat, but they are also a hardy breed, able to browse and remove undesirable species such as prickly ash, multiflora rose, wild parsnip and box elder. In effect, grazing Highland cattle in oak

savanna remnants may be an efficient way to help clear undesirable shrub species.

The goal of the research project described in this booklet is to scientifically investigate the potential of using Scottish Highland cattle in savanna restoration. The study will examine whether low to moderate grazing rotations will help control woody vegetation and help or hinder the native groundlayer. The study will also determine the impact of these various management strategies on soils, insects and small mammals.

Specifically, the savanna grazing research project will:

- Determine the effectiveness of two rotational grazing regimes on reducing shrub and sapling cover with and without spring burning, and on restoring native oak savanna vegetation.
- Evaluate the potential for incorporating degraded oak savanna acreage into productive rotational pasture systems on private livestock farms.
- Compare the effects of grazing on vegetation to the effects of fire, and the effects of grazing in combination with fire.



■ Wisconsin's original oak savanna (from Curtis, *Vegetation of Wisconsin*)



■ Grazing Scottish Highland cattle.

What is rotational grazing?

Rotational grazing means regularly moving livestock among a series of small pastures. The landowner first divides a pasture into smaller areas or "paddocks," using portable fencing. One paddock is grazed for a time, while the remaining paddocks rest and recover. Rotating livestock to different paddocks allows higher stocking rates and shorter grazing periods than grazing continuously on one pasture. This allows the vegetation in each paddock to re-grow before the next rotation.

- Compare grazing and fire effects on light levels, litter and soil characteristics (organic matter, soil nutrients and bulk density) that appear to be strong factors in the growth of oak savanna understory.
- Compare the impact of grazing and burning on the insects and small mammals of an oak savanna.
- Determine the impact of grazing on livestock performance and, if possible, calculate the economic potential for incorporating degraded oak savanna into productive rotational pasture systems on private farms.

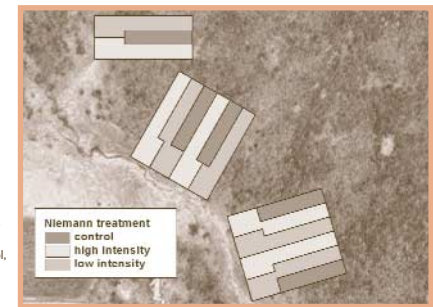
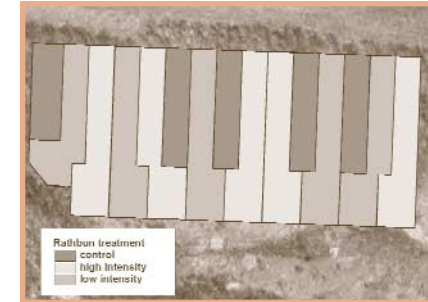
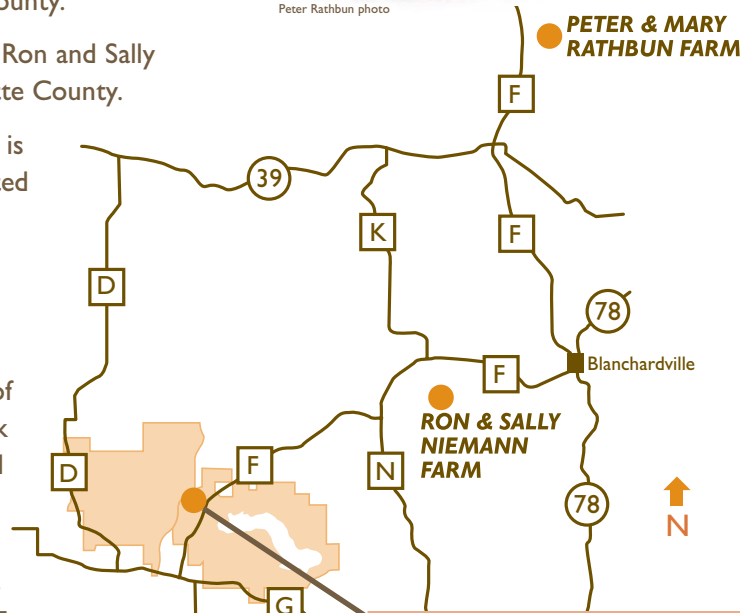
Research areas:

The research is being conducted on two private farms and a state wildlife area.

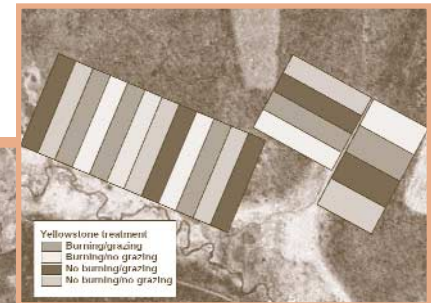
- Creag-Is-Daru is owned by Peter and Mary Rathbun and located in Iowa County.
- Prairie Oaks Farm is owned by Ron and Sally Niemann and located in Lafayette County.
- Yellowstone Lake Wildlife Area is managed by the DNR and located in Lafayette County.



Peter Rathbun photo



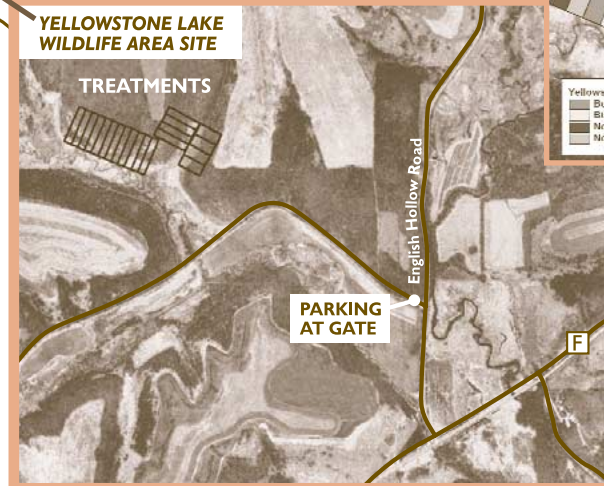
Aerial photos courtesy of the Wisconsin Department of Natural Resources, with illustrations by Emily Kathol, University of Wisconsin Department of Landscape Architecture.



Experimental methods:

At the Yellowstone Lake Wildlife Area, the site is divided into 5 sets of four 1-acre paddocks. In one paddock no grazing or fire occurs. In a second paddock only fire occurs, and in a third only grazing occurs. In the fourth paddock both fire and grazing are being used. The length and timing of grazing and rest periods is held constant among the paddocks. Cattle rotate through the paddocks and then onto adjacent pasture for a brief time, and the cycle then repeats. This results in 4 to 5 rotational cycles over the grazing season.

On the two private lands, researchers have divided each site into 5 sets of three 1-acre paddocks. One paddock is not grazed. Each of the other two paddocks has a different rotational grazing regime, varying in the length of time the paddock is grazed, with a three day grazing rotation in one paddock and a one day rotation in the other.



- The three treatment sites, shown above over aerial photos are (from top): Creag-Is-Daru, Prairie Oaks Farm, and Yellowstone Lake Wildlife Area.

At left is a detail of the Yellowstone site showing where visitors can access this public land.

Baseline data collection for vegetation and insects began in the summer and fall of 2000 (see sidebar). The project treatments (grazing and burning) began in the spring of 2001. Final data collection and statistical analysis will take place in the Fall of 2002 and Winter of 2003.

If you see people in the plots during the next year or two, they are probably engaged in some of the following research activities:

- Analysis of vegetation composition and structure, including the presence and abundance of herbaceous and woody species, shrub cover, shrub and sapling density, and tree density.
- Estimates of aboveground herbaceous biomass, analysis of plant nutrients, measurements of litter depth, light levels, and soil compaction.
- Identification of insects dwelling in soil and litter.
- Analysis of small mammal communities using an array of live traps and deeper pitfall traps.

- Estimates of deer browse versus cattle browse using deer exclosures.
- Monitoring of livestock dietary intake by examining cattle forage in the field and tissue sampling of browse, pre-grazing and post-grazing vegetation. Evaluation of cattle performance through body condition scoring and weight gain measurement at the beginning and end of each grazing season.

By the summer of 2003, researchers should have answers to some of the basic questions identified at the beginning of the project. Can grazing reduce shrub and sapling growth within degraded savannas? If so, what combination of grazing and controlled burning works best? How do grazing and burning alter herbaceous composition, soil compaction, erosion and certain chemical properties? How do grazing and burning of degraded oak savanna compare in forage production and quality? Finally, is rotational grazing with Highland cattle a practical technique for restoring oak savanna?



■ Scottish Highland calves.

Results of baseline vegetation studies in summer 2000.

Baseline studies provide researchers with an indication of the overall state of the plots before the grazing and controlled burning began in the Spring of 2001. Sampling of herbaceous plants revealed the presence (at low levels) of many prairie grass and forb species, including little bluestem, Indiangrass, side-oats grama, leadplant, round-headed bush clover, purple prairie clover, bird's foot violet and rosinweed. Sampling also revealed a high density and frequency of invasive, aggressive woody shrub species.

Some of these invasive plants were natives (gray dogwood, prickly ash, gooseberry) while others were exotics (autumn olive, honeysuckle). Large, open-grown oaks were present throughout the plots, but large numbers of invasive tree and shrub species were growing between and beneath the oaks, filling in the openings that are an important part of the oak savanna structure.

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Peter Rabinun photo

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