Savanna Restoration a Multi-year Project. Winter 2020 Update
This is the third in a series of yearly articles on this topic.
On the assumption that it will helpful, I have repeated some introductory information from those previous writings. To see the previous articles, scroll back on our Facebook page to early 2018 and early 2017.
In this article I will report on ongoing work and progress, using text and photos.
The goal of this work is to restore savanna areas to our Snake River Farm in the Anoka Sand Plain of Central Minnesota.
The purpose of savanna restoration is to improve the general health of the biome, including soil, water, microorganisms, insects, wildlife, plants and farm animals.
The method of restoring these overgrown woodlands includes
1. Severe, selective thinning.
2. Winter bale grazing with bison, cattle and sometimes sheep.
3. Rotational grazing during the growing season.
4. Inter-seeding as needed (especially with legumes) to achieve a healthy and vigorous sward.

A savanna is a grassy terrain with spaced trees and shrubs. The trees and shrubs are spaced such that at least 10% but not more than 50% of the ground is shaded. In the north central US, the dominant savanna trees are White Oaks. The most common savanna shrubs are fruit bearing trees such as wild cherries and crab apples.
This combination of acorn producing oaks, fruit producing shrubs, with underlying grasses and forbs is one of the most productive natural systems on earth.
A productive savanna provides food and habitat for a great variety of birds, animals, insects and soil building microbes.
Worldwide, savannas are one of the most common and most productive natural landscapes.
Savannas are pleasing to humans also. In fact, most parks and playgrounds are actually savannas.
In nature, savannas are produced primarily by free roaming, grazing animals in temperate climates.
Prehistorically, bison and elk herds produced a broad swath of savannas from Texas to Canada.
Until the 1970s, the small farms of mid-America maintained savannas as pastures.
Most of those small farms have disappeared over the past fifty years.
Since then, many Minnesota savannas have been cleared and converted to continuous cropland.
Many other savannas have become overgrown with brush and weedy trees.
You can easily spot thousands of small savannas if you know what to look for. You can identify an overgrown savanna by looking for “open grown” white oaks. Those white oaks are now crowded by younger trees and bushes.
An “open grown” oak has horizontal or lateral branches. Those branches, which are now shaded, grew when the oak was standing in the open.

The first photo shows the bison herd wintering in an area that we have severely thinned. The history of this part of the woods is somewhat different. It has never been grazed. But it was an oak savanna 100 years ago. I know that because the huge open-grown, savanna White Oaks came down in a wind storm in the early 1980s. Those oaks were around 150 years old. That windstorm opened the area for the thick understory of younger trees. The resultant forest that stood before this thinning was a combination of White and Red Oaks. Those trees grew up straight with few lateral limbs. Trees grow straight and tall, as in a pine planation, when they are surrounded by similar trees.
We thinned this space over the past three years. We left a few White Oaks, young Maples and Cherry trees.

We cut an incredible amount of timber to produce this potential savanna of several acres. To get to this stage we removed 95% of the trees. Less than 1 in 20 remain. There are a few stumps in the photo, but literally hundreds of stumps are cut to the ground.
In this photo I have set round bales for the bison. Bale rings or feeders of any kind do not do well with bison. The destruction of such devices is a recreational activity for them.
That is not really a problem however. Bison are extremely conservative with feed and water. They will clean up bales before they move on the next with almost zero waste. I set bales on end, with the wrap on. I can set out enough bales for several weeks and they waste nothing.
The bale strings are easy to pick up in the spring if it is done soon enough.

Second photo. This is a view from east to west of the area in photo one. We cut many hundreds of trees to open this area. Many of those were mature Red Oaks, larger than the White Oaks that remain.

Third photo. I set bales in this area three times. The final pattern of bales was no more than 20 feet from one bale center to another. That is pretty close. It leaves an almost solid covering of manure and inedible hay. More manure than hay. Bison will pick through the remainder of a hay bale much more thoroughly than cattle.

The fourth photo shows a different area where two open grown oaks have been liberated. A solid thicket had come to surround them over the past sixty years. In the foreground is a small Burr Oak that we left for variety. Many large and small Red Oaks have been removed. Many more small Reds need to be cut on the right of the photo and in the background.

The fifth photo shows this area before we started to thin. The photo is from a different angle but it provides a good view of just how thick the trees were. The ground was essentially 100% shaded, even without leaves on the trees. Nothing but a few spindly plants grew beneath. Most of the surface was bare ground with a thin covering of decaying leaves.
Bare earth beneath the trees supports little life and maintains only a thin forest topsoil.

The sixth photo shows the same area after initial thinning was begun. Dozens of large and small trees were removed to achieve this beginning. In the foreground are some of the larger logs. The logs were set aside for lumber and firewood.

The seventh photo was taken in late summer of the first year after thinning. Near the edge of the emerging clearing, grass has already taken hold. There are at least a few grass plants near the edge of any wooded area. Those plants take off very quickly when they receive full sun. Farther back, annual pioneer plants like Pigweed, Ragweed and Lambsquarters emerge on the bare ground. Pioneer plants are often considered weeds. These beneficial plants are well known for preparing the way for perennial forage plants. In addition, they are themselves, good, edible forage.
Notice also that several Red Oak stumps are sprouting brushy new growth.

The eighth photo is a close-up of a Red Oak stump full of first year sprouts. The common remedy is to spray sprouting stumps with a broadleaf herbicide. I will not use herbicides on our farm for many reasons. Broadleaf herbicides like those used in many lawn products are terribly fatal to all types of clovers and legumes. Those legumes are crucial to soil building.
We use the grazing animals to control these unwanted sprouts.

The ninth photo shows what the bison and cattle do to oak sprouts. Fewer and fewer sprouts will emerge for several years, and then the stumps will be dead.
In addition to the physical effects of grazing, the saliva of ruminants appears to have a toxic effect on these shoots.
The great majority of stumps have been cut down to ground level so that I could get a farm tractor with a grapple in to remove limbs and logs.

Tenth photo. There are at least thirty stumps, mostly Box Elder, in a 30 by 30-foot section of this clear-cut space. It will be luscious green pasture in two years.

The eleventh photo is a savanna that we produced by severe thinning of a mature oak woods. This small wood had no open-grown oaks. It has several ancient (before 1820) bison wallows. It was a favored lounging spot for bison. This spot is near the river but high, dry and sandy. The area may have been held open by bison until they were exterminated. Then many oaks sprouted at once. Again, most of the stumps have been cut to the ground and reduced with a stump grinder. Within three years it developed from bare ground to a nice pasture. Grass moved in naturally and I interseeded white clover.
In a situation like this, the tall trees are exposed to open weather for the first time in their lives. They are now susceptible to destruction by wind.
We left smaller trees as insurance.

Grazing and browsing animals are necessary tools for savanna restoration or development.
We are fortunate to have several species of grazing/browsing animals on our farm. Each species is a different tool.

The twelfth photo shows the cattle grazing on bales in an established savanna.
I believe bison have some advantages in restoration work but properly managed cattle can do a perfectly adequate job.
In this photo I am using the herd to improve open grassy spaces. I use bale rings for cattle. Without rings, cattle tend to lie on the hay. Once they do that they will not eat from that pile. I move the bale rings each time I refill them. That prevents the development of thick manure-hay mats. Thick mats can smother the grass for a year or two.
On the other hand, thick mats seem to be great organism incubators. Microorganisms, worms and insects spread outward from mats for years.

The thirteenth photo shows some of our sheep in their winter pasture. They have debarked a small elm seedling. Brush clearing is something that sheep and goats are very good at, winter or summer. We use the sheep to de-brush smaller areas of the farm. That is particularly convenient using moveable, electrified, mesh fencing.
Sheep can be a very useful tool, but they can be left too long. Overgrazing by sheep can damage savannas and pastures. They can both kill too many woody plants. Sheep graze very short. Left too long in a rotation, they can kill grasses and legumes.

Since I am on the topic of grazing animals, I will mention horses. Horses are not a good tool for pasture or savanna restoration. Fundamentally, that is a result of their small stomachs and natural need to run from danger. Horses are relatively fussy eaters. We keep a herd of ten horses. I rotate the cattle and sheep through the horse pastures to manage those pastures correctly.
Pasture improvement is relatively easy.
Savanna restoration is a lot of work.

It might be less costly to buy additional land than to restore what we have. But that is not the point. We should improve the land we care for.
I intend to write an update next year. Tom

First photo

Second photo

Third photo

Fourth Photo

Fifth Photo

Sixth Photo

Seventh Photo

Eighth photo

Ninth photo

Tenth photo

Eleventh photo

Twelfth photo

Thirteenth photo