

## **Restoring Savannas in Central Minnesota, Step by Step.**

For small parcels.

Takes five-to-seven-years.

The Sustainable Farming Association has a ton of information and sources for help here;

<https://www.sfa-mn.org/silvopasture-resource-manual/#1>

### **Task Outline and Schedule.**

In general, this is set-up for one step per year, but some steps can be combined or accelerated.

#### **Step one. Evaluate site and imagine what you can make of it.**

- a. You can do this yourself. You need to know your tree and shrub species.
- b. Or get lots of free or low-cost guidance from the MN Forester's Association, <https://www.minnesotaforestry.org/>
- c. or NRCS,
- d. or the U of M,
- e. or many other organizations listed in the SFA Manual above.

#### **Step two. Initial thinning/harvest.**

- a. You can do this yourself or with family labor. You need a chainsaw & a tractor, 30 to 70 hp.
- b. Or you can hire a logger.

#### **Step three. Brush thinning/clearing.**

- a. You can do this yourself or with family labor. You need a chainsaw and a portable brush saw. A tractor of suitable size with a rear mounted brush hog is very helpful.
- b. Or you can hire skilled local labor.

#### **Step four. Fencing as needed.**

- a. You can do this.

#### **Step five. Initial Planting & Grazing. There are several ways you can accomplish this.**

- a. Graze it periodically. Desirable forage will come, but "b" & "c" below will move the sward along much faster.
- b. Bale grazing is simple and productive.
- c. Add desirable plant species with hand held broadcast seeder.

#### **Step six. Second Thinning and stump removal.**

#### **Step seven. Interseeding/Reseeding.**



#1. This photo shows a large white oak. The shape of that tree with large lateral limbs, tells us that it initially grew in a open space. It has been crowded in recent decades by boxelders, black cherries, red oaks and buckthorn brush. I spent a half day cutting small trees and brush from under the white oak canopy, two years previous to this photo. The crowding was then much worse. I do not take enough before and after photos.

There are several red maples in the photo also. We want to liberate the white oak and allow the red maples to grow. The final setting should provide over 50% sunlight to the surface.



#2. This is the same scene, from a slightly different angle, three years later, in the Fall. The maples are in color. The stump in the right center, is of the red oak that is to the left center in the previous photo. The White Oak has plenty of space. The soil surface, which was formerly bare of grazable vegetation, has been reseeded and is growing a rich mixture of grasses, legumes and forbs. The maples have space to grow into good sources of maple syrup.

### **Introduction;**

There are countless overgrown oak woodlands and brush filled areas in Central Minnesota. Many of these areas were formerly wooded pastures. If they existed now, we would call those pastured woodlands oak savannas or silvopastures.

Proper thinning, reseeding and grazing can greatly improve the value and benefits of these wooded areas. You can make these wooded areas productive for farming, improve the wildlife habitat, increase the natural beauty and increase the carbon storage capability.

The carbon storage capacity of living top soil can far exceed the one-time storage capacity of a forest. Taking on too much at once, or relying too heavily on outside expertise can make the project too big or too expensive to even begin. It is easy to arrive at the point of thinking, "This will cost so much per acre that I might be better off just buying more usable land."

This paper lays out a multi-year, step by step process that is manageable, gives usable results in two or three years and is doable by the small farmer or land owner.

### **Background;**

Our Snake River Farm consists of 240 acres of mixed terrain in the Anoka Sand Plain of east central Minnesota. The farm contains a mile of the river, lowlands, transition land that was historically oak savanna, and open areas that were tilled until 1990.

The meandering path of the river created many small areas, ranging from one to five acres, which were in need of restoration. Those wooded and brushy areas, including historic savanna and lowland segments, comprise over 120 acres.

Since 1990, we have been slowly, but steadily working to improve the grazing capability of the entire farm. In recent years that effort has intensified with excellent results. The farm is now totally fenced and subdivided into more than 70 grazing paddocks.

Once we developed a method and learned to take it one step at a time, the entire process became more manageable.

Like other farms, we are seasonally very busy. We work on savanna restoration as time allows.

We have numerous small areas in some stage of this multi-year program at any one time. We work on areas when the conditions are right. For example, we work on low pastures in the winter when the soil is frozen.

We believe we have turned the corner on restoration. We now have many segments that are beautiful, productive savannas. Others that are being improved each year. There are still segments that we have not yet focused on, but we know what these areas will be like when completed.

### **General Suggestions;**

Start with the easiest segment you have.

Take your time, but get started.

Be careful. Logging and brush clearing can be dangerous. Develop knowhow and safety skills.

Use the tools and machines you have. Buy new tools as you gain experience.

There is a lot of labor required.

If you do not know the plant species that grow on your land, learn. You need to be able to identify and judge, trees, shrubs, weeds, forages.

The Internet knows everything. From chain saw safety to tree, shrub, and forage plant identification.

### **Rotate livestock through as soon as possible.**

Their hoof action and manure help to get desirable forages started.

Livestock will help you contain undesired regrowth.

Their hooves will break sticks turn them into soil carbon

**First Step; Evaluate and Plan.**

**Objective is to learn what you have, then envision what you want it to be.**

Survey your woods. There is a lot of good, free help for this.

Generally, decide which of the extant tree or shrub species you want in the end.

A proper savanna should have no more than 50% and no less than 10% shade to the ground.

Shrubs and small trees cause the most shading. Plan to take most of those out.

Leave the trees you desire, including young trees.

Leave native shrubs in appropriate quantity.

Educate yourself as needed.

Try to line up a buyer or user for the trees you will take out. Unfortunately, wood product companies have little interest in small quantities.

If you know someone with a portable saw mill, that can provide a use for good logs.

Otherwise, many folks still use firewood.

Take some photos at each step. I often forget that.



#3. This is a good example of a white oak that is being smothered in recent decades by rapidly growing red oaks and brush. This tree will be relatively easy to liberate.



#4. This is an example of a formerly open grown white oak that has been seriously damaged by crowding. Its lateral limbs have died because of shading. The tree will prosper if the savanna is restored but it has permanently lost its open grown appearance.



#5. This is an example of overgrowth on moderately wetter, lower soil. Much of what you see are poplars, red oaks, and brush. There are however, plenty of birch and red maples to make an excellent savanna pasture.

## **Second Step; Initial Thinning and harvest.**

**The objective this year is to get sunlight to the ground.**

**Equipment required;** We use a full-size chain saw for the trees and small chain saws for brush.

Use a FULL complement of safety gear.

### **The Work;**

Cut down the stuff you are most sure of. That means most of the brush. I leave some native shrubs but I severely limit buckthorn and most cherries.

Leave more than enough living trees. You will damage some during thinning. Other, newly exposed trees, may be damaged by wind in the next several years.

You can just drop the trees and leave them to dry in place. If you thin when the plants have leaves, the leaves will dry off and sun light will reach the ground.

Just getting sun light to the ground will allow many grasses and forbs to take hold.

Tap-rooted weeds will spring up. These pioneer plants are beneficial and temporary.

There is no rush to clear the ground. If you allow the cut material to simply rest where it falls, in a year, or even a couple of seasons, it will dry and thus give up much of its weight. Let time work for you.

Do the easy stuff first. If you find a tree that should come out but looks dangerous, leave it for another year.

Drop the trees of undesirable species. For me undesirable trees are Boxelder, American Elm, Siberian Elm, Ash (the Ash Borer is coming for them.)

Take out mature trees except not White Oaks.

I leave straight-grown, mature trees of the less desirable species for another year.

Trees with long clear trunks like close-grown red oaks have leaves only at the top. The shade of such trees is tolerable because it moves rapidly during the day.

You can harvest more in coming years.

After you fell a tree, cut most stumps short enough that your tractor can be driven over them.

Leave the complex or massive stumps for shortening another year. Take care to cut everything that you will drive over, short and parallel to the ground. Especially brush stems which could puncture a tire



#6. This photo was taken almost a year after the initial thinning. Saw logs were pulled out some months previous after they had given up much of their moisture (weight). This area has plenty of white oaks of all ages. Red oaks were cut along with brush.



#7. This photo was taken nine months after the initial winter thinning. Saw logs were removed. Two open grown white oaks to the right were liberated. Several small diameter maples, in the distance were spared. One six-inch maple, to the left of the larger white oak, was unintentionally broken by a felled tree. That is hard to avoid.

We are feeding the cattle using bale rings. Their hooves grind up sticks, stir the soil and bury seeds.





#8. Bale grazing means placing hay bale where we want the livestock to feed. Bale grazing has many soil benefits. It leaves the soil surface covered with rich manure, lots of carbon material to feed the soil organisms, protection from erosion and an emerging sward of excellent grasses and legumes. The animal's hooves break up sticks, mix the top surface of the soil and plant seeds that come with the hay.

**Third step; Clearing, cleaning up, seeding.**

**The objective this year is to open the area for machinery and grazing.**

Clear the soil surface of most of last year's cut timber and brush.

Minimize stumps.

Begin seeding. Grasses and legumes. Native forbs will probably reappear on their own.

**Equipment required;** Full-size and small chain saws.

Tractor with grapple (best) or loader.

A tractor powered brush cutter is very helpful also.

Shoulder-Carry Seeder.

A single section of an old steel harrow is useful. Simply dragging limbs for soil disturbance and seed covering can work also.

**The Work;**

Clear all the logs, brush and debris. Use what you can for saw logs and firewood.

Pile and burn what you must.

Cut most of the tree and brush stumps short so they do not damage tractor tires or prevent minor surface tillage with the harrow.

Do not set stump removal as a top priority. You can leave the huge or difficult to cut stumps. Time will take care of them if you can work around them.

Use the brush cutter but do not abuse it.

Overseed as appropriate. It is helpful if you can harrow to open the soil surface. The harrow can also be useful for seed coverage. A packer is better.



#9. You can see from the straight stems of the remaining trees that this woodland was virtually fully shaded. We removed tons of red oaks, boxelders and elms. We kept only maples for syrup and a few red oaks for future firewood or saw logs. We make maple syrup. With this “maple bush” and several more, we intend to produce maple syrup in greater volume.



#10. This area was thick. All of the trees in the near field are straight grown red maples. These trees have been densely crowded their entire lives. Now that they have space, they will grow rapidly. There is some risk of wind damage to newly exposed trees.



#11. This is a low wooded area. The pink tapes and stakes mark the surveyed property line. The line is toward the left side of the photo and runs directly away from the viewer. The right side of the photo has been initially thinned. The large trees are red oaks. Those will be harvested in the future. Clumps of white birch will remain as will red maples. This new paddock was seeded to a mixture of moisture thriving grasses and legumes with an oat nurse crop. It was also fenced. After the oats ripened, I made a pass with a brush cutter. The forages took hold spectacularly and provided excellent grazing in the first year.



#12. This area has been initially thinned, cleared of brush and grazed. The trees in the photo are mainly maples with several white oaks. The soil surface greened up quickly. If you look closely, you will see many coarse pioneer weeds. That is normal and generally good. This lot will need to be thinned again. It is still too thick.



#13. A simple, inexpensive seeder works just fine. Prepare the surface with a light harrow or disc, or even a dragged tree limb. You can cover the seeds in the same way, but a rolling packer works best. We have an inexpensive tractor mounted broadcaster that works quite well also.

#### **Fourth step; Fencing and water**

**The objective this year is to prepare your emerging savanna for livestock.**

You can use permanent fencing, but in many situations cheap temporary electrified fencing is adequate. Animals need good water at all times. Surface laid, black ABS is cheap and adequate.

**Equipment required;** You know this stuff. Or visit the Sustainable Farming Association website. There are unlimited choices.

#### **The Work;**

Build a fence suitable for the livestock you will graze. But do not over invest. Fencing needs change.

Provide a good water source.

Plan to rotate with adequate rest periods.



#14. Bison grazing a new paddock.

Goats, bison, cattle, sheep and horses will all browse, more or less. They can help develop and improve pastures in countless ways.

These bison are helping subdue alder brush regrowth in this low savanna.



#15. Goats will eat almost anything but they prefer a high percentage of buds and small stems. They are amazingly adept at debrushing.



**Fifth step; More seeding & Grazing. There are several ways you can accomplish this.**

**The objective this year is to improve your savanna.**

- a. Graze it periodically. Desirable forage will come, but “b” & “c” will move the sward along much faster.
- b. Bale grazing is simple and productive.
- c. Add desirable plant species with a hand seeder or tractor driven overseeder/interseeder.

**Equipment required;**

Shoulder-Carry Seeder.

Or, a three-point tractor-mounted, grass interseeder (not a broadcaster) is very useful here. You could rent one or perhaps borrow from NRCS. Watch for stumps.

**The Work;**

Rotate your livestock through two or three times during the growing season.

Graze according to the principles of adaptive, rotational grazing.

Bale graze in winter to add nutrients, organic matter from leftover hay and especially to add seeds.

Interseed/overseed the forage species your emerging savanna is lacking. Work toward the greatest number of perennial forages possible. Balance grasses, legumes and forbs. For me that generally means adding more legume species.



#16. This is a typical “work in progress” segment. This low area was mostly covered with alder brush. Several maples are visible in the foreground, along with a dead black cherry tree. There are a number of rotting stumps visible. Also, a pile of recently collected bushes and small trees. In the background, the elevation increases enough to provide for oak trees. The background area is grazed but needs thinning. Maybe next year.

**Sixth step; Second Thinning, regrowth clipping as needed, stump cutting.**

**The objective this year is to improve your savanna by doing a second cut of trees and brush and controlling regrowth from stumps. Cut remaining stumps when warranted.**

**Equipment required;**

Chain saw.

Tractor with grapple (best) or loader.

A tractor driven brush cutter is helpful if you need to constrain regrowth.

**The Work;**

Now that your woodland has settled down from the initial thinning, you can get a clearer view.

Some trees you intended to leave, may have been damaged. Take them out.

You initially should have left “too many” possibly desirable trees. Make more thinning selections.

Sprouts from stumps should be controlled by your livestock. If not, a pass with a brush cutter should take care of the regrowth.

You might cut some of the stumps that you originally by-passed. Or not. Dead stumps are actually good habitat for many insects, small organisms and rodents.

If you left some mature, straight stemmed trees, you might harvest those now, or leave them for future harvesting.



#17. This is regrowth on a red oak stump. Some stumps regrow more vigorously than others.



#18. This is the same stump after the beef herd spent a day in the paddock. Cattle and bison will aggressively browse regrowth. Browsers especially like boxelder and buckthorn regrowth. It is somewhat an acquired taste however. The animals should have history of exposure to the plants. I try to identify and keep cows that tends to browse well. They will teach their herd mates to do so also.

#### **Seventh step; Reseeding and Grazing**

**The objective this year is to feed your livestock while using them to improve your savanna.**

#### **Equipment required;**

Shoulder-Carry Seeder.

Or, a three-point tractor-mounted, grass interseeder (not a broadcaster) is very useful here. You could rent one or perhaps borrow from NRCS. Watch for stumps.

### **The Work;**

Rotate your livestock through two or three times during the growing season.

Interseed/overseed the forage species your emerging savanna is lacking. Work toward the greatest number of perennial forages possible. Balance grasses, legumes and forbs. For me that generally means adding more legume species.

Graze according to the principles of adaptive, rotational grazing.



#19. This is one of my favorite savanna spots. These white oaks had been crowded for 50 years. They responded with hundreds of trunk buds, new shoots from the bark that had not experienced direct sun shine for half their lifetime. If the goal is saw logs, buds are a problem. Our goal with trees like these is shade that sweeps through each day with the sun.

I like to think the trees are expressing their joy.