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Photo: Eddee Daniel

## **KURTZ WOODS: AN ECOLOGICAL RESTORATION PLAN TO RECONNECT THE FOREST**

Kurtz Woods State Natural Area,  
Ozaukee Washington Land Trust

## **Introduction**

### **Rationale:**

On February 5, 2023, Kurtz Woods was inducted into the Old Growth Forest Network, meaning that the forested area of the natural site had not been disturbed in at least 100 years. That is no small feat. Logging and agriculture cleared much of Wisconsin's forests and continues to do so today. I chose this site, an old field on the edge of Kurtz Woods, because this forest has served as an outdoor laboratory even before it was a State Natural Area, and the forested area is a beautiful reminder of what the landscape of Wisconsin once looked like.

### **The Site:**

Kurtz Woods State Natural Area is a 45-acre site owned by the Ozaukee-Washington Land Trust along the border of the Village of Saukville and the Town of Grafton, Wisconsin. Most of the preserve is high-quality southern mesic forest. The area of focus for this restoration plan will be the abandoned agricultural field area in the southeast corner of the preserve. In total, the restoration area will focus on this 3-acre unforested area.

### **Land Acknowledgment:**

It is essential to recognize the area now known as Kurtz Woods was originally part of the homelands of the Peoria, Bodwéwadmi (Potawatomi), Menominee, Myaamia, Hoocąk (Ho-Chunk), Očhéthi Šakówiŋ, Kiikaapoi (Kickapoo) peoples. Ecological restoration cannot work without knowledge and understanding that indigenous people inhabited and influenced landscapes for thousands of years before colonization.

### **The Geographic context:**

Kurtz Woods is a State Natural Area owned by OWLT. The abandoned agricultural field resides in the southeast corner of the property. On the property's eastern edge, railroad tracks create the boundary line. In the early 2000s, the surrounding farmland on the site's northern border became a neighborhood. Today, backyards of houses line the forest creating a dramatic line between trees and manicured lawns. Kurtz Woods is open to the public and has trail access through the neighborhood.

### **Vision:**

My vision for the three-acre corner old field in Kurtz Woods is that it can become an extension of the current forest. To restore the forest would be to connect this corner with its history of once being a southern mesic forest. I also hope it can one day be viewed as an example of a restored forest and serve as a comparison to the preserved old-growth forest connected to it. Successional processes are vital to me. I plan to utilize them by installing measures to foster natural reforestation and allow the landscape to carry the grunt work of restoring itself.





Kurtz Woods State Natural Area is outlined in red. The green-shaded area is a southern mesic forest of about 42 acres of the 45-acre site. The orange polygon area is the area of focus and is currently unforested. The railroad track lies along the shortest edge of the focus area in a north-south direction.

## **The Past to the Present**

### **State Natural Area:**

In 1980, the Kurtz family donated their 30-acre plot to the Nature Conservancy. The Kurtz family had owned the land since the 1800s and had kept it forest despite farming the surrounding area. In 1981 the DNR designated Kurtz Woods as “State Natural Area No. 169”. In 2005, The Nature Conservancy transferred ownership of those 30 acres to the Ozaukee-Washington Land Trust, which also gained an adjacent 15-acre plot donated by Mr. Michael Rosen of Cedar Development, LLC.

### **The Forest:**

Thirty acres of the forest are considered old-growth, meaning that historically this forest has not been logged or cleared and still represents the original vegetation of Wisconsin. OWLT has provided information that logging occurred in the 1930s along the southeast boundary. Logging left the remaining 12 acres of forest younger, with the oldest trees around 60 years old in this area. 1937 aerial photographs show the southeast corner of the land deforested, possibly pasture land that has since been allowed to repopulate with trees.

The younger forest, where trees have repopulated on their own, can be described by the process of succession. Succession is an important framework in this plan and explains how a field or meadow can become a forest. Woody species begin to move in if left without disturbances, like fire which maintains grasslands. This progression often occurs in stages, with shrubs and light-tolerant trees colonizing an area first, and then once tree cover is built up, other forest trees begin to create the understory.

The vegetation type of Kurtz woods is a southern mesic forest, where American Beech and Sugar Maples dominate, with an understory of younger black cherries, basswoods, white ash, and witch hazel trees. The forest is home to 82 plant species of both trees and herbaceous plants, including spring beauty, mayapple, bloodroot, hepatica, hog peanut, and various native ferns. Kurtz Woods is considered a high-quality forest, where in the 30 acres of old-growth forest, invasives are minimal, although garlic mustard occasionally appears. In the younger

forested areas, dense buckthorn patches have arisen, taking advantage of the openings in the understory.



1937



1970



2007

### **The Old Field Area:**

In the southeastern corner of the natural area is a rectangular, unforested area of about 3 acres. Aerial photos reveal that this area was once a farm field, most likely up until OWLT gained the property in 2005. This rectangular old field has three sides along the OWLT property boundaries: a small treeline and railroad tracks are on the east edge. Along the treeline, scattered along the north rim, are dead ash trees, which explain the number of ash saplings in the old field area. This restoration plan focuses on this abandoned field.



Photo: Aleigha Fandre

Within the old field, vegetation behaves oddly. Bluestem grasses, both little and big, appear in large swaths with little other species intermixed. These swaths are then interrupted by “islands” dominated by goldenrod and ash tree saplings. The dating of one sapling through tree-ring counting suggested they are about eight years old. A monoculture-like area of brome grass is in the center of the field. Soil samples revealed a mix of sandy to clay textures.

The south and west edges back along the forest and also have inclines of about 15 feet. These inclines are peculiar due to their straight lines dividing the forest from the old field area. The depression in the middle of the old field is strangely rectangular and very level compared to the surrounding forest full of morainal hills. This level area could be due to the previous farming, or the area was once used as a borrow pit. A borrow pit would explain both the odd soil mixtures found, as well as the level depression of the field.



While quaking aspens, an early successional species, slowly extend the treeline from the younger forest, the individuals are only condensed to the western and eastern edges. Goldenrods dominate the northern inclined edge, and the center of the old field has patches of goldenrod and ash saplings interrupted by swaths of big and little bluestem grasses. There is also a large patch of monoculture-like brome grass growing towards the southern edge and extending into the center of the area.

### **The Issue of Succession:**

Succession occurs in all landscapes; it is the shift of plant communities.

Succession occurs in two main ways; after primary colonization of a landscape or after a large disturbance greatly alters the landscape conditions. For example, burning a prairie can prevent woody species, such as trees, from moving into the area. Or, the clear-cutting of timber can “reset” a vegetation area, starting a successional process. The main idea is that succession is constantly working to alter plant communities.

The succession process is visible in the 12 acres of young forest (immediately adjacent to the 3-acre old field) in Kurtz Woods. Woody vegetation, such as trees, have moved back to reclaim the area as the historical landscape type of a southern mesic forest. Fire is often the major deterrent to succession, and when a place is left unburned, vegetation can drastically change. In this case, there are no records of historic fire use, and the surrounding forest offers a good model of what the parcel can look like. The aerial photos from 1937 show a more sparse tree cover density in this area, while in 2007, the land had become wholly reforested.

With this example of successful succession in mind, the 3-acre old field stands out. The old field had been out of agricultural production since at least 2005 when OWLT gained the property. Yet looking at the 2005 aerial photo compared to the 2022 aerial image, the unforested area looks the same—almost a perfect rectangle lacking trees or woody vegetation. The idea of succession suggests that since no large reset has happened to the site since 2005, the natural community should be changing and shifting. Common successional patterns of the surrounding areas suggest that an unburned grassy field like this should be moving in the direction of being populated by woody vegetation.



2005



2022

Succession does not happen overnight, but in 17 years, more evidence of succession should be present in this area. As a model for succession, I want to reference another OWLT-owned property of Kratzsch Conservancy. Parts of this conservancy are old farm fields left fallow, where prairies dominate. On the edge of this prairie, burned within the last decade, aspen trees are already encroaching at a much higher density than the aspens at the edge of the old field at Kurtz. Right next to this old farm field at Kurtz is a healthy, pristine example of a southern mesic forest. Succession took over and reforested the 12 acres that were not old-growth but abruptly stopped at the edge of this field.

OWLT has a few tree species planted in the west end of the old field area, including quaking aspen and pagoda dogwood. These planted trees are enclosed in tree cages, which does suggest heavy deer presence could be hindering the growth of young trees. Other than that, no apparent actions have taken place in this fallow field.

## **The Possible Future**

### **Guiding Principles:**

The guiding principles of this plan are influenced heavily by the mission and goals of OWLT and the Nature Conservancy, who have worked to protect and manage Kurtz Woods as a state natural area.

- Considering the old field as an extension of the old-growth forest. The old-growth area of Kurtz Woods is an ecological hotspot and is considered a high-quality area. The rest of the site must be considered when discussing plans to reforest the old field.
- Letting natural processes “lead the way” or “jumpstarting” succession. This principle reminds us that succession is an ongoing process, not a final outcome. Succession should be worked with and considered when planning the future of this space.
- Use passive restoration when possible. While some active restoration, such as plantings or removal of invasives, must happen to ensure a smooth transition in the landscape, passive restoration provides the ability for the area to “restore” itself.
- Resilience is key. The final outcome of this project should be a landscape that is not only an extension of the current southern mesic forest but also a healthy, self-sustaining ecosystem that will last without constant heavy management.
- Restoration is an ongoing process. Restoration does not take one landscape and transform it overnight. Processes must be allowed to happen over time.

The guiding principles outlined above take into account the current management of the site, as well as its rich history. As owners of this land, OWLT is the most critical stakeholder in this project. OWLT's mission is to “protect and steward land and water for the benefit of all.” Their vision is to inspire “people to engage with nature by ensuring that habitats, working lands, and water resources are conserved, connected, and resilient.” These statements are significant for this project. Kurtz Woods holds one of Wisconsin's few old-growth forest remnants, a high-quality example educators and the general public have used since the 1980s. It is essential in this project to consider this old field in terms of an extension of this healthy forest in order to maintain these guidelines.

**Goal:**

The restoration goal for this site is to include and help succession processes reforest the area. I want to reconnect the place to its historical southern mesic forest vegetation pattern. Successional processes appear stunted in this area; this proposal addresses ways to help activate natural successional processes to allow the forest to move back into the area. Then, once reforestation is underway, extending the trail into this area can create a narrative along the path, moving from old-growth to younger forest, showing progress.

**Reference Model(s):**

A reference model for this restoration plan is the old-growth forest of Kurtz Woods. As part of the same State Natural Area as the old field, the 30 acres of old-growth forest show what the area once looked like before farming.

**Common and Dominant Vegetation in a Southern Mesic Forest (According to the DNR:**

\*Present at Kurtz Woods

Type	Common Name	Scientific Name
Tree	Sugar Maple*	<i>Acer saccharum</i>
Tree	American Beech*	<i>Fagus grandifolia</i>
Tree	American basswood*	<i>Tilia americana</i>
Tree	Red oak*	<i>Quercus rubra</i>
Tree	White oak*	<i>Quercus alba</i>
Tree	White ash*	<i>Fraxinus americana</i>
Tree	Red elm*	<i>Ulmus rubra</i>
Tree	American elm*	<i>Ulmus americana</i>
Tree	Butternut*	<i>Juglans cinerea</i>
Tree	Black walnut*	<i>Juglans nigra</i>
Forb	Wild leak*	<i>Allium tricoccum</i>
Forb	Woodland phlox*	<i>Phlox divaricata</i>
Forb	Bloodroot*	<i>Sanguinaria canadensis</i>
Forb	Large-flowered trillium*	<i>Trillium grandiflorum</i>
Forb	May-apple*	<i>Podophyllum peltatum</i>
Forb	Spring-beauty*	<i>Claytonia virginica</i>

Forb	Canadian wood-nettle*	<i>Laportea canadensis</i>
Forb	Maidenhair fern*	<i>Adiantum pedatum</i>

**Possible Transformations and Improved Ecology:**

**Now:**

Big and little bluestem grasses, brome grasses, and goldenrods dominate the old field. Aspens and some small shrub species dot the landscape, but tree cover is nonexistent. Aspens are moving into the old field on the eastern edge showing the beginning of successional processes. Grasses and goldenrods that dominate the old field can be seen in the foreground.



Photo: Aleigha Fandre



**In 2 Years:**

Planted shrubs begin to shade out and outcompete grasses, allowing trees to establish. Aspens are moving into the old field from the west and east edges. Tree cover is still minimal, but shrub cover is growing and established. Some young trees are planted that can tolerate more light.

**In 10 Years:**

Planted trees continue to grow while still small and will begin to shade grasses and other prairie plants along with shrub layers. Aspens are continuing their march deeper into the old field. Tree cover is still young but beginning to increase. At this point, the area will hopefully be on its way to becoming more self-sufficient. As woody vegetation begins to dominate and trees establish naturally, the successional processes and changes to the area will become entirely self-sustaining. Planting will not be necessary, and neither will protection of saplings by tubing or weed suppression.

**In 50 Years:**

Planted and naturally established trees are now well established, creating a young forest area. Tree cover is significant, though some light patches may still be present. Understory, secondary successional species have begun to populate the area. Habitat is now recognized as forested, and the transition between the rest of the property and the old field is no longer sharp but a smooth forested transition differing mainly in tree ages.



This photo shows the young southern mesic forest in Kurtz Woods along the west side of the old field. Pole-sized trees can be seen, including birch and many sugar maples. Ground cover includes lots of maple seedlings. This is an example of what the old field could look like in 50 years once the forest has moved in. Photo: Aleigha Fandre

## The How

### Stage 1: Shrubs

#### Suggested Shrub Species:

Common Name	Scientific Name	Sun Tolerance	Present at Kurtz
American Hazelnut	<i>Corylus americana</i>	Full sun - partial shade	Yes
Grey Dogwood	<i>Cornus racemosa</i>	Full to partial sun	Yes
Round-leaved Dogwood	<i>Cornus rugosa</i>	Full sun - part shade	Yes
Witch Hazel	<i>Hamamelis virginiana</i>	Full sun - full shade	Yes

#### Shrub Planting Methods:

Shrub species should be planted in early fall or spring; this will minimize watering needs and give plants time to establish before the harsher seasons. When planted, a cardboard layer should be put down as an act of weed suppression, and a layer of mulch on top to also aid weed suppression and retain moisture. Planting shrubs is an early successional step necessary for foresting an area, but it is not happening naturally in this old field. The goal is that planting these shrubs will help establish trees in three ways:

- 1) Shrublands are necessary for the natural successional processes when moving from a grassland to a forest. Forests need a base layer to build the cover and outcompete grasses before trees populate. To utilize natural succession processes in other parts of the plan, shrubs must be allowed to grow.
- 2) Create ground cover and shade that outcompetes the dominant grass species, such as bluestem. Less grass competition and more shade can allow tree saplings to establish and grow.
- 3) Create a species habitat that can attract birds and other animals who are seed dispersers who may then bring in seeds from the forest.

### Stage 2: Tree Planting:

#### Suggested Tree Species:

Common Name	Scientific Name	Sun Tolerance	Present at Kurtz
Quaking Aspens	<i>Populus tremuloides</i>	Full sun	Yes
Bigtooth Aspen	<i>Populus grandidentata</i>	Full sun	Yes
American Beech	<i>Fagus grandifolia</i>	Full sun	Yes
Black Cherry	<i>Prunus serotina</i>	Full sun - partial shade	Yes



Red Oak	<i>Quercus rubra</i>	Full - Partial sun	Yes
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### Tree Planting Methods:

While the overall goal is to encourage natural succession to reforest in this site, some selective tree planting will help establish the conditions needed for other forest species to move in. Tree planting should co-occur with shrub planting or occur the following year. Early fall or spring ensures the trees have time to establish before extreme heat or cold. I propose using bare root saplings, with the same weed suppression methods used for planted shrubs. Tree tubes should be used to protect saplings from herbivory while establishing. Kurtz Woods has a notable deer population, and other trees in the old field from previous work have cages around them. Tree plantings should not be patterned. This plan aims to create a natural forested area; random planting will mimic natural growth. Watering will need to occur at planting and if the season is dry.

Another possible method of tree planting is direct seeding. Since Kurtz Woods is home to over 82 species of plants, there are ample opportunities to utilize native seeds. Seeds from various tree species in the forest can be collected and planted under the shrubs. This method is referred to as “sod busting,” as the shrub breaks up grass’s fibrous roots, creating competition for trees. Seeding trees under these sodbusters gives saplings a higher chance of sprouting and succeeding as the shrub offers protection from competition.

### Stage 3: Natural Succession

Succession is a slow process, and this must be recognized as this plan works to move an old field into a southern mesic forest. The first two stages of this plan include planting shrubs and tree saplings to develop the area’s canopy. The tree species suggested above in stage 2 are early successional forest trees that pave the way for the movement of later successional trees into the room.

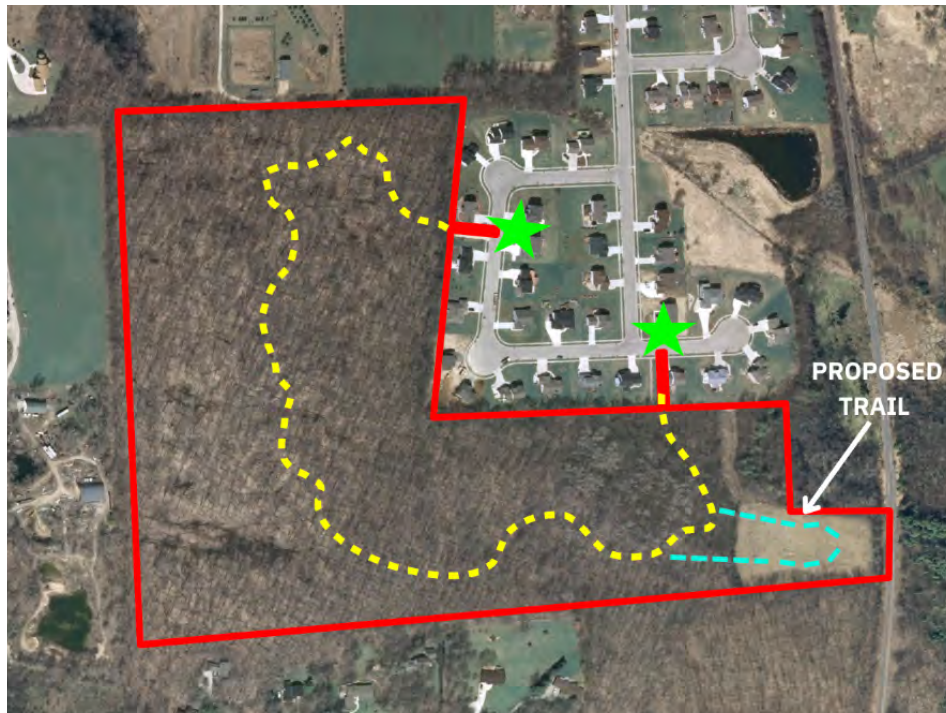
Sugar Maples are abundant in Kurtz Woods in both the understory as saplings and the canopy of the older forest. Young sugar maple saplings are already moving into the old field area in the southwest corner and should continue to move in as grasses decline. Similarly, aspen trees are known for colonizing open fields and forest edges. The planted aspens combined with the aspens already occurring on the forest edges will continue to multiply in the area creating the young forest’s canopy, paving the way for other hardwood trees of older forests to begin to move into the room.

Once trees are established, forest forbs can move in, taking advantage of the now-open soil as the sun-loving grasses and prairie plants have been shaded out. These forbs create the forest floor and contribute to the overall diversity of the area. As the trees grow and develop, more forbs will move in naturally. In this stage, small mammals and birds will aid in dispersing the seeds of woodland species as they move throughout the area.

### Stage 4: Trail Expansion

The current trail throughout Kurtz Woods State Natural Area is a 1-mile path running through the old-growth forest. I propose to expand that path to create a section that goes through the old field restoration site. Kurtz Woods has been a site of education and monitoring

since the Kurtz family still owned the land. Creating a path that runs through the restored area, even while work is still ongoing on restoration, can provide an educational example for visitors. When walking from the old-growth area to this newly reforested area, visitors can note changes and see how the transitions from young forest to old forest begin.



The current trail is marked in yellow, with green stars signifying the entrances. The proposed trail is in teal. (Map by OWLT)

## **Monitoring and management**

### **Stage 4: Monitoring and continued management**

The final stage of this project is the monitoring and management of the site. Since this is a long-term project, monitoring will act as an extension of restoration efforts and, in some cases, might be used in tandem with other stages of this plan. I have two proposed methods for monitoring:

1. Repeat Photography: repeat photography takes photographs of a site at set intervals. Photos taken at intervals, for example, every two years in July, can create a visual timeline of growth and change in the area.
2. Vegetation Surveys: Vegetation surveys monitor what species are moving into the old field area. Conducting vegetation surveys at specific time intervals can create a species composition of the forest which can be used to track changes.

### **Invasives:**

Within the old field, some non-local plant species exist. Invasive sweet clover and Canada thistle are the main two at the site. They are not dominant species, and the plan is to allow the planted shrubs and trees to shade out these species. As the old field returns to a

forested area, these prairie-loving invasives will be outcompeted. Letting natural processes take care of the invasive species allows for less management.

As succession begins, invasive buckthorn (present in the southern younger forest of Kurtz) may start to move into the old field. For this, I propose using the cut-and-dab method. When the plant is dormant, often in winter, cutting it down and dabbing the stump with herbicide to kill it. This management method is an easy way to treat buckthorn that does not harm surrounding species.

Once the area is majority forest, invasive management can be handled alongside the rest of Kurtz's Woods. Since Kurtz is such a high-quality site, invasive species are minimal, but buckthorn and garlic mustard are present. Transects and hand pulling of garlic mustard is OWLT's preferred method for the rest of the 42 acres and can be extended into the 3-acre old field.

### **Continued Management:**

Future management of this site can be incorporated with OWLT's actions with Kurtz Woods as a whole. Once the site is reforested, invasive species in the nearby forest, like garlic mustard, can begin to populate the area. In this case, OWLT can incorporate it with their usual garlic mustard efforts. Having the natural area be entirely forested will allow OWLT to manage the entire 45 acres as a whole forest rather than a fragmented site.

### **Community Engagement:**

OWLT often works with volunteers and community members. This restoration plan can be a wonderful opportunity to engage with local community members, possibly even groups from the neighborhood. Volunteers can help with the planting of shrubs and trees, and OWLT could also use this opportunity as a way to educate groups about succession processes.

The long-term engagement can involve educational events, possibly with local schools using the restoration site as an example of human intervention in succession. The forest can also serve as a visual learning tool, with groups taking note of the differences between the old-growth forest, the younger forest, and the restored old field to talk about changing landscapes.



Kurtz Woods old field, July 26, 2023.



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