



South Oak: A Vision for the Future

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There is something to be said
About the swamp,
About the bramble,
The places where feet do not fall without trial
And hands are met by thorn
Mice do not mind a mess
Nor the toad, fox, or wren
Welcome, are the havens of tangle

-Verse by the author

Welcome to South Oak Preserve

South Oak Preserve is a 72 acre site in Washington County owned and managed by the Ozaukee-Washington Land Trust. This preserve is located approximately 3 miles west of the city of West Bend, 1 mile south of the Milwaukee River, and within the Milwaukee River watershed. This off-the-beaten path preserve contains a diverse array of habitats. From the dense lowland forest, clear springs, fallow fields, open sedge meadows, and hidden ponds the area is a haven for a wide variety of wildlife. Despite the abundance of life found here, there is much work to be done regarding the past use and degradation of this site. There are still around 7 acres of land in row crops, and the remaining land has been heavily altered by drainage structures and prior agricultural use.

At a glance, it is evident that the prior use and degradation of the land has taken a heavy toll on the hydrology and vegetation of this site. My hope is that South Oak becomes a fantastic model for the junction of wildlife habitat restoration and community space for the nearby city of West Bend. I want to restore degraded areas of the preserve to enhance already existing wildlife habitat. Through this, restoration could also increase potential habitat for the establishment of state threatened species such as the Blanding's turtle. In addition, it is important that the nearby community can be involved with and enjoy this space, becoming a key component to the overall ecological corridor that could eventually connect the nearby OWLT properties, Decorah Woods and Fellenz Woods, with South Oak Preserve. Greater accessibility in the form of boardwalks and trails will be necessary for the continuation of public involvement in this site and further restoration efforts particularly in the lowland forest.



South Oak prairie (Photo: Lindsey Broadhead)

The possibilities for this site are great. Imagine walking along a boardwalk while birdsong and frog chorus fill the air on a warm spring morning. The deep, dark forest with light cascading through flowering shrubs to a colorful sedge meadow, filled with a mosaic of wildflowers and pollinators. A haven for both wildlife and people.



View of the south pond at South Oak Preserve (Photo: Lindsey Broadhead)

The History

South Oak Preserve lies within the ancestral homelands of the Ho-Chunk, Menominee, and Potawatomi people. It is important to pay respects to and acknowledge the stewardship work that their communities have implemented for millenia. Their connection to the land, water, and all living beings is an essential part of the history and identity of this place.

According to the original vegetative cover of Wisconsin maps, the property is well within the beech, sugar maple, and basswood dominated southern forests. Some remnants of this natural community can be found in the far western edge of the property joining the larger wooded natural area.

Based on historical aerial photography from 1937, the eastern quarter of the site was in annual crop production, and remained so until recent prairie restoration efforts. South Oak has highly altered hydrology in the form of a series of shallow drainage ditches throughout the property, a larger main ditch, two artificial ponds, berms, and spoil banks along the ditches. According to the OWLT site plan and aerial images, these structures were put into place between 1963 and 1970. Prior to the 1960s, and based off of historical aerial footage, the western 3/4 of the site appears to be grazed. During construction of the drainage structures trees were cleared, and

after implementation of the drainage structures it appears to be left abandoned, with succession quickly taking place afterwards. This is evident in the boxelder dominant forest surrounding the ponds, which was bare land during the construction of the drainage structures.

The western 3/4 of the site does contain mapped wetlands, which leads me to believe this is the reason that drainage structures were implemented and the forested area not farmed like the surrounding former agricultural fields.



Mapped wetlands at South Oak Preserve (Map: WI DNR)

The southwestern portion of the site has had continual tree cover since the first aerial photographs taken in 1937, and according to the OWLT site plan this is the highest quality portion of the property. There is a magnificent open grown oak presumed to be 250+ years old on the southern boundary of the preserve.

In 2017, OWLT initiated a tree planting in the northernmost fallow field with a CRP (Conservation Reserve Program) through NRCS and Washington County Farm Service Agency. The tree planting consisted of Black Cherry, Hackberry, White Oak, Basswood, Red Maple, Swamp White Oak, White Pine, and White Spruce.

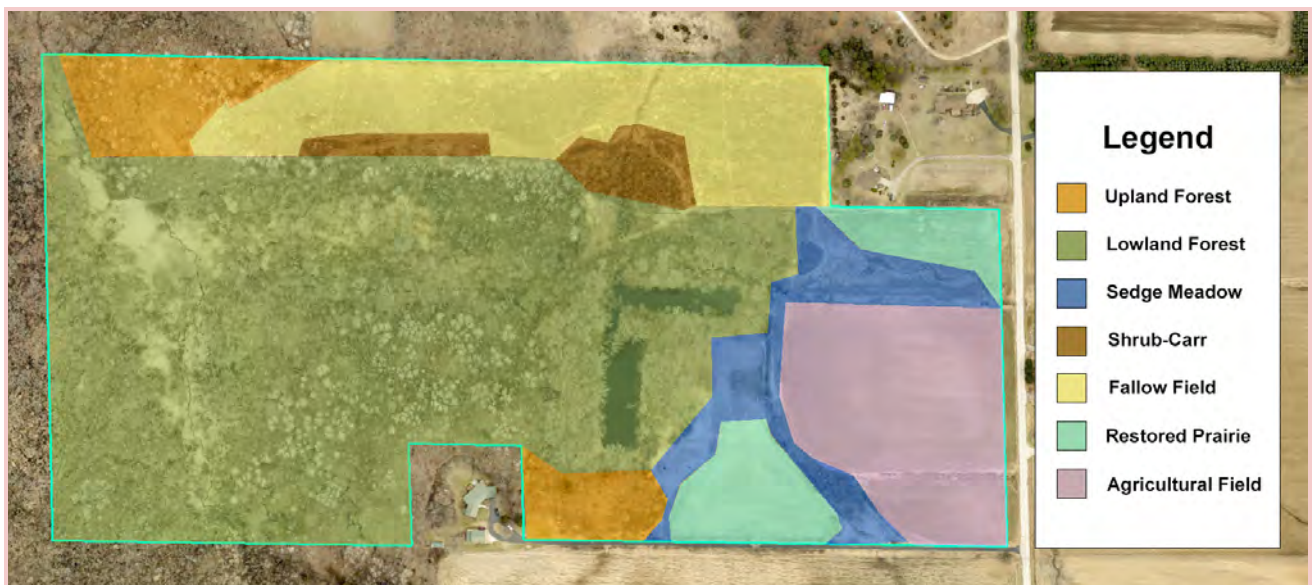
OWLT continues to manage the site, with most recently two wetland scrapes and a meander completed in 2018. These wetland scrapes were constructed with the purpose of slowing down water draining in from the surrounding agricultural lands. The meander was intentionally created as a dry waterway that carries water only during peak runoff periods.



Comparison of aerial photography from 1941 (left) and 1970 (right)

The Current State

There are a variety of different habitats present at the site which are detailed below. Much of the site is mapped wetland, but highly altered due to the drainage structures in place. The ditches do not allow water to spill out to the woodland wetlands and thus do not allow seasonal flooding events that lowland forests depend on. While conditions in some areas of the property are in good condition, much of the existing natural communities are in need of restoration. Although 72 acres is a sizable area, the surrounding agricultural fields all drain into this property, bringing excess nutrients from off site. In places, especially the north fallow field, soil is exposed and in need of remediation. Overall, there is not enough wetland-upland transition at this site and it is largely being overtaken by invasive species. Approximately 7 acres still remain in agricultural production as of 2023.



Current site communities at South Oak Preserve

Southern Hardwood Swamp/Lowland Forest

The lowland forest is characterized by wet soils for part of the year. Dominant tree species include boxelder, silver maple, cottonwood, and red maple. The vegetative cover of the site suggests that the lowland forest had at one point a large presence of green ash, which died off between 2015 and 2017 because of the presence of the emerald ash borer. The larger, older trees are now dead snags. With portions of this wet forest now open canopy, many of the previously ash dominated areas have been overtaken by reed canary grass. The understory shrubs of the lowland forest are dominated by prickly-ash and buckthorn with patches of black raspberry and prickly gooseberry present. Notable forbs include swamp saxifrage, skunk cabbage, and fringed loosestrife. Several ephemeral ponds exist within the forest, which provide critical breeding habitat for frogs and salamanders.

Shrub-Carr

The shrub-carr at this site is small, with about 1.25 acres now characterized by early successional sandbar willow, boxelder, black willow, and quaking aspen. It is primarily found on the edge of the north fallow field. Patches of sweet clover, queen anne's lace, and autumn olive are present within this community.

Fallow Field

This portion of the property was originally an agricultural field that has now gone fallow. Queen Anne's Lace and sweet clover are dominant species present, with common milkweed and goldenrod scattered throughout the area.



Queen Anne's Lace in fallow field at South Oak (Photo: Lindsey Broadhead)

Sedge Meadow

The existing sedge meadow at South Oak is heavily dominated by the invasive reed canary grass. Patches of lake sedge, joe-pye weed, and swamp milkweed exist, but significant restoration and plantings will be needed to restore this community.

Restored Prairie

Much of the former agricultural fields close to the road were planted to mesic prairie dominated by wild bergamot (*Monarda fistulosa*) and gray-headed coneflower (*Ratibida pinnata*). Canada wild rye, Canada milkvetch, golden alexanders are also notably present. The prairie planting is doing well, but there is a high population of red clover within the mowed path and spreading into the adjacent prairie.

Southern Mesic Forest

A small portion of the site contains upland mesic forest. Prominent trees include basswood, sugar maple, red oak, and white oak with understory plants like blue cohosh, mayapple, and prickly-ash present.

A large constraint to restoration of this site is access. While during low vegetation months access is considerably easier, during the spring and summer it may not be feasible to access the interior of the forest, especially with equipment, due to high vegetation and downed trees. Adjacent neighboring properties also may pose somewhat of a constraint on prescribed fire. This property is currently managed by OWLT, but volunteers from neighbors and nearby towns may be necessary to ensure the site's success and continued maintenance due to the many sites that OWLT manages.

The Future

The ecological restoration goals for this site fall into two main categories; enhance existing wildlife habitat and increase public engagement with the space.

Enhance wildlife habitat

South Oak already provides a home for a great diversity of wildlife. In general, adding additional food sources, habitat vegetative structure, and habitat diversity are great ways to enhance the already existing wildlife habitat at this site. A focus on wildlife that have particular needs or habitat restraints would also be a smart targeted focus for this site. According to Joanne Kline, retired DNR wetland biologist, the area contains potential habitat for the Blanding's turtle, a state special concern species. Further wildlife monitoring would be required for targeted restoration potential. There is also the potential for scientific research regarding the restoration of the site. How will bringing water back to this forest affect both plant and animal communities?

Increase public engagement

Engaging the public is vital for the continuation of restoration efforts. I am proposing a trail system that winds throughout the property, showcasing the diverse habitats offered by this site, and promoting better access to the interior of the lowland forest and ephemeral and artificial ponds. Impacts to vegetation, wildlife, and the trail itself would be minimized by avoiding critical bird breeding areas, large stands of dead ash, and the highest quality portions of the forest to prevent further invasive species introduction. The construction of this trail and subsequent boardwalk would provide a great opportunity for volunteers and public engagement, both in the realms of constructing the boardwalk itself, and citizen science opportunities once it is established in the form of wildlife and plant monitoring.



Future site communities for South Oak Preserve

Reference Models

These are the ideal end goals for each community type located at South Oak.

Southern Hardwood Swamp

Southern hardwood swamps are found in isolated basins, usually experiencing flooding during spring and drying up in late summer. The flooding often occurs over frozen or saturated ground in spring, but the timing and intensity of these floods can vary. Notable tree species found in these areas include silver and red maple, green ash, American elm, and swamp white oak. An example of this community could include Milwaukee River and Swamp State Natural Area, which has a hardwood floodplain forest that is regularly inundated by water from the floods



Milwaukee River and Swamp SNA (Photo: Joshua Mayer)

of the Milwaukee River. Although the two sites have slightly different hydrology, regular seasonal flooding is something that South Oak has not experienced since the drainage structures were built. This habitat supports a wide variety of wildlife including but not limited to blue-spotted salamanders, green frogs, Baltimore orioles, wood ducks, and beavers.

Sedge Meadow

Sedge meadows are characterized by the dominance of sedges. They often remain moist throughout the year, though may experience seasonal flooding like the above mentioned lowland forest. Notable plants in this community include lake sedge (*Carex lacustris*), tussock sedge (*Carex stricta*), southern blue flag iris, spotted joe-pye-weed, and swamp milkweed. White River Sedge Meadow State Natural area in Green Lake County could be an excellent reference model for this site. Wildlife potential includes american bittern, swamp sparrow, sedge wren, western chorus frog, smooth green snake, and mink.



White River Sedge Meadow SNA (Photo: Joshua Mayer)

Southern Mesic Forest

Characterized by trees such as sugar maple, american basswood, northern red oak, white oak, elms, and hickories in areas with well drained but moderately moist soils. These forests support understory shrubs like american hazelnut, witch-hazel, and forbs such as wild leek, blue cohosh, and may-apple. Nearby Kurtz Woods SNA is an excellent model for this habitat. Wildlife potential includes ovenbird, pileated woodpecker, northern ring-necked snake, wood frog, and white-footed mouse.

Boxelder Forest potential

There is a boxelder dominated forest on this site which does not have a reference model available in the state of Wisconsin. Purely speculative, but with boxelder being an extremely climate resilient tree, it could become a viable candidate for the reforestation of dead ash areas in lowland forests because of its ability to survive in many soil conditions from wet to dry. Monitoring the current boxelder forest at South Oak may prove to be a reference model in itself for future boxelder forests. The table below lists plants that grow well with boxelder.

Plants that grow with *Acer negundo* (Boxelder) (Plants of the Chicago Region)

<i>Acer saccharinum</i> (Silver maple)	<i>Ulmus americana</i> (American elm)
<i>Celtis occidentalis</i> (Hackberry)	<i>Vitis riparia</i> (Riverbank grape)

<i>Fraxinus pennsylvanica</i> (Green ash)	<i>Cryptotaenia canadensis</i> (Honewort)
<i>Parthenocissus quinquefolia</i> (Virginia creeper)	<i>Galium aparine</i> (Cleavers)
<i>Prunus serotina</i> (Black cherry)	<i>Rudbeckia lacinata</i> (Cutleaf coneflower)
<i>Rhus radicans</i> (Poison ivy)	<i>Sanicula gregaria</i> (Common black snakeroot)
<i>Sambucus canadensis</i> (American elderberry)	<i>Smilacina racemosa</i> (False solomon's seal)
<i>Smilax tamnoides</i> (Bristly greenbriar)	<i>Viola sororia</i> (Common blue violet)

The How

Hydrology

Repairing the hydrological systems at this site should be a priority for restoration. OWLT has a detailed plan including diagrams of the drainage structures, cost estimates, and timelines that can be referenced in addition to this restoration plan. In summary, breaches in the ditches and berms would allow diverted flood water back into the forest, which potentially could be a hands off approach to control both buckthorn and reed canary grass in the lowland forest.

Invasive Species Removal

Invasive species removal can increase potential wildlife habitat, one of the main goals of this restoration plan. Many of the natural communities are disrupted ecologically because there is now a complete monoculture of invasive plants, thus removing food sources, water, and habitat. Below is a table of the invasive species present at this site, and corresponding locations and treatment plans.

Invasive Plant	Location	Treatment Plan
Queen Anne's Lace (<i>Daucus carota</i>)	Fallow field	QAL is a biennial, which means it flowers in its second year and then dies. Mowing the plant for two years in a row should significantly reduce the population.
White Sweet Clover (<i>Melilotus albus</i>)	Fallow field	Hand pull, mow, or bush cut before seed sets. With how close it is to the QAL, mowing is likely the best and most efficient option. Mow two years in a row. Herbicide on seedlings in early spring is also an effective method.

Reed Canary Grass (<i>Phalaris arundinacea</i>)	Open areas in forest, along ditches, wet sections of prairie	<p>If a small enough patch and appropriate timing, RCG can be hand pulled. Other methods can include seed topping, herbicide, and burning.</p> <p>Forest: Hand pulling and herbicide may be the only options available as access to these areas is very limited due to dense vegetation. Flooding it out may be an option once hydrology is restored.</p> <p>A combination of these methods for 2-4 years may be necessary to largely eliminate RCG.</p>
Glossy buckthorn (<i>Frangula alnus</i>)	Forest	Hydrological restoration of seasonal flooding can be a great way to eliminate this species in the lowland forest. In late fall and winter, plants can be cut near base and dabbed with glyphosate using the Buckthorn Blaster.

Plantings & Soil Remediation

In order to improve wildlife habitat, improve soil, and replace invasive species, I propose a few sites that could use plantings after invasive species removal.

North Fallow Field & Shrub-Carr Zone:

After year two of Queen Anne’s Lace and Sweetclover removal, a cover crop of annual rye or barley is recommended to help cover exposed soil and build an organic layer. Several early successional trees such as boxelder, quaking aspen, black willow, and cottonwood are present on the edges of the forest to the northern fallow field. Natural succession combined with the already established tree plantings of Black Cherry, Hackberry, White Oak, Basswood, Red Maple, Swamp White Oak, White Pine, and White Spruce should create a pathway to restoring this field to the adjacent already existing upland forest that occupies a small portion of the property. I think smaller trees and shrubs could be planted in the gaps where sapling trees have died to provide structural diversity, microclimates for the trees, and a food source for wildlife. Options for these could include planting bare root elderberry (*Sambucus canadensis*), red-osier dogwood (*Cornus sericea*), hazelnut (*Corylus americana*), and american plum (*Prunus americana*) in the spring or fall when rainfall is abundant.

Sedge Meadow:

After removing reed canary grass, the sedge meadows of the property will not have a large diversity of plants. In order to restore this natural community, I recommend seeding it with characteristic sedge meadow species preferably after ditches have been breached to ensure soil is moist and the conditions are right for these species to grow. Refer to the table below for plants characteristic of southern sedge meadows.

Tussock sedge (<i>Carex stricta</i>)	Lake sedge (<i>Carex lacustris</i>)
Bluejoint grass (<i>Calamagrostis canadensis</i>)	Water sedge (<i>Carex aquatilis</i>)
Fowl meadow-grass (<i>Poa palustris</i>)	Northern water horehound (<i>Lycopus uniflorus</i>)
Common cattail (<i>Typha latifolia</i>)	Orange jewelweed (<i>Impatiens capensis</i>)
Common water horehound (<i>Lycopus americanus</i>)	Panicled aster (<i>Symphotrichum lanceolatum</i>)
Field horsetail (<i>Equisetum arvense</i>)	Purple meadow-rue (<i>Thalictrum dasycarpum</i>)
Marsh pea (<i>Lathyrus palustris</i>)	Southern blue flag iris (<i>Iris virginica</i>)
Meadow anemone (<i>Anemone canadensis</i>)	Spotted joe pye weed (<i>Eutrochium maculatum</i>)
Swamp milkweed (<i>Asclepias incarnata</i>)	Sartwell's sedge (<i>Carex sartwellii</i>)

Agricultural Field:

The 7 remaining acres of agricultural field I propose restoring to mesic prairie, similar to the already existing restored prairie. After harvest, plant a seed mix of both annual rye or barley with prairie seeds mixed in using a seed drill. Hardy plants such as yellow coneflower (*Ratibida pinnata*), wild bergamot (*Monarda fistulosa*), and canada wild rye (*Elymus canadensis*) are all options to consider in a prairie seed mix.

Hiking Trail

There is an existing mowed path from the parking area to the north boundary of the property, but this only allows access into the meadow and fallow field with some views of the shrub carr and subsequent succession happening in the north field. This existing trail, however, connects this preserve to the industrial park to the north and eventually Decorah Woods so I believe it should stay in place. Much of the site is classified as a wetland and may be wet for a portion of the year. Having a boardwalk system through the sedge meadow and lowland forest would increase interest from the public and have a lesser impact on the soil and surrounding vegetation. A wildlife viewing platform with benches at one of the ponds would be another idea to integrate public interest, with the other pond left untouched to provide a greater refuge for more sensitive wildlife. Below is a map detailing the layout of the trail and potential wildlife “viewpoints” along the boardwalk.



Map of current and proposed trail at South Oak Preserve. Current trail indicated in white, proposed trail indicated in green with solid line indicating boardwalk.

References

"Acer Negundo." *US Forest Service*,

www.fs.usda.gov/database/feis/plants/tree/aceneg/all.html#REFERENCES. Accessed 1 Aug. 2023.

Epstein, E.E. Natural communities, aquatic features, and selected habitats of Wisconsin.

Chapter 7 in *The ecological landscapes of Wisconsin: An assessment of ecological resources and a guide to planning sustainable management*. Wisconsin Department of Natural Resources, PUB-SS-1131H 2017, Madison.

"Glossy Buckthorn." *Wisconsin DNR*, dnr.wisconsin.gov/topic/Invasives/fact/GlossyBuckthorn.

Accessed 1 Aug. 2023.

Handler, S., A. Calhoun, G. Edge, B. Hutnik, N. Morehouse, R. O'Connor, A. Staffen, M. Zine, K. Marcinkowski, M. Peters, T. Ontl, and C. Swanston. 2021. Climate change field guide for southern Wisconsin forests: Site-level considerations and adaptation. USDA Northern Forests Climate Hub Technical Report #6. Houghton, MI. 102p.

Hoffman, Randy. *Wisconsin's Natural Communities*. University of Wisconsin Press, 2002.

"Planting for Wildlife Habitat." *Wisconsin DNR*, dnr.wisconsin.gov/topic/treeplanting/wildlife. Accessed 1 Aug. 2023.

Reinartz, Caitlin. "Native Tree Spotlight: In Defense of Box Elder." *Urban Ecology Center*, 12 Mar. 2013, urbanecologycenter.org/blog/native-tree-spotlight-in-defense-of-box-elder.html. Accessed 1 Aug. 2023.

Swink, Floyd, and Gerould Wilhelm. *Plants of the Chicago Region*. Indiana Academy of Science, 1994.

"White Sweet-clover." *Wisconsin DNR*, dnr.wisconsin.gov/topic/Invasives/fact/WhiteSweetclover. Accessed 1 Aug. 2023.

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Back cover: 250+ year old white oak. Front and back cover photos by Lindsey Broadhead.

