

# SHOREWOOD NATURE PRESERVE

## LAND MANAGEMENT PLAN

PREPARED AUGUST 2023



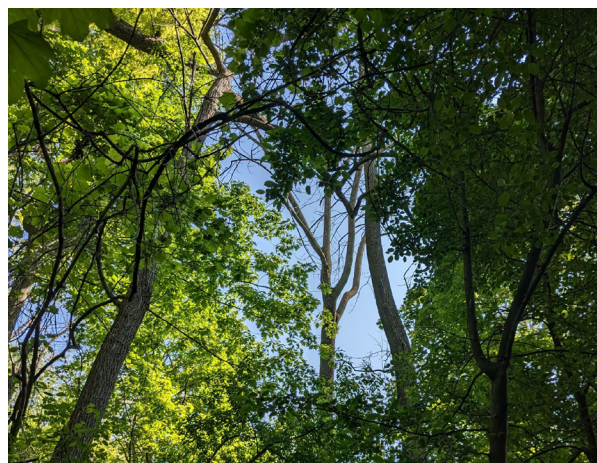
**VILLAGE OF SHOREWOOD**  
3950 N LAKE DRIVE  
SHOREWOOD, WI 53211



## SITE DESCRIPTION

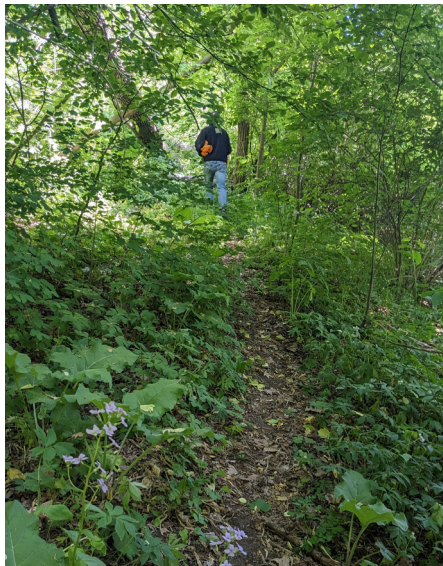
Shorewood Nature Preserve is a treasured nature destination for enthusiasts of all levels, featuring 6.5 acres of impressive mature hardwood trees among a fantastic array of woodland ephemeral flowers and year-round greenery. This preserve, located on the coast of Lake Michigan and tucked behind a row of residences, contains remnants of a strong Southern Mesic Forest and is high quality habitat for wildlife, including a variety of resident and migratory birds as well as a quiet, contemplative retreat for humans. Just south of Atwater Park, Shorewood Nature Preserve offers a trail system that reaches across the preserve and along the lakeshore, passing an outdoor amphitheater and several mature red oaks. While Atwater Park serves as a place for active recreation, Shorewood Nature Preserve offers a more passive and scientific place for wildlife observation and serves as an example of ecosystem management.

The existing trail system in the preserve could be improved to reduce erosion potential down the bluff and guide users toward hidden gems on the site. There are opportunities to add amenities for accessibility, shoreline stability, and lake viewing. Pockets of invasive species are present, which limit the growth of native species and the habitat they provide for wildlife. Appropriately timed and executed vegetation management will allow this site to thrive and provide habitat to an even greater amount of wildlife and migratory birds.



## SITE DESCRIPTION

Two walking vegetation surveys of this site were performed, one in October of 2022 and the other in June of 2023. Surveys were done by Ecologists at Marek Landscaping and focused on creating a comprehensive vegetation inventory to inform management actions. The site was broken into sections to reflect the observed plant communities, with herbaceous and tree species recorded along with their relative densities and distribution. The results of these surveys are included in this report and should be considered in making informed management decisions and setting long term objectives for the preserve.



The goal of this Land Management Plan is to assess the current vegetation community, identify areas of concern and areas in need of improvement, suggest and design a trail system and additional amenities for the preserve, and advise the Friends of Shorewood Nature Preserve board on land management activities.

## VEGETATION DESCRIPTION

Based on observations and data collected during both surveys performed on the preserve, the site has characteristics consistent with the Southern Mesic Hardwood Forest type as described by John T. Curtis in *The Vegetation of Wisconsin* and the Wisconsin DNR's ecological community descriptions. This ecosystem type is characterized by a wooded profile dominated by hardwood trees, namely Sugar Maple (*Acer saccharum*). Other species that co-dominate this forest type include American Basswood (*Tilia americana*), American Beech (*Fagus grandifolia*), Slippery Elm (*Ulmus rubra*), Red Oak (*Quercus rubra*), and Ironwood (*Ostrya virginiana*), all of which (besides American Beech and Slippery Elm) are found on the preserve. The shrub layer of this ecosystem is usually sparse unless a canopy opening occurs, allowing for shrubs like Gooseberry (*Ribes americanum*), Witch Hazel (*Hamamelis virginiana*), Musclewood (*Carpinus caroliniana*), and American Hazelnut (*Corylus americana*) to establish. The ground cover for this forest type consists heavily of spring-blooming ephemerals and shade-preferring forbs. Spring bloomers noted on the site include False Rue Anemone (*Enemion biternatum*), Bloodroot (*Sanguinaria canadensis*), Cutleaf Toothwort (*Cardamine concatenata*), Jack in the Pulpit (*Arisaema triphyllum*), Wild Leek (*Allium tricoccum*), and Blue Cohosh (*Caulophyllum thalictroides*).



An element of high value at Shorewood Nature Preserve is the large Red Oak near the lake, centrally located and 36.5" DBH, which harbors Nodding Trillium, Wood Anemone, and Blue Cohosh. Another area of note is the Cutleaf Toothwort found on the northern bluff. Both areas could be managed to encourage protection and an increase in these species' populations.

Invasive species pressure due to neighboring properties is high; however, only the extreme northwest corner slope and small south portion have potential for a seed bank of unwanted species, including Black Locust, Woodland Tulip, Daylily, Norway Maple, and Squill. Other threats include fragmentation of the site due to development and disease threats to certain species like elm, beech, and ash.

Opportunities will arise from natural and man-made disturbance. For example, the loss of Ash trees to Emerald Ash Borer paired with the targeted removal of invasive Buckthorn and Honeysuckle will increase the sunlight and set the stage for recruitment of desirable plants, especially less shade-tolerant species, like Red Oak, Paper Birch, and possibly White Pine. The protection of tree seedlings using tree tubes or cages could be a way to capitalize on recruitment, eliminating the need to buy from nursery sources.

## VEGETATION DESCRIPTION



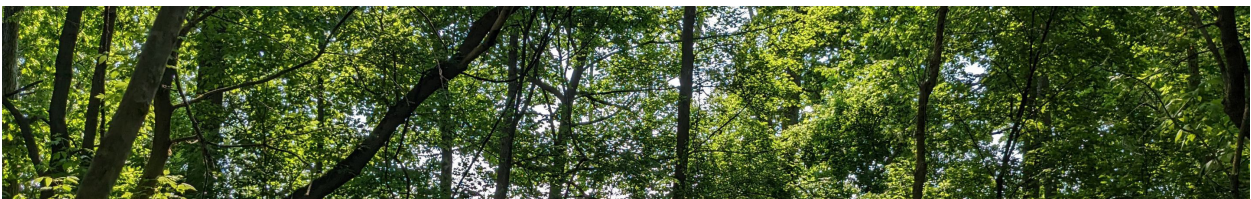
The structure and function of this forest type is governed by the canopy created by the dominant Sugar Maples. These trees cast deep shade that favor the regeneration of shade-tolerant tree species like Sugar Maple, Yellowbud Hickory (*Carya cordiformis*), and Ironwood. The canopy dictates the shrub and forb layer as well, only allowing species fit for shade to thrive. This oppressive structure is thwarted by the occurrence of environmental disturbance in the form of windthrow, ice damage, disease, or human intervention. These events create gaps in the canopy allowing for the development of oaks (*Quercus* sp.), cherries (*Prunus* sp.), birches (*Betula* sp.), aspens (*Populus* sp.), and conifers (*Pinus* and *Tsuga* sp.).

A noteworthy shade-intolerant species in Wisconsin that was found on the western ridge of the property at our initial vegetation survey is Butternut (*Juglans cinerea*), a species of Special Conservation Concern in Wisconsin because of its rarity in this region. It is considered Endangered according to the IUCN Red List. The development of this tree and its oak neighbors was most likely due to an opening in the canopy occurring, presumably from human activity.



**BUTTERNUT**

**Sadly, at our second vegetation survey in June, this Butternut had been recently cut down, possibly to open a view of the lake.** This begs the question of what management practices and community education need to happen to ensure this doesn't happen in the future.



Long term goals for this forest ecosystem should include the reduction and/or removal of Norway Maple and seed-producing Boxelder (a dioecious species—each individual is either seed-producing or pollen-producing). Additionally, careful and considerate management of this site could favor the recruitment and development of more Oak trees, a Wisconsin keystone species that is host of 534 species of lepidoptera, the insect order containing butterflies and moths.

## YEAR 1: RESTORATION GOALS

This first year of management is a wonderful opportunity to begin creating lasting change in the landscape and bring together a community of stewards for the land. The preserve would greatly benefit from invasive species management activities addressing Garlic Mustard, Dames Rocket, Buckthorn, and Honeysuckle populations. Reducing the pressure brought on by these plants would allow native species to establish and thrive, improving the health and function of the ecosystem. These activities can be done professionally or would make wonderful opportunities for volunteers to get involved in the management of the site.

Other immediate and relatively low impact activities could include woody debris cleanup. As woody species are cut and treated, the debris from these activities should be piled strategically, chipped and used for paths, burned, or removed from the site. Debris piles will provide some shelter and habitat for wildlife on-site. These piles could be burned immediately or as needed. Burning piles reduces the biomass left on the site and speeds up the cycling of nutrients back into the soil. This practice, when done correctly, is very safe and a great way to take care of woody debris. Physically removing debris from the site is costly and/or very labor intensive and requires an approved place to dispose of debris, which often means trucking it to a location and paying a fee to leave the debris. We see this as the least sustainable option, as it uses considerably more resources. Chipping the debris requires bringing a chipper to the base of the preserve, which could be challenging, but not impossible.



## YEAR 1: RESTORATION GOALS

### GOAL 1: PHASE 1 VEGETATION MANAGEMENT- TARGETED INVASIVE SPECIES CONTROL

- Invasive and undesirable species include Garlic Mustard, Orchard Grass, Gout-weed, Common Burdock, Canada Thistle, Bull Thistle, Common Hound's Tongue, Queen Anne's Lace, Motherwort, Catnip, Japanese Spurge, and Field Sow Thistle.
- Species of highest priority in the first years should include Garlic Mustard, Dame's Rocket, Buckthorn, Oriental Bittersweet, and Honeysuckle.
  - **SPRING/EARLY SUMMER- HERBACEOUS:** Garlic Mustard and Dame's Rocket are best pulled before flower and seed development. The whole plant, roots and all, should be removed from the ground and piled or bagged and removed.
  - **FALL/WINTER- WOODY:** Buckthorn and Honeysuckle should be removed using a cut-stump method. The tree is cut just above ground level and herbicide is applied to the circumference of the stump. Target large, fruiting trees/shrubs first to reduce seed dispersal.
- Allow native early successional plants, such as Jewel Weed, Snakeroot, and Virginia Creeper to establish and cover the understory, following removal of dense patches of invasive species. They will help outcompete invasive seed germination and plant growth.
- Treatment type and timing will vary between species based on phenology and priority.
- While it may take 2-3 years of management to establish control, progress will be notable immediately, especially following the removal of Dames Rocket and Garlic Mustard in Spring.



# YEAR 1: RESTORATION GOALS

## GOAL 2: CLEANUP AND MANAGE EXISTING WOODY DEBRIS AND STRATEGIZE PLAN FOR FUTURE WOODY DEBRIS CREATED FROM INVASIVE SPECIES REMOVAL

- Woody Debris 8" Diameter or Less: combination of making piles in strategic locations, burning piles over the course of several years, and chipping some of the wood for use as mulch on trails.
- Logs Greater Than 8" Diameter: strategically place along trails to create trail definition.



## GOAL 3: BUILD CONSENSUS AROUND PROPOSED TRAIL REDESIGN

- Review plans for walking trails throughout the preserve.
- Work with Marek Landscaping to finalize a trail design masterplan.
- Research and apply for grant opportunities to support this work.

## GOAL 4: PLAN AND HOST VOLUNTEER EVENTS

- Plan and host community events revolving around land management tasks, natural resources education, and outdoor recreation.
  - Community events will increase the Friends group's visibility in the community and bring together a local network of interested parties.
- Volunteer land management days are an effective way to get the community involved in local land management and get boots on the ground to get critical work done.
- Use Marek staff to help lead volunteer events and train volunteers in invasive species removal.

## PROPOSED MASTER PLAN TO AID WITH GRANT FUNDING



## YEAR 2 & 3: RESTORATION GOALS

On a larger scale, the preserve can benefit greatly from strategic forestry practices that both preserve the intact forest community and make room for improvements. Based on the current forest community, its features, and the Friends of Shorewood Nature Preserve's goals, a shelterwood cut silviculture system would be best for the site. A shelterwood cut system involves removing a small portion (20-30%) of the canopy at one time to create forest openings for recruitment of desirable species while removing undesirable species and minimizing forest and wildlife disturbance. Harvests should take place at any time except summer and should be done carefully as to not disturb developing age classes of trees. Openings in the canopy encourage tree seedlings to establish and provide space for seedlings or plantings to be more successful than if planted under an intact canopy. A preparatory cut may be necessary to reduce the recruitment of undesirable trees from surrounding seed sources but could be accomplished by removing undesirable trees as the first cut.



## YEAR 2 & 3: RESTORATION GOALS

An approach that would favor oak and hickory regeneration on the site is an irregular shelterwood system originating in Europe called Femelschlag. This differs from a traditional shelterwood cut in that it focuses on creating gaps in the canopy to allow for sun to reach the forest floor and incrementally expanding those gaps to promote species that are partially shade tolerant, like oaks and hickories, that rely on disturbances for seedling success. This approach is a flexible and adaptive system that can be modified as needed. This approach also helps to regenerate species across the shade-tolerant spectrum which promotes vegetation diversity and in turn, resilience to disturbance and environmental changes. The result of this approach will be a varied aged stand that creates a mosaic of species and tree ages across the site, increasing wildlife habitat potential and allowing for sustainable regeneration of desirable and invaluable trees species that would otherwise not develop past the seedling state or must rely on vegetative reproduction.

Gaps created in the canopy will allow for more sunlight to reach the forest floor and promote seedling growth of trees and shrubs. This can be a slow process that may need monitoring and protective measures for seedling predation and general environmental threats. Areas where gaps in the canopy are created could be planted with nursery shrubs and trees that are appropriate for the area. Vulnerable seedlings and saplings can be protected from predation and wildlife damage with wildlife exclosures or tree protector sleeves. The community can get involved in these efforts as well and act as monitors for these trees, encouraging them to continuously visit the site.



## YEAR 2 & 3: RESTORATION GOALS

### GOAL 1: SECURE FUNDING FOR TRAIL WORK AND FINALIZE TRAIL DESIGN

- Continue grant writing, if necessary, as well as supplemental fundraising to cover the cost of trail construction.
- Work with Marek Landscaping to finalize trail design.
- Share new trail map with the public to build support and excitement.

### GOAL 2: INVASIVE TREE REMOVAL

- Strategically remove undesirable and invasive trees by leaving gaps in the canopy to invigorate new growth.
- Target Species include Norway Maple and Boxelder.
- While removing trees, care should be taken to avoid unnecessary disturbance to the site. All safety precautions should be heeded to ensure the safety of all participants and bystanders.

### GOAL 3: PLANT SPECIES TO REVEGETATE AREAS IN NEED

- Areas that have been managed for invasive species will be at risk of increased invasive species growth due to soil disturbance and bare soil.
- Native tree and shrub species chosen specifically for this unique site should be planted in these spaces to avoid the encroachment of more invasive species.
- Refer to Table 2 for this list of species.
- These plant specimens should be carefully sourced from local plant nurseries, instead of being purchased from the cheapest supplier and shipped from other parts of the country. Those plants will not be well suited to our region and will have a far greater chance of failure.
- Deer fencing should be installed around newly planted shrubs.

### GOAL 4: CONTINUE VEGETATION MONITORING AND INVASIVE/UNDESIRABLE SPECIES MANAGEMENT

- Remove or treat invasive and undesirable species using an appropriate control method beginning with herbaceous species like Butter and Eggs, Thistles, Garlic Mustard, Dame's Rocket, and Burdock.
  - Techniques for removal include: hand pulling, cutting seed heads/flowers for annuals or biennials, spraying with appropriate herbicide
- Remove and treat undesirable woody plants using the cut-stump technique:
  - Cut the tree/shrub as close to the ground as possible and immediately apply the appropriate herbicide to the cut stump.

## YEAR 2 & 3: RESTORATION GOALS

### GOAL 5: MONITOR VEGETATION MANAGEMENT PROGRESS

- Use volunteers or hire a professional to take inventory of vegetation at key times of the year (spring/summer/fall) and keep records of desirable plant communities and general size of invasive species populations.
  - Continued vegetation monitoring will be an effective way to track restoration progress, forest succession, and provide quantitative data that can be used in applying for grants and planning appropriate management actions.
- Identify areas that could benefit from additional plantings of native groundcover or trees, or additional management activities.



### GOAL 6: BEGIN INITIAL TRAIL WORK

- In heavily eroded areas along lakeshore trail, pull trail back from crest.
- Clear fallen trees from trail and place along trail edge or in designated piles.

### GOAL 7: DUNE RESTORATION

- Possibly bury portions of rip rap in sand.
- Plant Dunegrass, Jack Pine, White Pine, and Oldfield Juniper in sand along shoreline trail.
  - Encourage dune encroachment as water line recedes.

### GOAL 8: CONTINUE HOSTING COMMUNITY INVOLVEMENT EVENTS

- Consistent, welcoming community events improve the Friends group's reputation and recognition, as well as build community buy-in and investment.
- At this stage, volunteer events for planting plugs and trees are a very cost-effective way to bring people into the preserve and encourage them to return more often.
- Events for the community can also be centered around education and exploration, such as seasonally themed hikes or birdwatching events.

## YEAR 4 & 5: RESTORATION GOALS

### GOAL 1: CONTINUE VEGETATION MONITORING AND INVASIVE AND UNDESIRABLE SPECIES MANAGEMENT

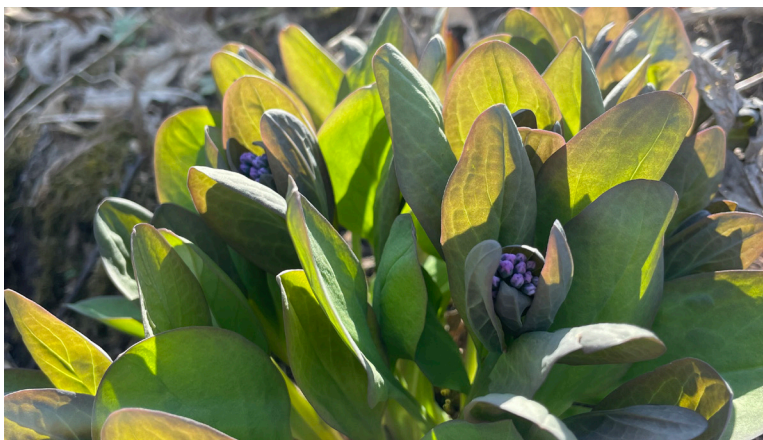
- Remove or treat invasive and undesirable species using an appropriate control method. By now, invasive species should be relatively manageable and should only require some maintenance.
- Continue removal and treatment of invasive and undesired woody plants. Previously treated plants should be monitored for resprouting activity and retreated.
- Continue monitoring site to identify new areas that could benefit from additional maintenance activities, seeding and planting, or new vegetation threats to the community.

### GOAL 2: BUILD TRAILS AND ADDITIONAL AMENITIES

- With funding secured, trail building can begin.
- Potential for additional work to happen, including construction of lookouts, boardwalks, steps down to the beach, or renovation of outdoor amphitheater.

### GOAL 3: ONGOING COMMUNITY INVOLVEMENT EVENTS BECOME REGULAR OCCURRENCES

- Building on the volunteer base formed over the last three years, annual invasive species control, vegetation monitoring, bird watching, etc. events become regular installments in the community.



### BASAL BARK APPLICATION

Basal bark application is beneficial in areas where removal is not required and can be used to control buckthorn up to 5 inches in diameter. For this technique, an herbicide solution is applied to the surface of the trunk from the ground up to 12-18" high. Herbicide can be applied using an extended sponge applicator (Figure 1) which can be made from a trash picker with sponges attached to the base. Herbicide should thoroughly cover the surface of the bark, but not be dripping. Use a 5-gallon bucket for the herbicide mix and soak the applicator in the mix, squeezing it once to express liquid before applying to plant.



**Figure 1** – Using a garbage grabber from any home improvement store (left), attach a sponge using zip ties and fasten it to the inside of the 'grabber' as shown in the photo (right).

It is important not to cut and remove plants that have been treated with basal bark application within one year, unless it is obvious that the plant has died. The herbicide can take time to kill the entire plant and often death does not occur until the plant begins its next growing season, where it will translocate the herbicide throughout itself and then die.

### CUT STUMP APPLICATION

Cut stump application involves cutting the tree or shrub at the base and carefully applying herbicide to the exposed stump. Both basal bark and stump cutting will effectively control buckthorn at all times of year, but is preferred in fall, winter, and spring. During these seasons, surrounding plants are likely dormant and overspray is less likely. Fall is the most effective time of year, as most translocation of nutrients and water is happening, allowing the herbicide to be translocated to the roots immediately.

Herbicide must be applied immediately following the cut to the surface of the stump, covering it entirely but not dripping wet. On larger trees, herbicide can be applied to the outer 2" perimeter of the surface of the stump only, which targets the cambium layer where the herbicide will be absorbed and translocated. Application is recommended using an 8 oz dripper bottle (Figure 2).

## PLANT CONTROL TECHNIQUES & EQUIPMENT

Figure 3 shows a Unitary Wash Bottle which can be used for carrying small amounts of herbicide and applying it precisely to small stumps. Because the liquid is dispensed from the bottom of the bottle, it can be handled in the field with ease and applied without turning the bottle upside down or on its side. For dense areas of small brush (less than 1 ½-inch diameter) a forestry saw (Figure 4) is most efficient. The FS-131 model is lightweight and sufficient, but for heavy use we recommend the FS-360 or FS-560.

For plants one half inch in diameter or greater use a cut stump application method with either triclopyr (amine/salt) or triclopyr (ester/acid). The triclopyr (ester/acid) formulation is the preferred herbicide for this application but should not be used in warmer temperatures due to its ability to volatilize (evaporate, which can spread to surrounding plants causing drift and/or be inhaled by the applicator). Triclopyr (ester/acid) formulation should also not be used in water, or in wetlands. Stumps must be cut low, preferably less than 4 inches tall. Herbicide must be applied within 30 minutes of making the cut.



**Figure 2** – Herbicide triclopyr-amino mixed with Impel bark oil, applied as a cut stump application.



**Figure 3** – Unitary Wash Bottle, available online from USP, United States Plastic Corp



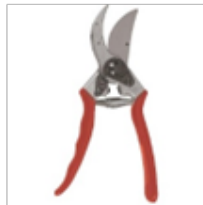
**Figure 4** – (LEFT) STIHL brand forestry saw with Bike Handle mount, necessary when operating for heavy use on woody debris. (MIDDLE) Circular saw blade attached, best for woody plants. (ABOVE) The blade can be changed out to use on grasses and herbaceous vegetation. Always make sure property PPE is worn during saw work.

### FOLIAR SPOT SPRAY APPLICATION

Plant surface must be dry, not wet or dewy. Coat the top of all leaf surfaces on the plant with herbicide using a backpack sprayer or hand help pump sprayer, to the point of wet but not dripping. Herbicide is absorbed through the leaf and translocated down through the plant. It may take up to two weeks for the plant to show signs of die-back. Herbicide will not work if the plant has already flowered because there may be enough energy left in the plant to produce viable seed once flowers are formed, even after it is treated with herbicide. When there is quality native species in a habitat, the overspray may not be worth the increased efficiency of using a backpack sprayer. In that circumstance, we recommend basal bark wiping individual plants.



**Figure 5** – Our favorite sprayer is the Chapin 4-gallon backpack, model # 61500. Inexpensive and durable.



**Figure 6** – Tools for cutting herbaceous vegetation (left to right): Bread knife, Felco Hand Pruners, Machete

- Glyphosate is the most common active ingredient for control of grasses and broad-leaf species. This is because glyphosate will not reside in the soil the way triclopyr and clopyralid will.
- The triclopyr/clopyralid mixed product is best used in fields and prairies. The advantage to using triclopyr/clopyralid is that these chemicals will not kill most grasses, therefore in a high-quality prairie the herbicide will select only for killing the targeted broadleaf plants and leaving grasses alive. The disadvantage is that it resides in the soil and can prevent establishment of broadleaf plants for the following growing seasons. The triclopyr/clopyralid mixed herbicide should also not be used near or around the base of trees or in heavy amounts in woodlands, as it can cause damage through their roots.

### SEED COLLECTION

Collect flowers and seeds to prevent the plant from reseeding. Collect flowers and seeds and dispose of them. An apron is helpful for carrying seed heads, making collection quick (Figure 7). For perennials, this is best followed up with a cut-stump application at the base to prevent it from re-flowering and producing another set of viable seeds. Figure 6 shows a variety of useful tools for cutting herbaceous vegetation.



**Figure 7** – Collect seed heads efficiently with an apron to carry them <https://rooapron.com/>



### HAND PULL

To remove the entire plant. Pull from the base of the plant to slowly loosen the roots, collecting the entire plant. Best to use with plants that have shallow roots, avoid using on plants with taproots as it may cause them to spread more. A root slayer, shown in figure 8, is an efficient tool to slice the plant beneath the ground, removing the upper portion. This works well with biennial species that have already shot up to flower and seed.

**Figure 8** – The Nomad Root Slayer is a favorite, but different handles may be preferred by different land stewards.

## SPECIES OBSERVED

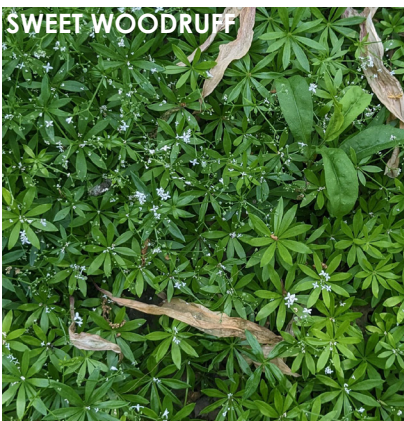
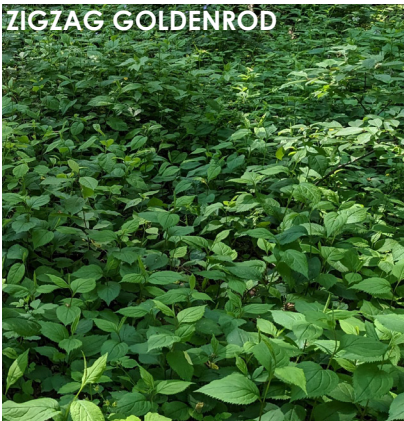
**TABLE 1. A list of species observed during a walking survey in June 2023**

Scientific Name	Common Name	WI Status	Growth Form	Duration
<i>Acer negundo</i>	Boxelder Maple	Native	Tree	Perennial
<i>Acer platanoides</i>	Norway Maple	Introduced - Naturalized	Tree	Perennial
<i>Acer saccharinum</i>	Silver Maple	Native	Tree	Perennial
<i>Acer saccharum</i>	Sugar Maple	Native	Tree	Perennial
<i>Actaea sp.</i>	Baneberry/Doll's Eyes	Native	Forb	Perennial
<i>Aegopodium podagraria</i>	Gout-weed	Introduced - Naturalized	Forb	Perennial
<i>Aesculus glabra</i>	Ohio Buckeye	Non-native - Escaped	Tree	Perennial
<i>Ageratina altissima</i>	White Snakeroot	Native	Forb	Perennial
<i>Ailanthus altissima</i>	Tree-of-Heaven	Non-native - Escaped	Tree	Perennial
<i>Alliaria petiolata</i>	Garlic Mustard	Introduced - Naturalized	Forb	Biennial
<i>Allium tricoccum</i>	Ramp, Wild Leek	Native	Forb	Perennial
<i>Ambrosia sp.</i>	Ragweed	Native	Forb	Annual
<i>Aquilegia canadensis</i>	Columbine	Native	Forb	Perennial
<i>Arctium minus</i>	Burdock	Introduced - Naturalized	Forb	Biennial
<i>Arisaema triphyllum</i>	Jack-in-the-pulpit	Native	Forb	Perennial
<i>Berberis thunbergii</i>	Japanese Barberry	Introduced- Invasive	Shrub	Perennial
<i>Betula papyrifera</i>	Paper Birch	Native	Tree	Perennial
<i>Bidens frondosa</i>	Common Beggar-ticks	Native	Forb	Annual
<i>Bromus pubescens</i>	Hairy Woodland Brome	Native	Grass	Perennial
<i>Carya cordiformis</i>	Yellow-bud Hickory	Native	Tree	Perennial
<i>Caulophyllum thalictroides</i>	Blue Cohosh	Native	Forb	Perennial
<i>Celastrus orbiculatus</i>	Oriental Bittersweet	Introduced - Naturalized	Vine	Perennial
<i>Chenopodium album</i>	Pigweed	Native	Forb	Annual
<i>Circaea canadensis</i>	Enchanter's Nightshade	Native	Forb	Perennial
<i>Cirsium arvense</i>	Canada Thistle	Introduced - Naturalized	Forb	Perennial
<i>Cirsium vulgare</i>	Bull Thistle	Introduced - Naturalized	Forb	Biennial
<i>Conyza canadensis</i>	Horseweed	Native	Forb	Annual
<i>Cornus alternifolia</i>	Pagoda Dogwood	Native	Shrub	Perennial
<i>Cornus sericea</i>	Red Osier Dogwood	Native	Shrub	Perennial
<i>Crataegus sp.</i>	Armed Hawthorne	Native	Tree	Perennial
<i>Cryptotaenia canadensis</i>	Honewort	Native	Forb	Perennial
<i>Cynoglossum officinale</i>	Common Hound's-tongue	Introduced - Naturalized	Forb	Biennial
<i>Dactylis glomerata</i>	Orchard Grass	Introduced - Naturalized	Grass	Perennial
<i>Daucus carota</i>	Queen Anne's Lace	Introduced - Naturalized	Forb	Biennial
<i>Duchesnea indica</i>	False Strawberry	Introduced	Forb	Perennial
<i>Elymus virginicus</i>	Virginia Wild Rye	Native	Grass	Perennial
<i>Erigeron sp.</i>	Daisy Fleabane	Native/Introduced	Forb	Biennial/Perennial
<i>Euonymus europaeus</i>	European Spindle-tree	Introduced - Escaped	Shrub	Perennial
<i>Eupatorium perfoliatum</i>	Common Boneset	Native	Forb	Perennial
<i>Fraxinus pennsylvanica</i>	Green Ash	Native	Tree	Perennial
<i>Galium odoratum</i>	Sweet Woodruff	Introduced	Forb	Perennial
<i>Geranium maculatum</i>	Wild Geranium	Native	Forb	Perennial
<i>Geum aleppicum</i>	Yellow Avens	Native	Forb	Perennial
<i>Glyceria striata</i>	Fowl Manna Grass	Native	Grass	Perennial
<i>Helianthus strumosus</i>	Rough-leaved Sunflower	Native	Forb	Perennial
<i>Heracleum maximum</i>	American Cow-Parsnip	Native	Forb	Perennial
<i>Hesperis matronalis</i>	Dame's Rocket	Introduced- Invasive	Forb	Perennial
<i>Hydrophyllum virginianum</i>	Virginia Waterleaf	Native	Forb	Perennial
<i>Impatiens capensis</i>	Orange Jewelweed	Native	Forb	Annual
<i>Juglans cinerea</i>	Butternut	Native	Tree	Perennial

## SPECIES OBSERVED

<i>Juncus tenuis</i>	Path Rush	Native	Rush	Perennial
<i>Leonurus cardiaca</i>	Motherwort	Introduced - Naturalized	Forb	Perennial
<i>Lonicera morrowi</i>	European Honeysuckle	Introduced - Naturalized	Shrub	Perennial
<i>Maianthemum racemosum</i>	Solomon's Plume	Native	Forb	Perennial
<i>Matteuccia struthiopteris</i>	Ostrich Fern	Native	Fern	Perennial
<i>Morus alba</i>	White Mulberry	Introduced - Naturalized	Tree	Perennial
<i>Nepeta cataria</i>	Catnip	Introduced - Naturalized	Forb	Perennial
<i>Oenothera biennis</i>	Common Evening Primrose	Native	Forb	Biennial/Perennial
<i>Osmorhiza claytonii</i>	Sweet Cicely	Native	Forb	Perennial
<i>Ostrya virginiana</i>	Eastern Hop-Hornbeam	Native	Tree	Perennial
<i>Pachysandra terminalis</i>	Japanese Spurge	Introduced - Persisting	Forb	Perennial
<i>Parthenocissus quinquefolia</i>	Virginia Creeper	Native	Vine	Perennial
<i>Persicaria virginiana</i>	Jumpseed	Native	Forb	Perennial
<i>Phalaris arundinacea</i>	Reed Canary Grass	Introduced- Invasive	Grass	Perennial
<i>Physalis sp.</i>	Ground Cherry	Native	Forb	Perennial
<i>Pinus strobus</i>	Eastern White Pine	Native	Tree	Perennial
<i>Populus deltoides</i>	Eastern Cottonwood	Native	Tree	Perennial
<i>Prunus americana</i>	American Plum	Native	Shrub	Perennial
<i>Prunus serotina</i>	Black Cherry	Native	Tree	Perennial
<i>Prunus virginiana</i>	Choke Cherry	Native	Shrub	Perennial
<i>Quercus rubra</i>	Northern Red Oak	Native	Tree	Perennial
<i>Ranunculus hispidus</i>	Bristly Buttercup	Native	Forb	Perennial
<i>Rhamnus cathartica</i>	Common Buckthorn	Introduced - Naturalized	Shrub	Perennial
<i>Rhus glabra</i>	Smooth Sumac	Native	Shrub	Perennial
<i>Rhus hirta</i>	Staghorn Sumac	Native	Shrub	Perennial
<i>Ribes americanum</i>	American Black Currant	Native	Shrub	Perennial
<i>Rubus idaeus</i>	American Red Raspberry	Native	Shrub	Perennial
<i>Sambucus racemosa</i>	Red Elderberry	Native	Shrub	Perennial
<i>Sanguinaria canadensis</i>	Bloodroot	Native	Forb	Perennial
<i>Scilla siberica</i>	Siberian Squill	Introduced- Invasive	Forb	Perennial
<i>Scrophularia marylandica</i>	Figwort	Native	Forb	Perennial
<i>Smilacina stellata</i>	Starry False Solomon's Seal	Native	Forb	Perennial
<i>Solanum dulcamra</i>	Bittersweet Nightshade	Introduced- Invasive	Vine	Perennial
<i>Solidago canadensis</i>	Canada Goldenrod	Native	Forb	Perennial
<i>Solidago flexicaulis</i>	Zigzag Goldenrod	Native	Forb	Perennial
<i>Sonchus arvensis</i>	Field Sow-thistle	Introduced - Naturalized	Forb	Perennial
<i>Symphotrichum lateriflorum</i>	Calico Aster	Native	Forb	Perennial
<i>Symphotrichum sp.</i>	Aster	Native	Forb	Perennial
<i>Thalictrum dioicum</i>	Early Meadow Rue	Native	Forb	Perennial
<i>Tilia americana</i>	Basswood	Native	Tree	Perennial
<i>Trillium cernuum</i>	Nodding Trillium	Native	Forb	Spring Ephemeral
<i>Tulipa sylvetris</i>	European Wild Tulip	Introduced	Forb	Spring Ephemeral
<i>Ulmus americana</i>	American Elm	Native	Tree	Perennial
<i>Uvularia grandiflora</i>	Large-flowered Bellwort	Native	Forb	Perennial
<i>Verbascum thapsus</i>	Common Mullein	Native	Forb	Biennial
<i>Viburnum lantana</i>	Wayfaring Tree	Introduced	Shrub	Perennial
<i>Vinca minor</i>	Running Myrtle, Periwinkle	Introduced - Escaped	Vine	Perennial
<i>Viola sororia</i>	Common Blue Violet	Native	Forb	Perennial
<i>Vitis riparia</i>	River Bank Grape	Native	Vine	Perennial
<i>Xanthium strumarium</i>	Common Cocklebur	Native	Forb	Annual

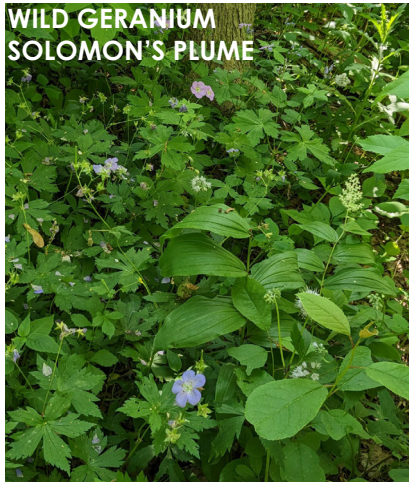
**SPECIES OBSERVED**



## RECOMMENDED SPECIES FOR FUTURE INTRODUCTION

**TABLE 2. A list of species for future planting**

Scientific name	Common name
<i>Ammophilla breviligulata</i>	Dune Grass
<i>Anemone quinquefolia</i>	Wood Anemone
<i>Aquilegia canadensis</i>	Columbine
<i>Cardamine concateneata</i>	Cutleaf Toothwort
<i>Caulophyllum thalictroides</i>	Blue Cohosh
<i>Geranium maculatum</i>	Wild Geranium
<i>Fagus grandiflora</i>	American Beech
<i>Maianthemum racemosum</i>	Solomon's Plume
<i>Matteuccia struthiopteris</i>	Ostrich Fern
<i>Ostrya virginiana</i>	Eastern Hop-Hornbeam
<i>Cornus alternifolia</i>	Pagoda Dogwood
<i>Diervilla lonicera</i>	Dwarf Bush Honeysuckle
<i>Hamamelis virginiana</i>	American Witch Hazel
<i>Pinus banksiana</i>	Jack Pine
<i>Pinus strobus</i>	Eastern White Pine
<i>Podophyllum peltatum</i>	Mayapple
<i>Polygonatum biflorum</i>	Solomon's Seal
<i>Sanguinaria canadensis</i>	Bloodroot
<i>Solidago flexicaulis</i>	Zigzag Goldenrod
<i>Symphotrichum lateriflorum</i>	Calico Aster
<i>Thalictrum dioicum</i>	Early Meadow Rue
<i>Trillium cernuum</i>	Northern Nodding Trillium



**SHOREWOOD NATURE PRESERVE |  
VEGETATION MANAGEMENT PLAN**

**EXISTING TRAIL & VEGETATION PLAN**

3950 N LAKE DR  
SHOREWOOD, WI 53211  
DRAWING: L-1  
REVISION: 16  
SCALE: 1"=30'  
07-31-2023

**LEGEND**

- Property Line
- 5' Contours
- Existing Trails
- Trail Erosion
- Invasive Species (dense pockets)
- Southern Hardwood Forest- Red Oak Dominant
- Box elder/Green Ash/Black Cherry
- Swale/ Drainageway
- Notable Existing Trees

**EXISTING NATIVE COVER**

**SHRUB LAYER:**

(Full list on separate spreadsheet)

- American Black Currant
- Chokecherry
- Pagoda Dogwood
- Raspberry

**HERBACEOUS LAYER:**

(Full list on separate spreadsheet)

- Blue Cohosh
- Calico Aster
- False Solomon's Seal
- Jewelweed
- Meadow Rue
- Ostrich Fern
- Virginia Jumpseed
- Virginia Waterleaf
- Wild Geranium
- Yellow Avens
- Zig Zag Goldenrod

**SPRING EPHEMERALS:**

(Full list on separate spreadsheet)

- Bloodroot
- Columbine
- Cutleaf toothwort
- Jack in the pulpit
- Trillium
- Trout lily
- Virginia bluebells
- Wild ginger
- Wild leek

**EXISTING INVASIVE COVER**

**SHRUB/TREE LAYER:**

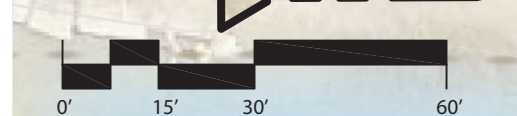
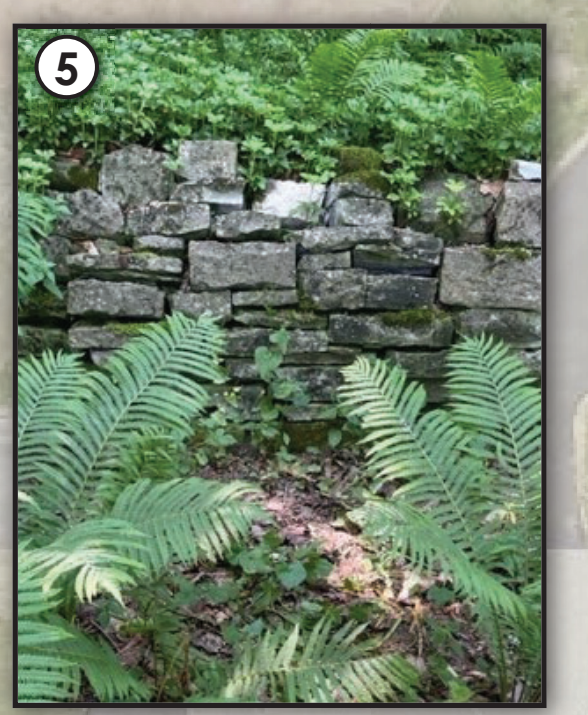
(Full list on separate spreadsheet)

- Buckthorn
- European spindle tree
- Honeysuckle

**HERBACEOUS LAYER:**

(Full list on separate spreadsheet)

- Burdock
- Dame's rocket
- Daylilies
- Garlic mustard
- Mock strawberry
- Oriental bittersweet



**SHOREWOOD NATURE PRESERVE |  
VEGETATION MANAGEMENT PLAN**

**PROPOSED TRAIL & VEGETATION PLAN**  
3950 N LAKE DR  
SHOREWOOD, WI 53211  
DRAWING: L-2  
REVISION: 15  
SCALE: 1"=30'  
08-07-2023

**LEGEND**

- Property Line
- 5' Contours
- New Trails
- Decommission Trail
- Dune restoration
- Amenities
- Swale/ Drainageway
- Notable Existing Trees (to stay)
- Potential Dune Plantings

**EXISTING NATIVE COVER**

**SHRUB LAYER:**

- (Full list on separate spreadsheet)
- American Black Currant
  - Chokecherry
  - Pagoda Dogwood
  - Raspberry

**HERBACEOUS LAYER:**

- (Full list on separate spreadsheet)
- Blue Cohosh
  - Calico Aster
  - False Solomon's Seal
  - Jewelweed
  - Meadow Rue
  - Ostrich Fern
  - Virginia Jumpseed
  - Virginia Waterleaf
  - Wild Geranium
  - Yellow Avens
  - Zig Zag Goldenrod

**SPRING EPHEMERALS:**

- (Full list on separate spreadsheet)
- Bloodroot
  - Columbine
  - Cutleaf Toothwort
  - Jack in the Pulpit
  - Trillium
  - Trout Lily
  - Virginia Bluebells
  - Wild Ginger
  - Wild Leek

**PROPOSED NATIVE COVER**

**SHRUB/TREE LAYER:**

- (Full list on separate spreadsheet)
- American Witch Hazel
  - Beech
  - Dwarf Bush Honeysuckle
  - Eastern Hop-Hornbeam
  - Eastern White Pine
  - Jack Pine
  - Oaks
  - Pagoda Dogwood
  - Wayfaring Tree

**HERBACEOUS LAYER:**

- (Full list on separate spreadsheet)
- Blue Cohosh
  - Calico Aster
  - Columbine
  - Ostrich Fern
  - Mayapple
  - Solomon's Plume
  - Solomon's Seal
  - Wild Geranium
  - Zigzag Goldenrod



**Shorewood Nature Preserve**  
**Cost Estimate - August 9th, 2023**

No.	Item Description	Unit	Estimated Quantity	Unit Price	Estimated Total Price Range (+/- 10%)
<b>TRAILS</b>					
1	New Trails (1,800 LF; 3,600-5,400 SF)	SF	4,500	\$4.50	\$18,300 - \$22,300
2	Decommission Trails (600 LF; 1,200-1,800 SF)	SF	1,500	\$2.25	\$3,100 - \$3,700
3	Fix Shoreline Trail Erosion (in worst areas)	LS	1	\$25,000	\$22,500 - \$27,500
4	Site Clear & Grub	LS	1	\$50,000	\$45,000 - \$55,000
<b>TRAILS TOTAL:</b>					<b>~ \$88,900 - \$108,500</b>

<b>AMENITIES (NEW &amp; UPDATED)</b>		Unit	Estimated Quantity	Unit Price	Estimated Total Price Range (+/- 10%)
1	Existing amphitheater updates (add sitting rocks; replace stage lumber; reinforce benches)	LS	1	\$20,000	\$18,000 - \$22,000
2	Existing chain link fence removal & stabilization (200 LF)	LS	1	\$4,000	\$3,600 - \$4,400
3	Stabilize drainageway along entrance path with wood & rock, check dams & vegetation	LS	1	\$8,000	\$7,200 - \$8,800
4	Terraced steps	EA	20	\$440	\$7,900 - \$9,700
5	Wood bridge over ravine	LS	1	\$40,000	\$36,000 - \$44,000
6	Gate installation	LS	1	\$3,000	\$2,700 - \$3,300
7	Viewing platform	SF	60	\$200	\$10,800 - \$13,200
8	Wood steps down to beach (3 sets of 10 steps - black locust processed natural rounds, sawn in half round)	EA	30	\$606	\$16,400 - \$20,000
10	Ephemeral pool	LS	1	\$8,000	\$7,200 - \$8,800
11	Stepping stones or boardwalk over Ephemeral Pool	SF	180	\$80	\$13,000 - \$15,800
12	Culvert or boardwalk crossing drainage (West of terraced steps)	SF	24	\$100	\$2,200 - \$2,600
<b>AMENITIES TOTAL:</b>					<b>~ \$125,000 - \$152,600</b>

<b>VEGETATION MANAGEMENT</b>		Unit	Estimated Quantity	Unit Price	Estimated Total Price Range (+/- 10%)
1	Invasive species removal – Cut & treat	AC	1.5	\$7,150	\$9,600 - \$11,800
2	New species introduction (native seed, plugs & plants)	LS	1		\$40,000-\$120,000
3	White pine grove iron supplement	LS	1	\$3,000	\$2,700 - \$3,300
4	Dune restoration (erosion control & plantings)	LS	1		\$30,000-\$50,000
5	Clear fallen trees from trail & place along path (if clearing and grubbing doesn't cover/ include this)	LS	1	\$15,000	\$13,500 - \$16,500
<b>VEGETATION MANAGEMENT TOTAL:</b>					<b>~ \$95,800 - \$201,600</b>

**GRAND TOTAL: ~ \$309,700 - \$462,700**

*\*\*Note: These are general cost ranges and would need to be varified further in the field. Material costs will increase with time.*