

Ecological Assessment & Management Plan

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The Village of Cross Plains Conservancy Parks

Dane County, Wisconsin
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Prepared by

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Submitted to

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Executive Summary

In July of 2005, Scott Taylor of Taylor Conservation, LLC conducted an ecological assessment of the Cross Plains Conservancy Park lands. Four Conservancy Parks were visited: (1) Glacial Valley, (2) Cedar Glen, (3) Dorothy Statz, and (4) Westview (Figure 1, p. iv).

This document records the results of the ecological assessment and provides a management plan to guide actions necessary to preserve and enhance the diversity of plant and animal species on Conservancy lands. The management plan outlines measurable objectives and concrete actions that can be completed immediately. Priority actions are enumerated on page 18, but a timetable is *not* provided since the Village will schedule the actions in accordance with future budget allocations and the amount of volunteer participation.

The Conservancy Park lands were acquired by the Village to preserve natural plant and animal communities, provide passive recreational opportunities to Village residents, and protect the quality of the scenic vistas from the Black Earth Creek Valley. Most of the Conservancy Parks contain walking paths enabling public access and enjoyment of relatively undisturbed natural areas (Figures 3-6, pp. 39-42).

Natural areas in Wisconsin often require active management to reverse threats to ecosystem health posed by invasive species, or to preserve fire-dependent natural communities, like prairies and oak savannas, that are becoming overgrown by trees and shrubs. The primary threats to ecosystem health and species diversity on Cross Plains Conservancy lands were:

1. the spread of invasive non-native plant species in forests and prairies, like buckthorn (*Rhamnus cathartica*), honeysuckle (*Lonicera X. bella*) and barberry (*Berberis spp.*), which are aggressive plants that can displace native species;
2. tree and shrub encroachment in dry prairie remnants, which can suppress and eventually eliminate native prairie species;
3. the loss of oaks as they are replaced by more shade tolerant tree species, like elm, hickory, white ash, basswood, black cherry and hackberry.

The Introduction (p. 2) of this document describes the environmental and landscape context of the Conservancy Park lands, introduces the Natural Heritage Inventory and explains the principles underlying the practice of ecological restoration. The Ecological Assessment section (p.6) provides the results of Scott Taylor's fieldwork and Kevin Thusius' bird survey and discusses the wildlife habitat potential of Conservancy lands. The Management Plan (p. 18) section recommends and explains needed management actions.

The following pages contain a brief overview of the Conservancy Parks, priority actions and costs of priority actions; it is primarily for use as a reference by members of the Parks and Recreation Committee.

Summary of Conservancy Parks and Priority Actions

(**Note:** The costs assume the use of a paid contractor billing at a rate of \$35/hour. The costs given are estimates for planning and budgeting purposes *only*. Volunteers can accomplish all of this work except prescribed burning, which should be done by professionals until Village staff gain training and experience. Trained volunteers can assist with prescribed burning.)

Glacial Valley Conservancy (45 acres)

Oak Forest (17 acres)

Old Field (9 acres)

Pine Forest (8 acres)

Young Hardwood Forest & Pines (7 acres)

Dry Prairie (4 acres)

This park has an extensive trail network (Figure 3). However, the East Slope of the oak forest does not have a trail. The East Slope is shallow enough to permit construction of a trail, which would connect the ridgetop trail to the Old Field below. Eventually this trail system could connect to the Ice Age Trail, which will be located east of the park (Kevin Thusius – Ice Age Trail and Park Foundation, personal communication). The West Ridge of the Oak Forest is heavily infested by buckthorn and honeysuckle. The Dry Prairie is becoming overgrown by red cedars and buckthorn.

The Dry Prairie is the best representation of a pre-European settlement-era plant community in the Conservancy and therefore probably has the greatest ecological significance of any natural community in the Conservancy.

High Priority Work:

1. Kill buckthorn, honeysuckle and Norway maple on the West Ridge, West Slope and East Slope of the Oak Forest (Figure 3).
Cost: \$3,250.00 (\$250/acre for 13 acres, 30-40% of cost is for herbicide, the remainder is for labor)
2. Clear red cedars and shrubs from dry prairie and start annual prescribed burning.
Cost: \$4,000.00 (labor for tree and brush removal, \$1,000/acre for 4 acres) \$1,000.00 annually to burn prairie (planning and labor).

Cedar Glen Conservancy (33 acres)

Oak Forest (25 acres)

Young Hardwood Forest (6 acres)

Dry Prairie (2 acres)

This park has a trail network on the East Slope but no trails were found on the West Slope (Figure 4). The West Slope is very steep and trail construction would be costly. Both the West Slope and the East Slope of the Oak Forest are heavily infested with buckthorn, honeysuckle and barberry. The Dry Prairies on the West Slope are becoming overgrown

with red cedar. Control of invasive species on the West Slope is not considered a priority since there is currently no trail access there.

High Priority Work:

1. Kill buckthorn and honeysuckle in the portion of the oak forest on the east slope that contains a trail (Figure 4).
Cost: \$1,600.00 (\$400/acre for 4 acres, 30-40% of cost is for herbicide, the remainder is for labor)

Dorothy Statz Conservancy (5 acres)

Oak Forest (3.5 acres)

Old Field & Stream Corridor (1.5 acres)

This park has a trail network extending to most areas (Figure 5). There is very little buckthorn and honeysuckle in the Oak Forest. No management actions are judged critical to protect ecosystem health in this park. However, there is a likely oak savanna remnant on the ridgetop. This would be an ideal location to attempt oak savanna restoration since this site only covers 1 acre; lessons learned could be applied to larger sites elsewhere in the Conservancy. Also, the Old Field & Stream Corridor below would be an ideal setting for a native prairie planting since it currently has very low plant species diversity and there is ample public access. See Appendix 4 for cost estimates for oak savanna restoration and prairie planting.

No high priority work recommended.

Westview Conservancy (4 acres)

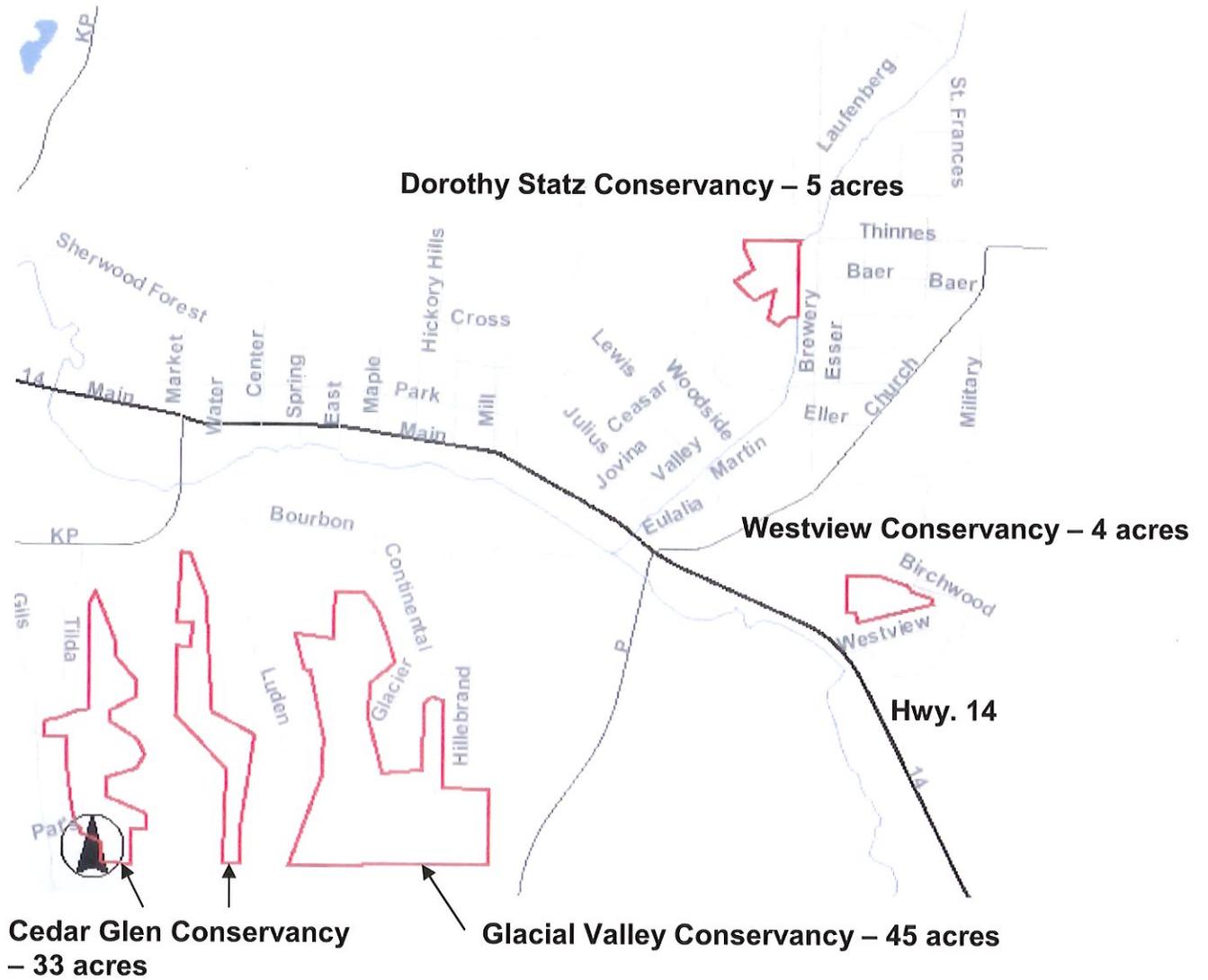
Dry Prairie (4 acres)

This park has a trail following the ridgetop. The trail terminates at a bench that commands sweeping views of the Black Earth Creek Valley. This entire Park is a remnant dry prairie that is becoming overgrown with red cedar. The lowermost slopes are completely covered over with red cedar and brush.

High Priority Work:

1. Clear red cedars and shrubs from dry prairie and start annual prescribed burning.
**Cost: \$4,000.00 (labor for tree and brush removal, \$1,000/acre for 4 acres)
\$1,000.00 annually to burn prairie (planning and labor).**

Figure 1: Overview of The Village of Cross Plains Conservancy Parks.



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I. Introduction

Overview of Conservancy Park Lands

The Conservancy Parks consist primarily of forests covering ridgetops and steep side-slopes that surround the Village of Cross Plains. The forests are relatively old and dominated by large, mature oaks; although there are pockets of younger forests and an aging pine plantation. Several small, remnant native prairies – none greater than 4 acres – occupy rocky west-facing slopes. They are becoming overgrown with red cedar, a common phenomenon on hillside prairie remnants in southwestern Wisconsin. There are also two old fields that were probably once farmed or grazed. The Conservancy Parks cover 87 acres; of these 46 acres are oak forests (52%), 13 acres are young hardwood forests (15%), 10 acres are dry prairies (12%), 10 acres are old fields (12%) and 8 acres are a pine plantation (9%).

Geology & Landscape

The surrounding landscape, known as the “driftless” area for the absence of glacial deposits, is characterized by narrow, steep-sided ridges overlooking level valley bottoms. The rugged topography was shaped by millions of years of erosion by streams that wind through every valley and draw. Capped with Ordovician-Period (430-500 million years ago) dolomite, the ridges have resisted stream-erosion while the softer sandstone of the Cambrian Period (500-540 million years ago), which underlies the lower hillsides and valley-bottoms, has worn away. The continental glaciers that once lay within miles of Conservancy lands spilled meltwater into the valley of the Black Earth Creek, filling it with sand and gravel. Meanwhile silt, that was likewise deposited in the Mississippi River Valley by glaciers, was lofted by westerly winds and deposited over this area in a blanket ranging from several inches to 4 feet in depth (Hole 1976). This silty material is known as “loess”.

The Cross Plains Conservancy lands are located in the “Western Coulee and Ridges” ecological landscape (WI. DNR 1999). Ecological landscapes are large regions that share broadly similar geology, climate and natural vegetation. They are subdivided into landtype associations. The landtype association of the Conservancy is “Hills and Valleys – Wisconsin River Drainage” (LTA:222Lc18).

Watershed

The Conservancy lands are located in the Black Earth Creek Watershed. The Black Earth Creek is classified as an “Outstanding Resource Water”, indicating excellent water quality and a very healthy aquatic ecosystem. Indeed, this stream is rated one of the top trout streams in the nation. The Black Earth Creek Watershed was the subject of a DNR-led Priority Watershed Study in 1989. A total of \$125 million in local assistance and cost-share grants was spent on watershed improvements over the next 10 years. Subsequent monitoring suggested that this work resulted in substantial reductions in pollutant loading to the Creek (WI. DNR 2002).

The Dorothy Stutz Conservancy Park adjoins Brewery Creek (Figure 5), a 2.7 mile tributary to Black Earth Creek. The Creek provides important habitat for forage fish and small brown trout (WI. DNR 2002). It is designated a “priority stream” in the Dane County Open Space Plan, making it a candidate for County funding for stream bank work.

Soils

The soils of Conservancy lands are mostly silt loams formed in loess over clay loam that weathered from dolomite bedrock. All of the soils are well-drained to excessively well-drained. The soils of the Dorothy Statz Conservancy formed in Glacial deposits. They formed in loess over calcareous glacial till lying approximately 30 inches beneath the surface (Glocker & Patzer 1978).

Some areas of the Conservancy have very thin soils, creating dryness and harsh growing conditions. These include western-most ridgetop in the Glacial Valley Conservancy (Figure 3), where they formed in approximately 12 inches of loess directly over fractured dolomite, and the extremely steep slopes below this ridge, which have less than 10 inches of soil above dolomite and sandstone bedrock (Glocker & Patzer 1978).

Table 1. Soils of the Cross Plains Conservancy Parks.

Soil Series	Landscape position in Conservancy	Drainage Class	Classification
Dunbarton silt loam	Hillsides & Ridgetops (Glacial Valley & Cedar Glen)	Well-Drained	Lithic Hapludalf
Stony and Rocky Land	Very Steep Hillsides (Glacial Valley & Westview)	Excessively-Drained	None
Sogn silt loam	Ridgetop (Glacial Valley)	Excessively-Drained	Lithic Haplustoll
Eleva sandy loam	Ridgetop (Glacial Valley)	Excessively-Drained	Typic Hapludalf
Kidder soils	Hillside (Statz)	Well-Drained	Typic Hapludalf
Seaton silt loam	Toe slope (Statz)	Moderately Well-Drained	Typic Hapludalf
Port Byron silt loam	Valley Bottom (Statz)	Moderately Well-Drained	Typic Hapludoll
Orion silt loam	Stream Terrace (Statz)	Somewhat Poorly-Drained	Aquic Udifluent

Vegetation

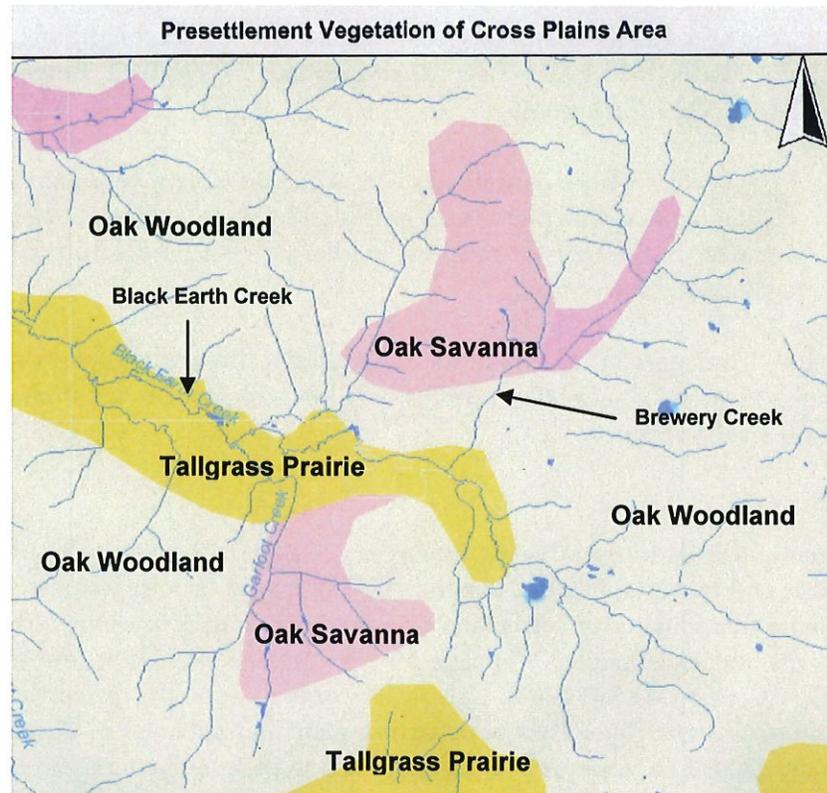
Before Europeans arrived, south central Wisconsin was mostly open country, dominated by prairies and oak savannas (Finley 1951). Grasses, wildflowers and widely scattered oaks were the principal vegetation. The Presettlement Vegetation Map of the area surrounding Cross Plains shows prairie in the Black Earth Creek Valley floor and oak savanna and woodland on surrounding ridges and valleys (Figure 2). The landscape was kept open by fires, probably ignited by native americans (Curtis 1959).

For millennia, fire checked the growth of forests. Areas that burned often and contained few barriers to the spread of fire were usually treeless prairies, rich in grass and forb species. Areas that burned less frequently – usually hillsides and ridgetops – developed into oak savannas, with as much as 50% tree cover. A place with even more trees is considered oak woodland. Like the prairie, these oak communities contained a high diversity of grass and forb species. Bur oaks and white oaks were the dominant tree species in this landscape since their thick bark protected them from fire. Also, oak seedlings readily resprout after being top-killed by a fire. This prepares them for a growth spurt once released from fire (Johnson 1993).

Following European settlement, wildfires sharply diminished and eventually halted. No longer suppressed by fire, oak seedling-sprouts grew rapidly and formed closed-canopy oak forests within a generation (Curtis 1959). Also, fire-sensitive hardwood tree species began

spreading and displacing oak trees. Lands that were prairies are now mostly farmed or built upon, so that only 0.5% of the original area covered by prairie in Wisconsin still exists (WI. DNR 1995).

Figure 2:



Today, forests cover about 40% of this region, with the remaining lands in crops, grassland or wetlands in major river valleys (WI. DNR 1999). Forests generally occur on hillsides that are too steep for farming. Valley bottoms and broad, level ridgetops contain row crops, hay fields, pasture and fallow grassland. Oak-hickory forests are still the predominant forest type in this region, although many are gradually converting to other shade-tolerant hardwoods, like sugar maple, red maple, American elm, basswood, shagbark hickory and white ash; young oaks do not compete well against these species.

The Natural Heritage Inventory

The Natural Heritage Inventory (NHI) is a system for locating and documenting occurrences of rare species and natural communities. It is part of an international system coordinated by the organization, NatureServe. In Wisconsin, it is managed by a partnership between the Nature Conservancy and the Endangered Resources Program of the DNR. Planners and resource managers use the NHI to determine the likelihood of occurrence of rare species in areas affected by development or land management activities. For each natural community in the Cross Plains Conservancy, rare species listed in the NHI that could be present are noted in the Management Plan. The narrative for each Conservancy

community also notes whether it matches any NHI-recognized natural communities. Species listed in the NHI are categorized as one of the following:

Special Concern: Any species whose population is suspected to be declining, but scientific evidence is insufficient to prove this.

Threatened: “Any species which appears likely, within the foreseeable future, on the basis of scientific evidence to become endangered.” (WI DNR, Bureau of Endangered Resources).

Endangered: “Any species whose continued existence as a viable component of this state’s wild animals or wild plants is determined by the Department to be in jeopardy on the basis of scientific evidence.” (WI DNR, Bureau of Endangered Resources).

“Threatened” and “Endangered” are statutory designations, affording legal protection to species designated as such. “Special Concern” is only advisory; species with this designation currently have no legal protection.

Management Approach

Management recommendations in this document are guided by the principles of *ecological restoration* and rely on a flexible, experimental approach. Ecological restoration is “an intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability” (Society for Ecological Restoration International Science & Policy Working Group 2004). Usually, restoration attempts to recreate the historic conditions of an ecosystem. Since European arrival, many natural areas in Wisconsin have changed dramatically. Often, ecosystems originally rich in plant and animal species have become biologically degraded through loss of species and structural changes to habitat. This is the result of several factors, including the cessation of fire, the invasion of aggressive, exotic species and landscape-scale fragmentation of ecosystems. Restoration tries to reverse these impacts and return ecosystems to an approximation of pre-European settlement conditions.

The response of degraded ecosystems to restoration treatments is difficult to predict. Therefore, restoration practitioners commonly embrace an experimental approach to their work, termed “adaptive management”. This approach requires constant monitoring of restoration results and flexible workplans. Information gained from monitoring the response of an ecosystem to a restoration treatment is used to refine subsequent treatments. Hence, the recommended actions in the management plan should not be view as a fixed program, but only as a starting point.

Ecological restoration is always a dynamic, long-term process requiring copious labor and patience. On public lands, it is most successful when there is broad community involvement. Partnerships between government agencies and local, volunteer-based “Friends” groups whose mission is the restoration of the natural area can be very effective.

II. Ecological Assessment of Conservancy Parks: Natural Community Descriptions

Glacial Valley Conservancy Park

(Figure 3)

Oak Forests

This community occupied west and east slopes and two separate ridgetops. The West Slope is very steep with many small rocks on the surface. The East Slope is gentle and a dry drainage-way passes along its base. This natural community was similar to two Natural Heritage Inventory Community Types, Southern Dry-Mesic Forest and Southern Dry Forest.

Very large white oaks (*Quercus alba*) and bur oaks (*Quercus macrocarpa*) dominated the forest canopy in this community. Many of the dominant oak trees had an open-grown form, suggesting the forest canopy was more open in the past. The 1937 air photo shows many small openings in the forest canopy, suggesting sunnier conditions (Figure 7). The East Slope was clearly logged at one time as there were many decayed tree stumps. Younger trees in this community were non-oak species, like basswood (*Tilia Americana*), shagbark hickory (*Carya ovata*), American elm (*Ulmus americana*), black cherry (*Prunus serotina*) and white ash (*Fraxinus americana*). These individuals were just beginning to grow into the main canopy. Only a handful of young oaks were observed suggesting that the oaks will eventually lose dominance to other species.

The shrub layer of this forest was dominated by gooseberry (*Ribes missouriense*), black raspberry (*Rubus occidentalis*), nannyberry (*Viburnum lentago*), woodbine (*Parthenocissus quinquefolia*), buckthorn (*Rhamnus cathartica*) and honeysuckle (*Lonicera X bella*). Buckthorn and honeysuckle are invasive non-natives and were dominant in the understory on both ridgetops and parts of the West Slope. Common herbaceous species were enchanter's nightshade (*Circaea lutetiana*), wild geranium (*Geranium maculatum*), white avens (*Geum canadense*) and elm-leaved goldenrod (*Solidago ulmifolia*).



Dense stand of buckthorn.

Two invasive, non-native tree species were observed: black locust (*Robinia pseudoacacia*) and Norway maple (*Acer platanoides*). The Norway maples were located on the West Ridge; some are mature and reproducing. Norway maple is an aggressively reproducing species whose seedlings are very shade tolerant; they will outcompete most other hardwood seedlings in the understory. The black locust was near the drainage-way at the base of the East Slope. Locust is not shade tolerant and will probably only spread into the adjoining old field. It spreads aggressively by root-sprouts.

Key elements of wildlife habitat in this community were:

1. Standing dead trees, fallen logs and decay cavities in large, old trees. Standing dead trees and decay cavities are used for nesting by many birds and mammals, like woodpeckers, chickadees, raccoons, squirrels and bats. Standing dead trees and fallen logs are readily colonized by insects, which then become a food source for birds and mammals. Fallen logs provide nesting sites for small mammals and cover for salamanders, who seek the cool, moist conditions beneath them.

Past harvesting in this forest has diminished the quantity of dead wood and old trees with cavities. But as these forests mature, standing dead trees and fallen logs will be more abundant.

2. Mast-producing tree species. Oaks, especially white oaks and bur oaks, are a critical, high-energy food source for white-tailed deer, wild turkey, woodpeckers, squirrels and bluejays. The large oaks will probably continue to produce acorns for many decades, but as the oaks are replaced by other species, there will be fewer acorns for wildlife, possibly making winter survival more difficult for them.

Other mast-producing species in this forest were black cherry, which produces berries consumed by many bird species, and shagbark hickory, which produces nuts relished by squirrels. These food sources will likely increase in abundance as cherries and hickories replace some of the oaks.

3. Layered forest vegetation. This forest contained a well-developed sapling/shrub layer beneath the main forest canopy. This layer will become even better developed as the mature trees gradually die and create canopy openings, allowing light penetration. Layered forest vegetation usually allows for greater bird diversity since there are more nesting and foraging sites.

Old Field

The Old Field occupied a ridge that slopes gradually downward to the north. As a product of past agriculture, this community did not resemble any Natural Heritage Inventory Community Type.

This community was dominated by non-native grasses and had very little species diversity. The absence of a remnant native community here suggests that crops were raised or cattle were grazed in the past. Historic air photos show that this field has been completely open since 1937 (Figure 7). The dominant grasses were brome grass (*Bromus inermis*), blue grass (*Poa pratensis*) and orchard grass (*Dactylis glomerata*). The field contained no mature trees and a few patches of multiflora rose (*Rosa multiflora*), a shrub. Common forb species were tall goldenrod (*Solidago altissima*), daisy fleabane (*Erigeron annuus*) and Canada thistle (*Cirsium arvense*). Saplings of black locust, an invasive tree, were found on the west edge of the field near the Oak Forest. These were probably root sprouts from the mature locusts in the woods. If more root sprouts form, a dense clone of black locusts could develop.

Left unmanaged, this field might be colonized by tree seedlings and develop into a forest. But since the grass sod creates intense competition and inhibits the germination and growth of young trees, this process could take many decades.

The key element of wildlife habitat in this community was grass cover that could harbor small mammals, like meadow voles, and ground-nesting birds, like ring-necked pheasants and field sparrows. Meadow voles would serve as a food source for foxes, coyotes, red-tailed hawks and owls.

Pine Forest

The Pine Forest occupied a ridgetop, a north slope and an east slope. The slopes were very steep, with thin soil and many small rocks at the surface. Small bedrock outcrops were scattered around the slopes. A large depression with very steep side-slopes was on the east slope – this may be a former lime quarry. Historic air photos show that this site was completely open before it was planted (Figures 7 & 8). It may have been a dry prairie before, like the west slope of the Glacial Valley Conservancy today. As a human-established forest, it did not resemble any Natural Heritage Inventory Community Type.

Red pines (*Pinus resinosa*) and white pines (*Pinus strobus*) that were planted in the 1950's dominated this forest. The original plantation rows were still evident. The red pines and white pines were segregated into separate blocks. There were several pockets of dead or declining pines that were filled with aspens (*Populus tremuloides*), red cedars (*Juniperus virginiana*) and buckthorn.

The pines were not reproducing and there were few hardwood seedlings and saplings in this community – perhaps due to the scarcity of hardwood seed trees in this area. White pine will probably reproduce eventually, since it is shade-tolerant. Red pine, however, is not shade-tolerant and will probably never reproduce well; hence, as the red pines grow old and die, the areas they occupied may develop into shrublands dominated by buckthorn, red cedar and scattered hickories and ashes, not unlike the Young Forest & Pines community described below.

The shrub and herb layers in this community had fewer species than most other communities in the Conservancy. Buckthorn, which formed dense stands in some areas, was the most common shrub. Honeysuckle, woodbine and frost grape (*Vitis riparia*) were also present. Common nightshade (*Solanum delcamara*), enchanter's nightshade, and *Galium spp.* were the most common forb species.

The key elements of wildlife habitat in this community were mature red and white pines. These provide roosting sites for wild turkeys and perching locations for hawks and owls seeking prey. Pines also provide winter cover for songbirds and white-tailed deer. The calorie-rich white pine seeds are eaten by many birds and mammals.

Young Hardwood Forest & Pines

The Young Hardwood Forest & Pines occupied a ridgetop where soil is very thin and bedrock is exposed in places. This area did not resemble any Natural Heritage Inventory Community Type.

This community consisted of scattered mature trees of walnut (*Juglans nigra*), bur oak, aspen and red pine amid dense brush and saplings of shagbark hickory and red cedar. A narrow line of pole-sized (4-10 inches in diameter) red pines followed the west edge of the ridge and small pockets of stunted red pine were scattered elsewhere. The aspens will probably have a short lifespan on this dry site. According to historic air photos, this area was almost completely open in 1962. By 1990 it was covered with trees and brush (Figure 10).

Common shrub species were honeysuckle, which formed dense stands in some places, buckthorn, blackberry (*Rubus allegheniensis*), and black raspberry. There were small patches of dry prairie in this community, suggesting the present day prairie on the west slope once extended onto the ridgetop. Enchanter's nightshade, white avens, daisy fleabane and *Galium spp.* were some of the most common forb species in this community.

The key elements of wildlife habitat in this community were bramble thickets. Brambles consist of *Rubus* species, like raspberries and blackberries. Here they are growing in full sun and are fruiting heavily. These fruits are a valuable mid-summer food source to many birds and mammals. Brambles also provide nesting cover to rabbits and other small mammals, which are important food sources for hawks, owls, fox, coyote and raccoons.

Dry Prairie & Red Cedars

Most of this community occupied a very steep, west-facing slope where soil is thin and rock fragments and small bedrock outcrops are common. It resembled two Natural Heritage Inventory community types: Dry Prairie, on the steep slope where side-oats grama grass (*Bouteloua curtipendula*) dominated, and Dry-Mesic Prairie, on the narrow band of ridgetop where big bluestem grass (*Andropogon gerardii*) dominated.

The dry prairie was dominated by native grasses, e.g. side oats grama grass (*Bouteloua curtipendula*), big bluestem (*Andropogon gerardii*) and little bluestem (*Schizachyrium scoparium*). It also contained many red cedars and sumacs (*Rhus glabra*, *R. typhina*). The Dry Prairie is the best representation of a pre-European settlement-era plant community in the Conservancy and therefore probably has the greatest ecological significance of any natural community in the Conservancy. The matrix of native grasses may harbor a multitude of native forb species that were not noted during field visits. Historic air photos show that this area was almost completely open in 1937, and that cedars gradually encroached in the following decades (Figures 7-10).

Common forb species in the prairie were bergamont (*Monarda fistulosa*), spiked lobelia (*Lobelia spicata*), bluebell (*Campanula rotundifolia*), thimbleweed (*Anemone virginiana*), leadplant (*Amorpha canescens*) and yarrow (*Achillea millefolium*). There were also non-native forbs, some potentially invasive, like leafy spurge (*Euphorbia esula*) and ox-eye daisy (*Chrysanthemum leucanthemum*).

Red cedars covered approximately one-half of the prairie. Buckthorn seedlings were present below most of the cedars – perhaps because birds that eat buckthorn fruit perch on the cedars and excrete the seeds onto the ground below. Left unmanaged, cedar and buckthorn will probably continue to spread and dominate this community completely.

Key elements of wildlife habitat in this community were:

1. Red cedars. The fleshy, berry-like cones of red cedar are consumed by a wide variety of bird species. Also, the dense cedar foliage provides winter cover for birds and white-tailed deer.
2. Short-grass prairie. Where not covered by cedars, the short grasses of the dry prairie may harbor unique bird and reptile species that prefer this type of grassland habitat.



Red cedars in the Dry Prairie.

Cedar Glen Conservancy Park

(Figure 4)

Oak Forests

This community occupied very steep, rocky slopes with scattered bedrock outcrops. The west slope contained several gullies. This community most resembled Natural Heritage Inventory Community types, Southern Dry-Mesic Forest and Southern Dry Forest.

The oak forests were dominated by large red oaks and bur oaks and younger shagbark hickories. Many of the oaks had open-grown form, suggesting the forest canopy was once more open. Historic air photos confirm that there were many small forest openings as late as 1962 (Figure 9). The hickories were just starting to grow into the main canopy. Young trees of walnut, hackberry (*Celtis occidentalis*), basswood and American elm were also present. Very few young oaks were observed, suggesting that the oaks may lose dominance to the more shade-tolerant hickories, elms, basswoods and hackberries. The west slope contained two areas of dry prairie overgrown with red cedars (Figure 4). Historic air photos show that these areas were mostly open as late as 1962 (Figure 9). These prairies had similar species composition to the ones in the Glacial Valley and Westview Conservancy Parks.



Open-grown oak tree.

Gooseberry, black raspberry, woodbine, prickly ash (*Zanthoxylum americanum*), nannyberry, frost grape, buckthorn, honeysuckle and barberry (*Berberis sp.*) were the most common shrub species. Honeysuckle, a non-native shrub, formed dense thickets on the east slopes.

Barberry and buckthorn, also both non-native, were extremely abundant in the understory on the west slopes.

Common forb species in this community were wild geranium, enchanter's nightshade, Pennsylvania sedge (*Carex pennsylvanica*), white avens, elm-leaved goldenrod, *Galium spp.*, white snakeroot (*Eupatorium rugosum*) and honewort (*Cryptotaenia canadensis*). Many wild-coffee (*Triosteum perfoliatum*) plants were observed on the east slopes suggesting this area once had savanna-like conditions, since wild-coffee is considered a reliable indicator of a past savanna (Bader et al. 1994).

Key elements of wildlife habitat in this community were:

1. Standing dead trees, fallen logs and decay cavities in large, old trees. Standing dead trees and decay cavities are used for nesting by many birds and mammals, like woodpeckers, chickadees, raccoons, squirrels and bats. Standing dead trees and fallen logs are readily colonized by insects, which then become a food source for birds and mammals. Fallen logs provide nesting sites for small mammals and cover for salamanders, who seek the cool, moist conditions beneath them.

Some mature oaks in this community appeared to be dying of oak wilt, a vascular fungus that mostly affects red and black oaks. These dead individuals will serve the vital habitat functions outlined above.

2. Mast-producing tree species. Oaks, especially white oaks and bur oaks, are a critical, high-energy food source for white-tailed deer, wild turkey, woodpeckers, squirrels and bluejays. The large oaks will probably continue to produce acorns for many decades, but as the oaks are replaced by other species, there will be fewer acorns for wildlife, possibly making winter survival more difficult for these species.

Other mast-producing species in this forest were hackberry, which produces berries consumed by some bird species, and shagbark hickory, which produces nuts relished by squirrels. These food sources will likely increase in abundance as hackberries and hickories replace some of the oaks.

3. Layered forest vegetation. The east slopes contained an extremely well-developed sapling/shrub layer beneath the main forest canopy. Layered forest vegetation usually allows for greater bird diversity since there are more nesting and foraging sites.
4. Red cedars. These covered the two dry prairie areas on the west slopes. The fleshy, berry-like cones of red cedar are consumed by a wide variety of bird species. Also, the dense cedar foliage provides winter cover for birds and white-tailed deer.
5. Short-grass prairie. Where not covered by cedars, the short grasses of the dry prairies may harbor unique bird and reptile species that prefer this type of grassland habitat.

Young Hardwood Forest

This community occupied a steep east slope and portions of a ridgetop. As a young, developing community, it did not resemble any Natural Heritage Inventory community type. It contained scattered large oaks, walnuts and shagbark hickories surrounded by saplings and brush. There were dense pockets of basswoods and many young red oaks and white oaks. It contained the same shrub and herb species as the nearby oak forest (Figure 4), with honeysuckle extremely abundant. Part of this community is a ridgetop field that has been colonized by walnut saplings.

The key element of wildlife habitat in this community were dense trees and brush. These create bird nesting habitat unlike the older Oak Forests in Cedar Glen. This habitat may harbor bird species like chipping sparrow, indigo bunting and grey catbird.

Dorothy Stutz Conservancy Park

(Figure 5)

Oak Forest

This community occupied a steep, east-facing slope. It resembled the Natural Heritage Inventory community type, Southern Dry-Mesic Forest.

Large red and white oaks shared dominance with younger shagbark hickories, elms and hackberries in this community. The younger non-oak trees have recently entered the main forest canopy and will probably come to dominate this forest since few young oaks were observed. Historic air photos show this slope has been thickly forested since 1937 (Figure 7).

A small portion of this site is located on the ridgetop. This area was probably an oak savanna as open-grown bur oaks were the dominant tree and there was much wild coffee in the understory, which is considered a reliable indicator of a past savanna (Bader et al. 1994).

Gooseberry, woodbine, frost grape, black raspberry, buckthorn and honeysuckle were common shrubs in this community. Enchanter's nightshade, Pennsylvania sedge (*Carex pennsylvanica*), columbine (*Aquilegia canadense*), solomon's seal (*Polygonatum biflorum*), mayapple (*Podophyllum peltatum*), white avens, and pointed tick trefoil (*Desmodium glutinosum*) were common forb species.

American elm, which was abundant in this forest, is susceptible to Dutch Elm Disease (DED), a fatal disease caused by a fungus spread by bark beetles. Once infected, an elm tree's foliage wilts and fall off. It can take from one to several years for an infected tree to die. DED affects young and old elms alike. Many of the young elms in this forest will probably succumb to DED at some time in their lives.

The key elements of wildlife habitat in this community were:

1. Standing dead trees, fallen logs and decay cavities in large, old trees. Standing dead trees and decay cavities are used for nesting by many birds and mammals, like

woodpeckers, chickadees, raccoons, squirrels and bats. Standing dead trees and fallen logs are readily colonized by insects, which then become a food source for birds and mammals. Fallen logs provide nesting sites for small mammals and cover for salamanders, who seek the cool, moist conditions beneath them.

Many of the large (>20 inches in diameter) red oaks in this community will probably die in coming decades. As dead trees, they will provide the habitat benefits outlined above. Because this forest is close to Brewery Creek, it could host salamanders and amphibians who breed in the water, and then seek cover under fallen logs or in the leaf litter of this forest.

2. Mast-producing tree species. Oaks, especially white oaks and bur oaks, are a critical, high-energy food source for white-tailed deer, wild turkey, woodpeckers, squirrels and bluejays. The large oaks will probably continue to produce acorns for many decades, but as the oaks are replaced by other species, there will be fewer acorns for wildlife, possibly making winter survival more difficult for these species.

Other mast-producing species in this forest are hackberry, which produces berries consumed by some bird species, and shagbark hickory, which produces nuts relished by squirrels. These food sources will likely increase in abundance as hackberries and hickories replace some of the red oaks.

3. Layered forest vegetation. This forest contains a well-developed sapling/shrub layer beneath the main forest canopy. Layered forest vegetation usually allows for greater bird diversity since there are more nesting and foraging sites.

Old Field & Stream Corridor

This community occupied a valley bottom, which probably has abundant moisture and nutrients available to plants. As a product of past agriculture, this community did not resemble any Natural Heritage Inventory community type.

The Old Field & Stream Corridor was dominated by grasses and wildflowers, like brome grass, wild parsnip (*Pastinaca sativa*), crown vetch (*Coronilla varia*), and nettles (*Urtica dioica*). Brewery Creek, which forms the east edge of this community, was lined with trees of box elder (*Acer negundo*), black willow (*Salix nigra*) and walnut. Reed canary grass (*Phalaris arundinacea*) and dame's rocket (*Hesperis matronalis*) were the most common forb species growing along the stream bank. Historic air photos indicate that this area has been completely open since 1937 (Figure 7). It was probably under cultivation for much of this time. Air photos also show that Brewery Creek was straightened after 1962, probably to make way for homes built on the east bank.

The key element of wildlife habitat in this community was grass and forb cover that could harbor small mammals, like meadow voles, and ground-nesting birds, like ring-necked pheasants and field sparrows. Meadow voles would serve as a food source for foxes, coyotes, red-tailed hawks and owls.

Westview Conservancy Park

(Figure 6)

Dry Prairie & Red Cedars

The Dry Prairie & Red Cedars community of Westview occupied a thin-soiled ridgetop and a steep, rocky, west slope. This site was very similar to the Dry Prairie sites of Glacial Vally and Cedar Glen. Lower areas of the hillside are completely dominated by red cedar, buckthorn and sumac. These areas may have once been a prairie and may still contain suppressed prairie plants beneath the trees and brush. This community resembled the Natural Heritage Inventory community type, Dry Prairie.

This community was dominated by side oats grama grass, little bluestem and big bluestem; it also contained many red cedars, aspens, buckthorns and sumacs. The plant species composition was similar to the dry prairies in Glacial Valley and Cedar Glen and has the same degree of ecological significance as a remnant pre-European settlement-era plant community.

Besides native grasses, common forb species in this prairie were spiked lobelia (*Lobelia spicata*), bluebell (*Campanula rotundifolia*), thimbleweed (*Anemone virginiana*), leadplant (*Amorpha canescens*), dogbane (*Apocynum sp.*), early horse gentian (*Triosteum aurantiacum*), purple prairie clover (*Dalea purpurea*) and yarrow (*Achillea millefolium*). There were also non-native herbs, some potentially invasive, like leafy spurge, crown vetch (*Coronilla varia*), spotted knapweed (*Centaurea biebersteinii*), and ox-eye daisy.

Red cedars covered a very large share of the prairie. Buckthorn seedlings were present below most of the cedars – perhaps because birds that eat buckthorn fruit perch on the cedars and excrete the seeds onto the ground below. Left unmanaged, cedar and buckthorn will probably continue to spread and dominate this community completely.

Key elements of wildlife habitat in this community were:

1. Red cedars. The fleshy, berry-like cones of red cedar are consumed by a wide variety of bird species. Also, the dense cedar foliage provides winter cover for birds and white-tailed deer.
2. Short-grass prairie. Where not covered by cedars, the short grasses of the dry prairie may harbor unique bird and reptile species that prefer this type of grassland habitat.



Brush encroaching on Dry Prairie.

Wildlife Assessment

The wildlife assessment consisted of a field inventory of birds and an office-based review of animal species that could inhabit Conservancy lands. The bird inventory was conducted by Kevin Thusius in the Cedar Glen and Glacial Valley Conservancy Parks on May 15th and June 14th, 2005. During these visits, birds were observed and identified via site and auditory cues. Once a bird was observed the species was recorded on a digital voice recorder, and later entered into an MS Excel spreadsheet. A species was considered “nesting” if it was observed feeding young, carrying nesting materials or sitting on a nest. A species was considered a “probable breeder” if it was observed engaging in breeding behaviors such as singing, physically defending territory from other males or feeding adult females. The following bird species were noted during two bird surveys:

Species	Breeding Status
American Crow	Confirmed Nesting
Song Sparrow	Confirmed Nesting
Belted Kingfisher	Probable Breeder
Great-crested Flycatcher	Probable Breeder
Black-capped Chickadee	Probable Breeder
House Wren	Probable Breeder
House Finch	Probable Breeder
American Robin	Probable Breeder
White-breasted Nuthatch	Probable Breeder
American Goldfinch	Probable Breeder
Brown-headed Cowbird	Probable Breeder
Tree Swallow	Probable Breeder
Rose-breasted Grosbeak	Probable Breeder
Canada Warbler	Migrant
Blue-grey Gnatcatcher	Probable Breeder
Chipping Sparrow	Confirmed Nesting
Northern Cardinal	Probable Breeder
White-crowned Sparrow	Probable Breeder
Indigo Bunting	Probable Breeder
Gray Catbird	Probable Breeder
Blue Jay	Probable Breeder
Red-eyed Vireo	Probable Breeder
Downy Woodpecker	Probable Breeder
Cedar Waxwing	Probable Breeder
Eastern Wood-Peevee	Probable Breeder
Red-bellied Woodpecker	Probable Breeder

House Sparrow	Probable Breeder
Northern Flicker	Probable Breeder
Field Sparrow	Confirmed Nesting
Eastern Bluebird	Probable Breeder
Red-tail Hawk	Probable Breeder
Eastern Meadowlark	Probable Breeder
Barn Swallow	Probable Breeder
Eastern Spotted Towhee	Probable Breeder
Pileated Woodpecker	Probable Breeder
Eastern Phoebe	Probable Breeder

A list of mammals, birds, reptiles and amphibians that *could* occur on Conservancy lands was compiled. Most are common species that inhabit a range of habitats, like forests, old fields and fencerows. Some of them are grassland or dry prairie specialists that could inhabit the Dry Prairie & Red Cedars natural community. However, this community may not provide adequate habitat for some grassland species since it is covered with cedars and occurs in patches smaller than 5 acres – 40 acres or more is considered optimal for grassland species (Sample and Mossman 1997). Since most frogs and salamanders breed in water, they are most likely to inhabit the forest and meadow of the Dorothy Stutz Conservancy, which is close to Brewery Creek.

Mammals
Eastern chipmunk
Grey squirrel
Fox squirrel
Striped ground squirrel (grassland)
Red fox
Gray fox
Meadow vole
Shorttail shrew
Masked shrew
Eastern mole
Least weasel
Short-tailed weasel
Long-tailed weasel
Short-tailed shrew
Deer mouse
Meadow jumping mouse
White-footed mouse
Woodchuck
Cottontail rabbit
Coyote
Opossum

Raccoon
Striped skunk
White-tailed deer
Little brown bat
Birds
Great-horned owl
Screech owl
Barred owl
Common grackle
European starling
Mourning dove
Red-winged blackbird
Wild turkey
Ring-necked pheasant
Rock dove
American redstart
Woodthrush
Red-headed woodpecker
Yellow-billed cuckoo
Yellow-throated vireo
Common nighthawk (grassland)
Eastern kingbird (grassland)
Grasshopper sparrow (grassland)
Horned lark (grassland)
Western meadowlark (grassland)
Reptiles & Amphibians
Eastern garter snake
American toad
Green frog
Chorus frog
Leopard frog
Brown snake
Blue-spotted salamander
Eastern grey tree frog
Spring peeper
Tiger salamander
Blue racer (dry prairie)
Bullsnake (dry prairie)
Eastern milk snake (dry prairie)

III. Management Plan

The management plan recommends management actions for the natural communities found on Conservancy Park lands. The Oak Forests of Glacial Valley Conservancy were divided into two management units: Oak Forest: Ridges & West Slope and Oak Forest: East Slope, with separate objectives and actions for each. The Dry Prairie & Red Cedar community, which was found in 3 Conservancy Parks, is discussed in a single section.

A “Target Community” is the natural community that ecological restoration attempts to recreate. It is often the likely historic community for the site, such as an oak savanna or dry prairie. However, there are alternatives to restoration of historic plant communities that still enhance biodiversity. For example, you may simply attempt to maintain an oak forest rather than create an oak savanna. Or you may just control invasive species like buckthorn, honeysuckle and barberry; this alone will enhance biodiversity and ecosystem health. Consequently, more than one possible target community is often proposed.

High Priority Actions*	
Action	Management Unit
Kill buckthorn, honeysuckle, Norway maple and black locust.	Glacial Valley: <i>Oak Forest: Ridges & West Slope; Oak Forest: East Slope</i>
Clear red cedars and brush; start annual prescribed burning.	Glacial Valley & Westview: <i>Dry Prairie & Red Cedars</i>
Kill buckthorn and honeysuckle.	Cedar Glen: <i>Oak Forest (East Slope)</i>
Priority Actions**	
Action	Management Unit
Plant native prairie.	Dorothy Statz: <i>Old Field & Stream Corridor</i>
Restore oak savanna remnant on ridgetop.	Dorothy Statz: <i>Oak Forest</i>
Plant native shrubs and oak seedlings in the understory.	Glacial Valley: <i>Oak Forest: Ridges & West Slope</i>
Kill buckthorn and honeysuckle; plant native shrubs and trees in openings and in the understory.	Glacial Valley: <i>Pine Forest</i>
Kill buckthorn and honeysuckle; plant and/or encourage hardwood seedlings and saplings.	Glacial Valley: <i>Young Hardwood Forest & Pines</i>
Plant native shrubs and oak seedlings in the understory.	Cedar Glen: <i>Oak Forest (East Slope)</i>
Plant oak seedlings in the ridgetop field.	Cedar Glen: <i>Young Hardwood Forest</i>

*High Priority actions are needed to preserve species diversity in communities threatened by invasive species; they are recommended for areas with public access.

** Priority actions are relatively inexpensive and enhance species diversity; they are recommended for areas with public access.

Glacial Valley Conservancy: *Oak Forest: Ridges & West Slope*

(Figure 3)

Acreage	8 acres
Trail Access	Yes, in West Ridge. No access on East Ridge.
Topographic Position	Ridgetops, upper west slope
Slope Steepness	Nearly level (ridgetop) 12-60% (hillside)
Drainage	Well drained (ridgetop), excessively drained (hillside)
Soil Texture	Silt loam, sandy loam

Kill Norway maple, buckthorn and honeysuckle and plant native shrubs to encourage native shrub and herb diversity. Discourage dominance of American elm. American elm trees should be discouraged (not eliminated) by cutting those competing with trees of other species since they are susceptible to premature death due to Dutch Elm Disease. Planting native shrubs, like dogwoods, viburnums, elderberry and hazelnut, will increase the species diversity and fill the habitat niche of the non-native shrubs after they are removed. If buckthorn and honeysuckle are cut, pile the cut shrubs to create wildlife cover.

If you wish to perpetuate the oak forest, conduct prescribed burns to encourage oak regeneration and diminish the abundance of shade-tolerant hardwoods. Burning will top-kill many small stems (<2 inches in diameter). Oaks will usually resprout and survive, thereby gaining an advantage over more fire-sensitive hardwoods. This could increase the number of young oaks available to replace canopy trees as they die. **The Village is legally liable for impacts to State-listed threatened and endangered plant and animal species that may be present in the Oak Forest (State Statute 29.604). Contact the DNR Bureau of Endangered Resources to learn how to mitigate the impact of burning on these species.**

There are three possible Target Communities for this part of the Oak Forest: (1) Hardwood Forest, (2) Oak Forest, and (3) Oak Woodland/Savanna. A mixed hardwood forest will develop naturally. The continuation of the Oak Forest will require active suppression of the shade tolerant hardwoods, e.g. American elm, shagbark hickory, basswood, black cherry, white ash and hackberry, that can outcompete oak seedlings, and use of prescribed burning. The Oak Woodland/Savanna requires extensive canopy opening and use of prescribed burning. Restoration of a savanna does not guarantee that the species-rich herbaceous layer typical of the savanna will reemerge; planting may be necessary. Nonetheless, the Village may want to consider this option since oak savannas are very rare in southern Wisconsin.

(See Appendix 1 for detailed management prescriptions for each Target Community.)

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Oak Forest of the Glacial Valley Conservancy:

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	
Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Glacial Valley Conservancy: *Oak Forest: East Slope*

(Figure 3)

Acreage	9 acres
Trail Access	No
Topographic Position	Upper & lower east slope
Slope Steepness	6-60%
Drainage	Excessively drained (upper slope), moderately well-drained
Soil Texture	Silt loam, sandy loam

Kill black locusts, buckthorn and honeysuckle and plant native shrubs to encourage native shrub and herb diversity. Discourage dominance of American elm. American elm trees should be discouraged (not eliminated) by cutting those competing with trees of other species since they are susceptible to premature death due to Dutch Elm Disease. Locust will probably not reproduce in the forest since its seedlings do not tolerate shade. But the roots of these trees, which are shallow and wide-spreading, will probably continue to produce seedling-sprouts in the nearby field. Planting native shrubs, like dogwoods, viburnums, elderberry and hazelnut, will increase the species diversity and fill the habitat niche of the non-native shrubs after they are removed. Buckthorn and honeysuckle abundances are lower in this area than on the Ridgetop. Nonetheless, if buckthorn and honeysuckle are cut, pile the cut shrubs to create wildlife cover.

If you wish to perpetuate the oak forest, conduct prescribed burns to encourage oak regeneration and diminish the abundance of shade-tolerant hardwoods. Burning will top-kill many small stems (<2 inches in diameter). Oaks will usually resprout and survive, thereby gaining an advantage over more fire-sensitive hardwoods. This could increase the number of young oaks available to replace canopy trees as they die. **The Village is legally liable for impacts to State-listed threatened and endangered plant and animal species that may be present in the Oak Forest (State Statute 29.604). Contact the DNR Bureau of Endangered Resources to learn how to mitigate the impact of burning on these species.**

There are two possible Target Communities for this part of the Oak Forest: (1) Mixed Hardwood Forest and (2) Oak Forest. A mixed hardwood forest will develop naturally. The continuation of the Oak Forest will require active suppression of the shade tolerant hardwoods, e.g. American elm, shagbark hickory, basswood, black cherry, white ash and hackberry, that can outcompete oak seedlings and the use of prescribed burning. Since this area occupies an east slope, where sunlight is less intense, and a drainageway, it may be too moist for fire-dependent oak woodland/savanna restoration.

(See Appendix 1 for detailed management prescriptions for each Target Community.)

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities

similar to this one. None of these species were noted during the field visits, but they could be present in the Oak Forest of the Glacial Valley Conservancy:

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	
Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Glacial Valley Conservancy: *Old Field* (Figure 3)

Acreage	9 acres
Trail Access	No
Topographic Position	Ridgetop
Slope Steepness	2-20%
Drainage	Well drained
Soil Texture	Silt loam

Kill the black locust seedlings and saplings on the west side of the field and the multiflora rose bushes. Plant clumps of native, fruit-bearing shrubs, like elderberry, dogwoods, viburnums, wild plum and sumac, along the field edges. Bark-treat the locusts with herbicide rather than cutting them; cutting will trigger the roots to send up more sprouts. The patches of multiflora rose may be cut or just bark-treated. Although multiflora rose provides wildlife cover, it can become invasive and should be replaced with native shrubs. Dense clumps of native shrubs planted along the field edge, near the woods, will provide food and cover for wildlife. Include shrubs that bear fruit during summer (elderberry) and fall (dogwoods, viburnums), and those that hold their fruit over the winter (high-bush cranberry, sumac). To create dense clumps, space the plants 4-6 feet apart. These shrubs can be retained if prairie planting or tree planting is done.

Convert this field to (1) a native tall-grass prairie or (2) a closed-canopy forest. If conversion to a forest is done, leave some ¼ to ½ acre areas open so that brushy thickets form; these will provide wildlife cover. If conversion to a prairie is done, you may still plant 10-30 oak trees per acre so that this area develops into an oak savanna. If you plant the oaks, include some shade-tolerant grasses and forbs in the planting seed mix.

Conversion to a different community type is recommended since the existing community was shaped by past farming or grazing and, as such, has little restoration potential. Establishing a native tall-grass prairie would add much species diversity to the Conservancy since this habitat does not currently exist here. Planting trees, however, creates an opportunity to increase the future abundance of oaks, which are currently not reproducing well anywhere in the Conservancy. If a prairie is planted, it should be managed by prescribed burning; this could be done together with prescribed burns for oak woodland/savanna restoration on the ridgetop to the north (Figure 3). If possible, use local genotype seed for the prairie planting, i.e. seed that has been collected from nearby prairie remnants on similar well-drained sites.

Many species that depend on large blocks of similar habitat are declining because human land uses have fragmented most habitats into smaller pieces. These species are called *area-dependent*. Establishing native plant communities on abandoned farmland presents the opportunity to join isolated habitats into single, large blocks. In this case, establishing a forest would join the Oak Forest to the West with the ridgetop Oak Forest to the North, creating a single forest of 26 acres. Unfortunately, establishing a prairie would probably *not*

create habitat for area-dependent grassland bird species, like bobolink or eastern meadowlark, since this field is relatively small and bordered by woods; many grassland-nesting birds prefer blocks of at least 40 acres of grassland (Sample and Mossman 1997).

(See Appendix 1 for detailed management prescriptions for each Target Community.)

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits and it is very unlikely that they are present because of past disturbance of this site by farming; nonetheless, they could be present in the Old Field of the Glacial Valley Conservancy Park:

Invertebrates	
Ottoo skipper (<i>Hesperia ottoe</i>)	Special Concern
Net-veined leaf hopper (<i>Polyamia dilate</i>)	Threatened
Herptile	
Western slender glass lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Mammals	
Prairie vole (<i>Microtus ochrogaster</i>)	Special Concern
Western harvest mouse (<i>Reithrodontomys megalotis</i>)	Special Concern
Plants	
Wooly milkweed (<i>Asclepias lanuginose</i>)	Threatened
Pale purple coneflower (<i>Echinacea pallida</i>)	Threatened
Glade mallow (<i>Napea dioica</i>)	Special Concern
Prairie false-dandelion (<i>Nothocalais cuspidata</i>)	Special Concern
Wilcox panic grass (<i>Panicum wilcoxianum</i>)	Special Concern
American fever-few (<i>Partenium integrifolium</i>)	Threatened
Prairie parsley (<i>Polytaenia nuttallii</i>)	Threatened

Glacial Valley Conservancy: *Pine Forest*

(Figure 3)

Acreage	8 acres
Trail Access	Yes – on north slope and ridgetop, only
Topographic Position	Upper north & east slopes, ridgetop
Slope Steepness	Nearly level on ridgetop, 12-60% on slopes
Drainage	Excessively Drained
Soil Texture	Silt loam, sandy loam

Kill buckthorn and honeysuckle and plant native shrubs to encourage native shrub and herb diversity. Plant white pine or hardwood tree seedlings to replace dead or declining red pines. Planting native shrubs, like dogwoods, viburnums, elderberry and hazelnut, will fill the habitat niche of the non-native shrubs after they are removed. Plant white pine, white oak, bur oak and shagbark hickory seedlings since these species are adapted to the dry conditions found on the ridgetop and steep slopes. This is a good opportunity to increase the future abundance of oak trees in the Conservancy. If buckthorn and honeysuckle are cut, pile the cut shrubs to create wildlife cover.

Encourage the growth of dominant white pines by cutting or girdling their nearest neighbors. The white pines enjoy a longer lifespan than red pines; the growth of dominant ones should be encouraged. They will likely develop into very large, attractive trees.

Target Community: Pine/Hardwood Forest

Objectives:

- ✓ >90% of shrub cover is of native species.
- ✓ Desirable tree seedlings (white pines, oaks and hickories) become established.
- ✓ Dominant white pines can achieve maximum size possible.

Actions:

1. Kill buckthorn and honeysuckle by basal bark treatment with appropriate herbicide or by cutting and herbiciding cut stumps.
2. Plant white pine, white oak, bur oak and shagbark hickory seedlings in canopy openings that are at least ¼ acre in size (enlarge existing openings by felling stunted or unhealthy red pines, if necessary). Protect seedlings from deer browse and control competing saplings and shrubs.
3. Plant native shrub seedlings in sunniest areas. Protect seedlings from deer browse and control competing saplings and shrubs.
4. Where white pines are crowded (neighboring crowns are touching), select the largest individuals for retention and accelerate their growth by cutting surrounding trees.

Monitoring:

- ✓ Monitor annually for survival and spread of buckthorn and honeysuckle.
- ✓ Check the survival of planted trees and shrubs annually for 3 years after planting.

- ✓ Measure shrub cover in 2015 to evaluate dominance of natives.

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Pine Forest of the Glacial Valley Conservancy.

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	
Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Glacial Valley Conservancy: *Young Hardwood Forest & Pines*

(Figure 3)

Acreage	7 acres
Trail Access	Yes – on ridgetop, only
Topographic Position	Ridgetop, upper east slope
Slope Steepness	0-12% on ridgetop, 12-60% on slopes
Drainage	Excessively drained
Soil Texture	Silt loam, sandy loam

Encourage the survival and growth of existing young hardwoods to accelerate the development of a mature forest. Kill buckthorn and honeysuckle and plant native shrubs to encourage native shrub and herb diversity. Control of buckthorn and honeysuckle, which forms dense stands in some places, will release growing space to hardwood seedlings and saplings that are planted or establish naturally. Planting native shrubs, like dogwoods, viburnums, elderberry and hazelnut, will fill the habitat niche of the non-native shrubs after they are removed. If buckthorn and honeysuckle are cut, pile the cut shrubs to create wildlife cover.

To accelerate the growth of hardwoods, the healthiest young trees should be identified and “released” by killing their nearest competitors. Favor oaks and shagbark hickories since they are suited to the dry conditions of the ridgetop and steep hillside. In places lacking oaks and hickories, black cherries, walnuts and white ashes should be favored instead. Red pines and red cedars that are not competing with hardwoods should be left. They will enhance the aesthetics and diversity of this community and provide winter wildlife cover.

Target Community: Oak & Hickory-Dominated Hardwood Forest

Objectives:

- ✓ >90% of shrub cover is of native species.
- ✓ >50% of hardwood seedlings and saplings are oaks and hickories.

Actions:

1. Kill buckthorn and honeysuckle by basal bark treatment with appropriate herbicide or by cutting and herbiciding cut stumps.
2. Kill competing trees and brush around desirable hardwoods – i.e. oaks, hickories, black cherries, white ashes and walnuts.
3. Plant white oak and shagbark hickory seedlings in the sunniest areas. Protect seedlings from deer browse and control competing saplings and shrubs.
4. Plant native shrub seedlings in the sunniest areas. Protect seedlings from deer browse and control competing saplings and shrubs.

Monitoring:

- ✓ Monitor annually for survival and spread of buckthorn and honeysuckle.
- ✓ Check the survival of planted trees and shrubs annually for 3 years after planting.

- ✓ Evaluate extent of oak and hickory dominance among seedlings and saplings in 2015.

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Young Hardwood Forest & Pines of the Glacial Valley Conservancy:

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	
Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Glacial Valley, Cedar Glen and Westview Conservancies: *Dry Prairie & Red Cedars*

(Figures 3, 4 & 5)

Acreage	10 acres (4 acres – Glacial Valley; 2 acres – Cedar Glen; 4 acres – Westview)
Trail Access	Yes – for Glacial Valley and Westview. No access for Cedar Glen.
Topographic Position	Upper west slopes (Glacial Valley & Cedar Glen), Upper west & south slopes and ridgetop (Westview)
Slope Steepness	12 – 60% (Glacial Valley & Cedar Glen), 0-60% (Westview)
Drainage	Excessively drained
Soil Texture	Silt loam, sandy loam

Keep the Dry Prairies free of brush and trees to maintain their species diversity. Remove the red cedars completely by cutting, piling and burning them when there is snow cover. The cut stumps of the cedars do *not* need to be treated with herbicide; red cedars will not resprout. Hardwood saplings and broadleaved shrubs, e.g. white ash or buckthorn, must be stump-treated with herbicide after being cut to prevent resprouting. In the Glacial Valley and Westview Parks, clearing brush and trees from the prairies will open up views of the valleys below.

Conduct prescribed burns to prevent the reinvasion of trees and shrubs and reinvigorate the native prairie species. Have an experienced professional plan and direct prescribed burns until Village staff have training and experience. In Glacial Valley, the pine trees on the ridgetop above the prairie, and their combustible litter on the forest floor, pose a fire hazard. A well-installed firebreak will be needed between the prairie and the pines. The walking trail will form part of the fire break.

Native prairie remnants often harbor rare insect species that are vulnerable to fire. Hence, no more than one-third of any dry prairie site should be burned in a single year. A three-year rotation in which one-third of a site is burned every year should be done. **The Village is legally liable for impacts to State-listed threatened and endangered plant and animal species that may be present in the Dry Prairies (State Statute 29.604).** Contact the **DNR Bureau of Endangered Resources to learn how to mitigate the impact of burning on these species.**

Annual monitoring should take place after burning to observe the response of buckthorn seedlings, leafy spurge, crown vetch and ox-eye daisy. Herbicide use may be necessary to control leafy spurge. Consult a professional with experience controlling invasive plants in natural areas before using herbicides to control leafy spurge.

Target Community: Dry Prairie

Objectives:

- ✓ Prairie has <5% tree and shrub cover.
- ✓ Prairie has >90% cover of native grasses and forbs.

Actions:

1. Cut, pile and burn red cedars when there is snow cover.
2. Cut and stump-treat with appropriate herbicide large (>1 inch in diameter) hardwoods and shrubs. Aspens should be girdled, rather than cut.
3. Conduct prescribed burns on a three-year rotation in which one-third of the prairie is burned annually to control non-native plants and reinvigorate native prairie species.

Monitoring:

- ✓ Monitor annually for the survival or spread of leafy spurge, crown vetch and ox-eye daisy.
- ✓ Monitor annually for the survival or spread of trees and non-native shrubs, e.g. red cedar, aspen, buckthorn and honeysuckle.
- ✓ Measure grass and herb cover in 2015 to evaluate dominance of natives.

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Dry Prairie & Red Cedars communities of the Glacial Valley, Cedar Glen and Westview Conservancy Parks:

Invertebrates	
Ottoo skipper (<i>Hesperia ottoe</i>)	Special Concern
Net-veined leaf hopper (<i>Polyamia dilate</i>)	Threatened
Herptile	
Western slender glass lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Mammals	
Prairie vole (<i>Microtus ochrogaster</i>)	Special Concern
Western harvest mouse (<i>Reithrodontomys megalotis</i>)	Special Concern
Plants	
Woolly milkweed (<i>Asclepias lanuginose</i>)	Threatened
Pale purple coneflower (<i>Echinacea pallida</i>)	Threatened
Glade mallow (<i>Napea dioica</i>)	Special Concern
Prairie false-dandelion (<i>Nothocalais cuspidata</i>)	Special Concern
Wilcox panic grass (<i>Panicum wilcoxianum</i>)	Special Concern
American fever-few (<i>Parthenium integrifolium</i>)	Threatened
Prairie parsley (<i>Polytaenia nuttallii</i>)	Threatened

Cedar Glen Conservancy: *Oak Forest*

(Figure 4)

Acreage	25 acres (17 acres – West Slope; 8 acres – East Slope)
Trail Access	Yes – on south end of East Slope.
Topographic Position	Upper east & west slopes
Slope Steepness	6-30%
Drainage	Well drained
Soil Texture	Silt loam

Kill barberry, buckthorn, multiflora rose and honeysuckle, and plant native shrubs to encourage native shrub and herb diversity. Planting native shrubs, like dogwoods, viburnums, elderberry and hazelnut, will fill the habitat niche of the non-native shrubs after they are removed.

Barberry and buckthorn seedlings are *extremely* abundant on the west slopes. Barberry carpets the forest floor in some places. It will be very time consuming to control these plants by cutting and herbicide-treating individuals. Investigate the use of prescribed burning, mowing and broadcast-spraying narrow-spectrum herbicides that have low-toxicity to animals and little activity in the soil (e.g. fosamine ammonium) as alternatives. Honeysuckle dominates the understory of the east slopes. Here, the plants are larger and may be killed individually. If honeysuckle on the east slope is cut, pile the cut shrubs to create wildlife cover.

If you wish to perpetuate the oak forest, conduct prescribed burns to encourage oak regeneration and diminish the abundance of shade-tolerant hardwoods. Burning will top-kill many small stems (<2 inches in diameter). Oaks will usually resprout and survive, thereby gaining an advantage over more fire-sensitive hardwoods. This could increase the number of young oaks available to replace canopy trees as they die. **The Village is legally liable for impacts to State-listed threatened and endangered plant and animal species that may be present in the Oak Forest (State Statute 29.604). Contact the DNR Bureau of Endangered Resources to learn how to mitigate the impact of burning on these species.**

There are three possible Target Communities for this part of the Oak Forest: (1) Mixed Hardwood Forest, (2) Oak Forest, and (3) Oak Woodland/Savanna. A mixed hardwood forest will develop naturally. The continuation of the Oak Forest will require active suppression of the shade tolerant hardwoods, e.g. American elm, shagbark hickory, and hackberry, that can outcompete oak seedlings, and the use of prescribed burning. The Oak Woodland/Savanna requires extensive canopy opening and use of prescribed burning. Restoration of a savanna does not guarantee that the species-rich herbaceous layer typical of the savanna will reemerge; planting may be necessary. Nonetheless, the Village may want to consider this option since oak savannas are very rare in southern Wisconsin.

(See Appendix 1 for detailed management prescriptions for each Target Community.)

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Oak Forests of the Cedar Glen Conservancy:

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	
Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Cedar Glen Conservancy: *Young Hardwood Forest* (Figure 4)

Acreage	6 acres
Trail Access	Yes
Topographic Position	Upper east slope
Slope Steepness	6-30%
Drainage	Well drained
Soil Texture	Silt loam

Encourage the survival and growth of young oaks by killing neighboring trees and shrubs. Plant oak seedlings in the old field. Kill buckthorn and honeysuckle, and plant native shrubs to encourage native shrub and herb diversity. Planting native shrubs, like dogwoods, viburnums, elderberry and hazelnut, will fill the habitat niche of the non-native shrubs after they are removed. Planting oak seedlings in the field is an opportunity to ensure the future existence of mature oak trees in the Conservancy. If buckthorn and honeysuckle are cut, pile the cut shrubs to create wildlife cover.

Target Community: Hardwood Forest

Objective:

- ✓ >90% of shrub cover is of native species.

Actions:

1. Kill buckthorn and honeysuckle by basal bark treatment with appropriate herbicide or by cutting and herbiciding cut stumps.
2. Kill competing trees and brush around young oaks.
3. Plant white oak, red oak, bur oak and shagbark hickory seedlings in the old field on the ridgetop. Protect seedlings from deer browse and control competing saplings and shrubs.
4. Plant native shrub seedlings in sunniest areas. Protect seedlings from deer browse and control competing saplings and shrubs.

Monitoring:

- ✓ Monitor annually for survival and spread of buckthorn and honeysuckle.
- ✓ Check the survival of planted trees and shrubs annually for 3 years after planting.

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Young Hardwood Forest of the Cedar Glen Conservancy.

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	

Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Dorothy Statz Conservancy: *Oak Forest* (Figure 5)

Acreage	3.5 acres
Trail Access	Yes
Topographic Position	Upper east & west slopes, ridgetop
Slope Steepness	2-30%
Drainage	Well drained
Soil Texture	Loam

Kill buckthorn and honeysuckle to enhance native shrub and herb diversity. If you allow the hardwood forest to develop, encourage the survival and growth of young shagbark hickories, black cherries, hackberries and red oaks by killing American elms that are competing with them. Buckthorn and honeysuckle abundances are relatively low in this community. Nonetheless, if buckthorn and honeysuckle are cut, pile the cut shrubs to create wildlife cover.

If you wish to perpetuate the oak forest, conduct prescribed burns to encourage oak regeneration and diminish the abundance of shade-tolerant hardwoods. Burning will top-kill many small stems (<2 inches in diameter). Oaks will usually resprout and survive, thereby gaining an advantage over more fire-sensitive hardwoods. This could increase the number of young oaks available to replace canopy trees as they die. **The Village is legally liable for impacts to State-listed threatened and endangered plant and animal species that may be present in the Oak Forest (State Statute 29.604). Contact the DNR Bureau of Endangered Resources to learn how to mitigate the impact of burning on these species.**

There are two possible Target Communities for all areas the Oak Forest: (1) Mixed Hardwood Forest and (2) Oak Forest. A mixed hardwood forest will develop naturally. The continuation of the Oak Forest will require active suppression of the shade tolerant hardwoods, e.g. American elm, shagbark hickory, and hackberry, that can outcompete oak seedlings, and the use of prescribed burning.

Oak Woodland/Savanna is a suitable Target Community for the ridgetop and west slope, where there are bur oaks with open-grown form. Oak Woodland/Savanna restoration requires extensive canopy opening and the use of prescribed burning. Restoration of a savanna does not guarantee that the species-rich herbaceous layer typical of the savanna will reemerge; planting may be necessary. Nonetheless, the Village may want to consider this option since oak savannas are very rare in southern Wisconsin. Because this site only covers 1 acre, it would be a good place to try oak savanna restoration before it is attempted in other oak forests of the Conservancy that are larger.

(See Appendix 1 for detailed management prescriptions for each Target Community.)

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits, but they could be present in the Oak Forest of the Dorothy Stutz Conservancy:

Mammal	
Woodland Vole (<i>Microtus pinetorum</i>)	Special Concern
Herptile	
Western Slender Glass Lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Plants	
Yellow Giant Hyssop (<i>Agastache nepetoides</i>)	Threatened
Autumn Coral-Root (<i>Corallorhiza odontorhiza</i>)	Threatened
Prairie Parsely (<i>Polytaenia nuttallii</i>)	Threatened

Dorothy Statz Conservancy: *Old Field & Stream Corridor*

(Figure 5)

Acreage	1.5 acres
Trail Access	Yes
Topographic Position	Valley bottom & stream terrace
Slope Steepness	2-12%
Drainage	Moderately well drained (valley bottom), somewhat poorly drained (stream terrace)
Soil Texture	Silt loam

Plant native, fruit-bearing shrubs, like elderberry, dogwoods, viburnums, wild plum and sumac, in clumps by the woods or along the stream. Clumps of native shrubs will provide food and cover for wildlife. Include shrubs that bear fruit during summer (elderberry) and fall (dogwoods, viburnums), and those that hold their fruit over the winter, (high-bush cranberry, sumac). To create dense clumps, space the plants 4-6 feet apart. These shrubs can be retained if prairie planting or tree planting is done.

Convert this field to (1) a native tall-grass prairie or (2) a closed-canopy forest. Kill the box elders growing on the streambank so their seedlings will not take over prairie or tree plantings. Box elders reproduce aggressively and their seedlings would rapidly colonize the bare ground created by broadcast spraying herbicide, as is required for prairie or tree planting. If conversion to a forest is done, leave some ¼ acre areas open so that brushy thickets form. These will provide wildlife cover. Also, do not plant trees within 35 feet of the streambank; grasses should be retained here to protect the streambank from erosion. If conversion to a prairie is done, you may still plant 10-30 oak trees per acre so that this area develops into an oak savanna. If you do this, include some shade-tolerant grasses and forbs in the planting seed mix. Also, use local genotype seed if possible, i.e. seed that has been collected from nearby prairie remnants on similar moist sites. Funds from Dane County may be available for prairie planting along the streambank since Brewery Creek is listed as a “priority stream” in the Dane County Open Space Plan (WI DNR 2002).

Conversion to a different community type is recommended since the existing community was shaped by past farming or grazing and, as such, has little restoration potential. Establishing a native tall-grass prairie would add much species diversity to the Conservancy since this habitat does not currently exist here. Planting trees, however, creates an opportunity to increase the future abundance of oaks, which are currently not reproducing well anywhere in the Conservancy.

(See Appendix 1 for detailed management prescriptions for each Target Community.)

The following species were listed in the Natural Heritage Inventory; they have been observed in either the Town of Cross Plains or the Town of Berry in natural communities similar to this one. None of these species were noted during the field visits and it is very

unlikely that they are present because of past disturbance of this site by farming; nonetheless, they could be present in the Old Field & Stream Corridor of the Dorothy Stutz Conservancy Park:

Invertebrates	
Ottoo skipper (<i>Hesperia ottoe</i>)	Special Concern
Net-veined leaf hopper (<i>Polyamia dilate</i>)	Threatened
Herptile	
Western slender glass lizard (<i>Ophisaurus attenuatus</i>)	Endangered
Mammals	
Prairie vole (<i>Microtus ochrogaster</i>)	Special Concern
Western harvest mouse (<i>Reithrodontomys megalotis</i>)	Special Concern
Plants	
Wooly milkweed (<i>Asclepias lanuginose</i>)	Threatened
Pale purple coneflower (<i>Echinacea pallida</i>)	Threatened
Glade mallow (<i>Napea dioica</i>)	Special Concern
Prairie false-dandelion (<i>Nothocalais cuspidata</i>)	Special Concern
Wilcox panic grass (<i>Panicum wilcoxianum</i>)	Special Concern
American fever-few (<i>Parthenium integrifolium</i>)	Threatened
Prairie parsley (<i>Polytaenia nuttallii</i>)	Threatened

Figure 3: Glacial Valley Conservancy

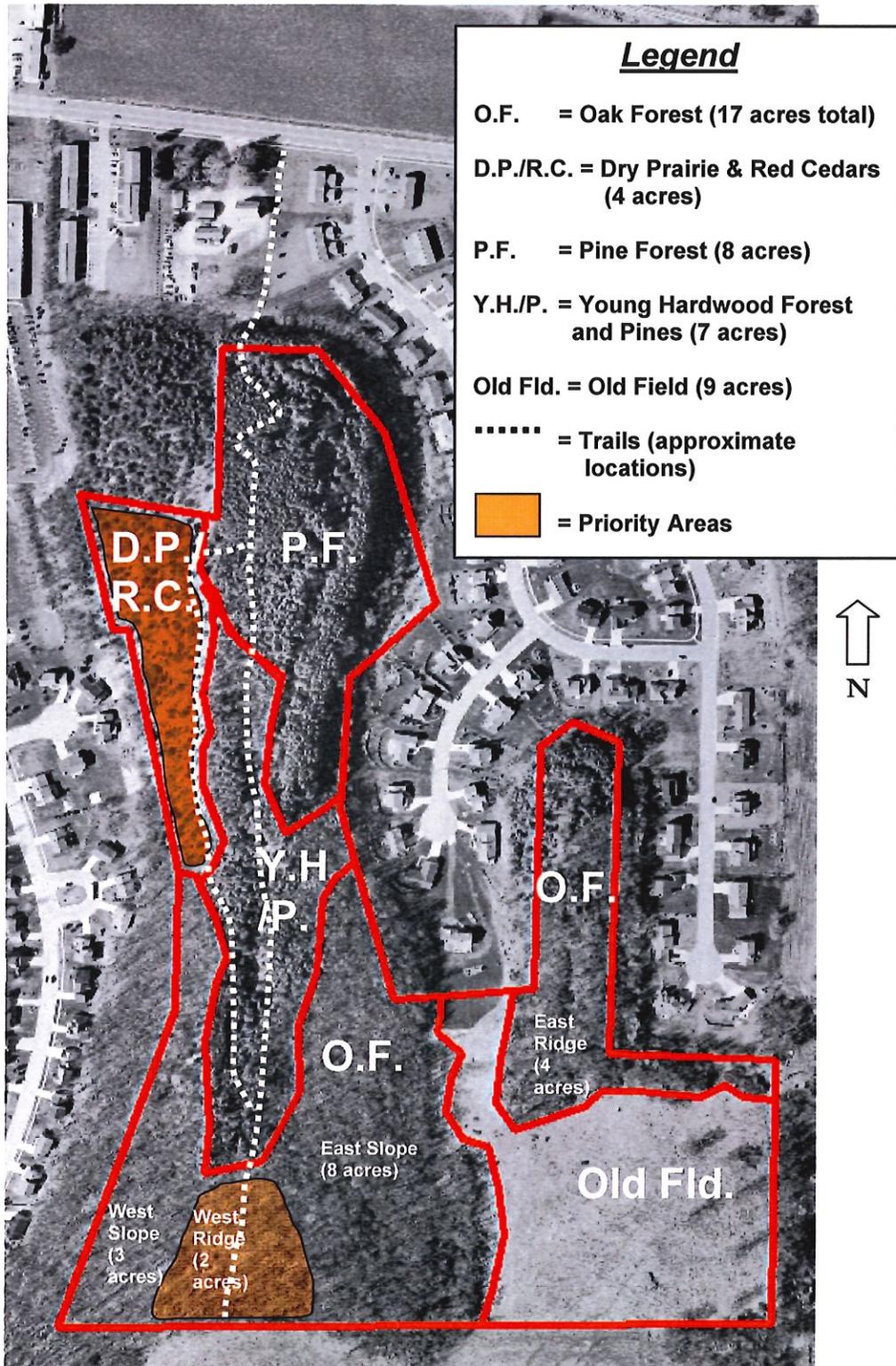


Figure 4: Cedar Glen Conservancy

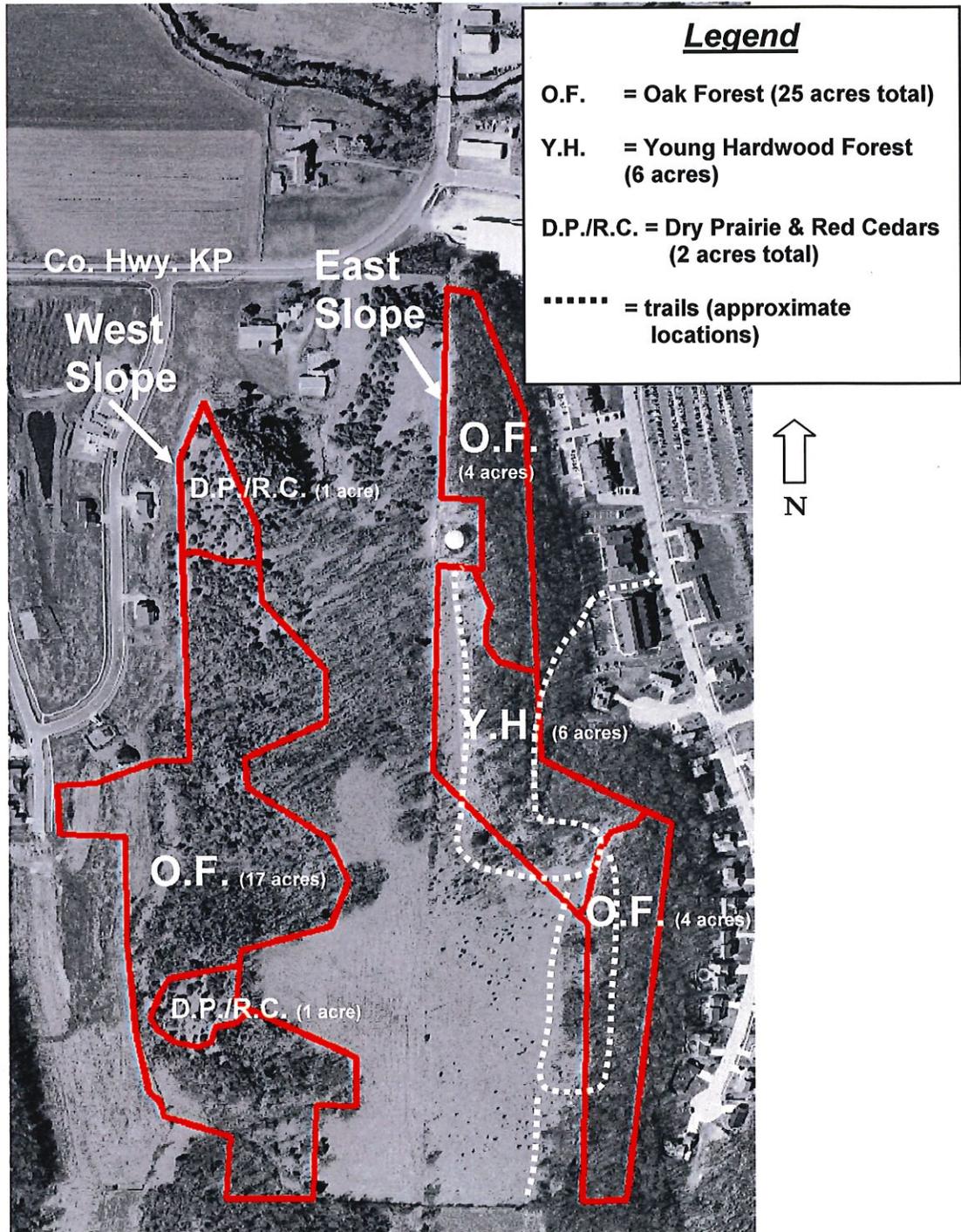


Figure 5: Dorothy Statz Conservancy

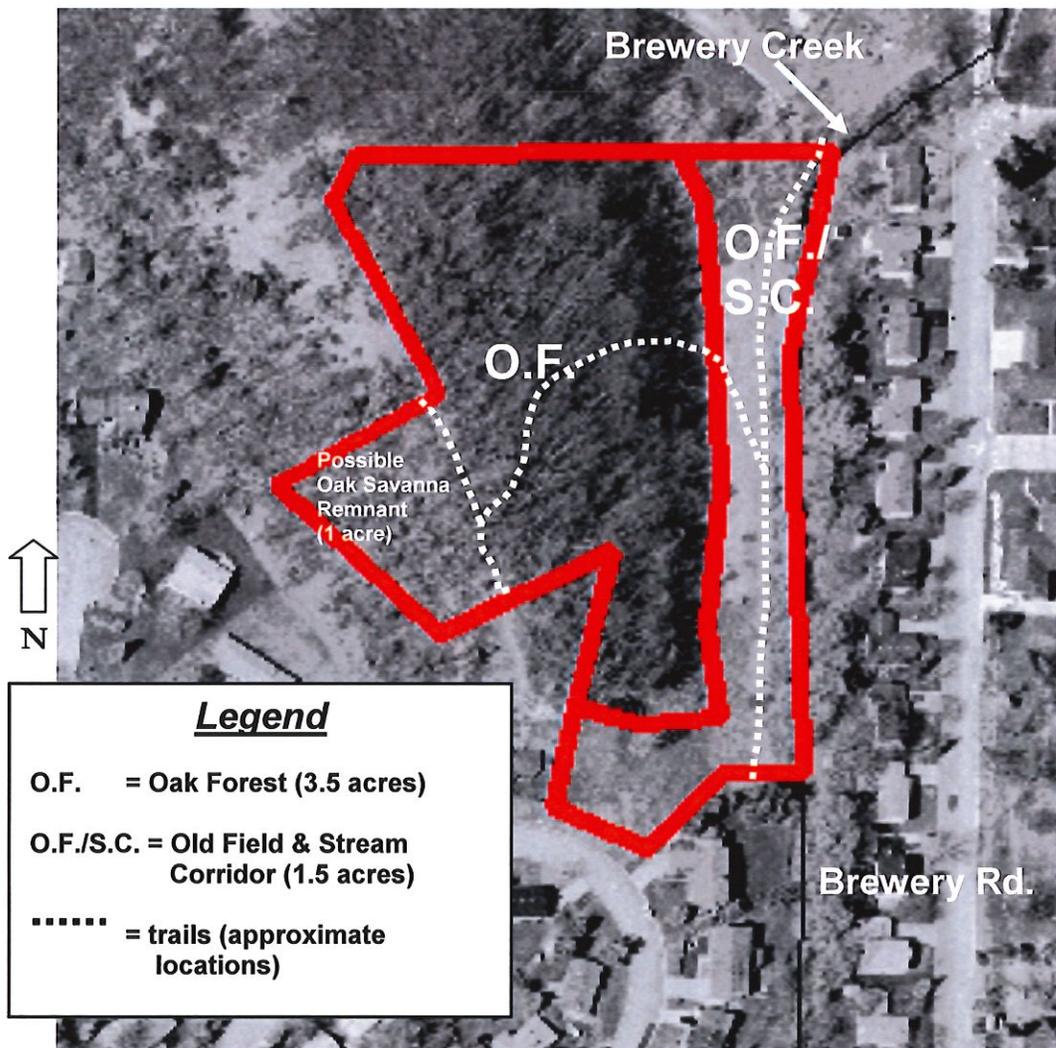
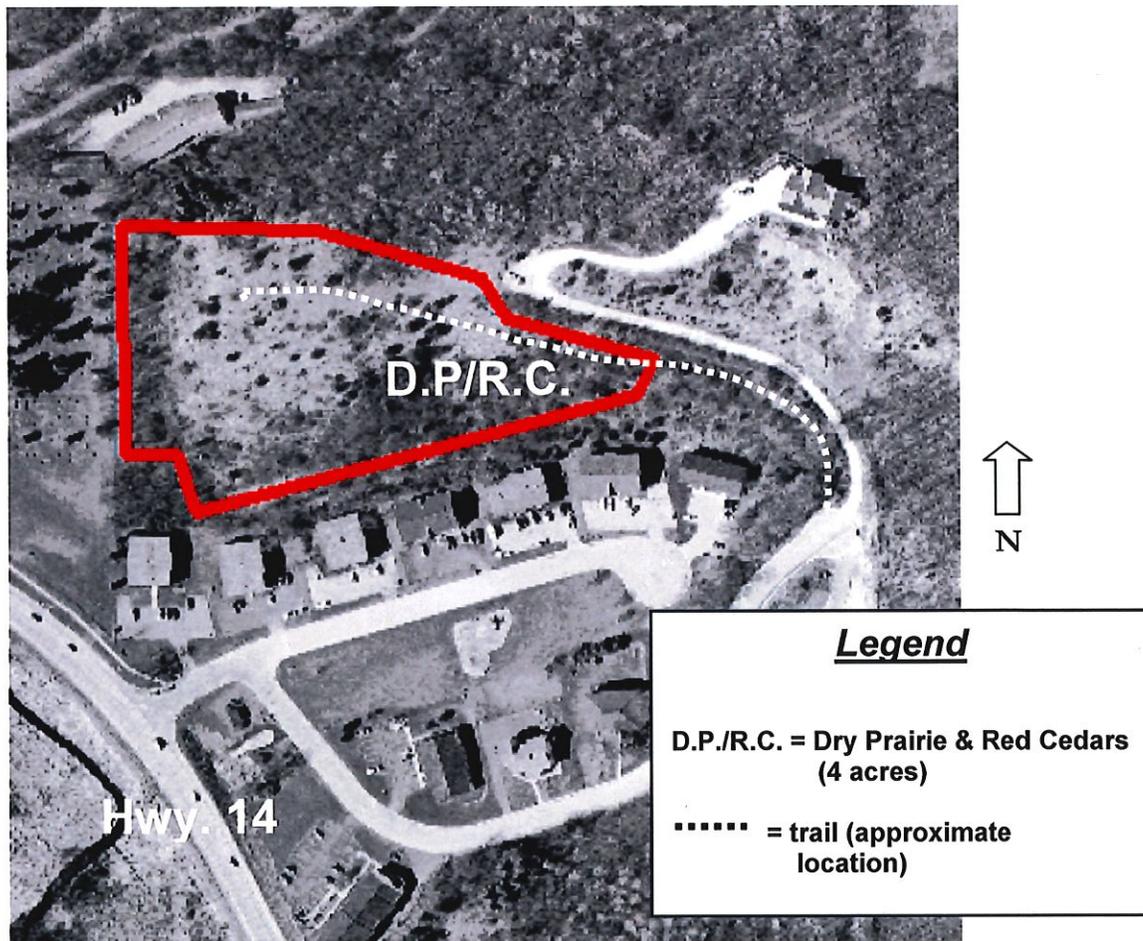


Figure 6: Westview Conservancy



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Glossary

Biodiversity: The variety of organisms present in a community or habitat, in taxonomic and genetic terms.

Crown (of a tree): The volume of space occupied by the living branches and foliage of a tree.

Decay cavity: A hollow area in a tree trunk that formed as a result of wood-rotting fungi. It usually forms beneath a surface wound or a branch stub.

Dominance: The prevalence of a plant species, or group of plant species, in a community or habitat, which determines the character of the community or habitat.

Ecosystem: A natural community of plants and animals together with the physical environment they inhabit, functioning as a unit.

Ecosystem Health: The condition of an ecosystem in which the biological and physical processes that comprise it are maintained within a “normal” range of variability.

Forb: A broad-leaved, herbaceous plant, i.e. not grass-like or woody.

Habitat: The dwelling place of a species or natural community that provides the conditions necessary for life.

Herptile: A reptile or an amphibian.

Invasive: Describes a plant or animal species with the habit of colonizing a community or habitat and displacing those species already present until it becomes dominant.

Local genotype: The genetic makeup of members of a species that reside in the same region.

Natural Community: All of the populations of species that share an ecosystem or a habitat.

Main canopy: The uppermost layer of vegetation, comprised of the dominant plant species.

Mast: Nuts and berries consumed by wildlife and considered crucial to their survival due to potentially high levels of fat, protein and carbohydrates.

Suppression: The process by which one organism impedes the growth and development of another by consuming the bulk of vital resources, as when a fast growing trees shades and robs soil moisture from a neighboring slow-growing tree.

Top-Kill: The death of above-ground plant tissue, due to fire, herbivory or human removal, that leaves below-ground tissue, e.g. roots and rhizomes, alive and able to regrow stems and foliage.

Understory: In a plant community, the space beneath the main canopy occupied by suppressed individuals and individuals of species inherently shorter than the dominant species. For example, the tree saplings, shrubs and forbs growing beneath dominant forest trees.

Appendix 1: Management Prescriptions for Target Communities.

Target Community: Hardwood Forest

Objectives:

- ✓ American elm is <30% of main canopy trees.
- ✓ >90% of shrub cover is of native species.

Actions:

1. Kill buckthorn, honeysuckle, black locust and Norway maple by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps.
2. Kill American elms by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps *only when they are suppressing vigorous, young trees of oak, shagbark hickory, basswood, white ash or black cherry or to create sunnier conditions for shrub plantings.*
3. Plant native shrub seedlings in sunniest areas. Protect seedlings from deer browse and control competing saplings and shrubs.

Monitoring:

- ✓ Monitor annually for survival and spread of buckthorn, honeysuckle, black locust and Norway maple.
 - ✓ Check the survival of planted shrubs annually for 3 years after planting.
 - ✓ Measure tree canopy cover in 2015 to evaluate American elm cover.
 - ✓ Measure shrub cover in 2015 to evaluate dominance of natives.
-

Target Community: Oak Forest

Objectives:

- ✓ Oak seedlings and saplings are present in >50% of sample plots.
- ✓ >90% of shrub cover is of native species.

Actions:

1. Kill buckthorn, honeysuckle, black locust and Norway maple by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps.
2. Kill majority of non-oak trees larger than 2 inches in diameter by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps. Preserve some shagbark hickories and black cherries since they produce fruit valuable to wildlife.
3. Conduct prescribed burns for five years to control non-oak trees and brush that were not removed in previous thinning. Thereafter, conduct burns when judged necessary to control undesirable species or encourage oak regeneration.

4. Plant native shrub seedlings. Protect seedlings from deer browse and control competing saplings and shrubs.
5. Plant at least 200 white oak and bur oak seedlings per acre if oak seedlings and saplings are present in fewer than 50% of sample plots.

Monitoring:

- ✓ Monitor annually for survival and spread of buckthorn, honeysuckle, black locust and Norway maple.
- ✓ Check the survival of planted trees and shrubs annually for 3 years after planting.
- ✓ Monitor for presence of oak seedlings and sapling in 2015.
- ✓ Measure shrub and herb cover in 2015 to evaluate dominance of natives.

Target Community: Oak Woodland/Savanna*Objectives:*

- ✓ >90% of main canopy consists of oaks with very large crowns or open-grown form.
- ✓ >90% of grass, forb and shrub cover is of native species.
- ✓ Canopy cover of dominant trees is $\leq 80\%$.
- ✓ Grasses and wildflowers of oak woodlands and savannas are common.

Actions:

1. Kill buckthorn, honeysuckle, black locust and Norway maple by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps.
2. Kill majority of non-oak trees larger than 2 inches in diameter by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps. Preserve some shagbark hickories and black cherries since they produce fruit valuable to wildlife.
3. Kill suppressed and subdominant oaks by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps. Oaks that are retained should have the largest crowns and be windfirm.
4. Conduct prescribed burns for five years to control non-oak trees and brush that were not removed in previous thinning. Thereafter, conduct burns on 3-5 year intervals.
5. If characteristic oak savanna grasses and wildflowers are not common by the fifth year, hand-broadcast seed of native grasses and forbs in the late fall. Late fall broadcast seedings, or "frost seedings", are effective since the action of rainfall, melting snow and the freeze-thaw cycle embed the seed into the soil. Allow these plants to develop for 2 full growing seasons before burning again.

Monitoring:

- ✓ Monitor annually for survival and spread of buckthorn, honeysuckle, black locust and Norway maple.
- ✓ Monitor the understory five years after initial canopy thinning for the presence of native grasses and wildflowers typical of oak woodlands and savannas.
- ✓ Measure shrub and herb cover in 2015 to evaluate dominance of natives and the frequency of oak woodland/savanna grasses and forbs.

Target Community: Tall-Grass Prairie (Old Field Conversion)

Objectives:

- ✓ >90% of grass and forb cover is of native species typical of the Dry-Mesic prairie.
- ✓ Tree and shrub cover is <5%.
- ✓ Black locust seedlings and saplings and multiflora rose bushes are absent.

Actions:

Note: Failure to observe diligent site preparation and post-planting maintenance can result in a failed prairie planting.

1. Kill existing grasses, herbs and shrubs by broadcast-spraying appropriate herbicide. This should begin in spring and be done at least 3 times during the growing season. Establish a cover crop in September if needed to control erosion. Repeat these steps during a *second* growing season. *Two years of herbicide treatments will be necessary to completely kill the existing grasses and herbs.*
2. Broadcast or drill in seed of native grasses and wildflowers in October or November of the second year. Or drill in seed the following spring, before June. If seed is broadcast in the spring, the soil must be dragged or tilled *very lightly* first, and then packed following seeding to ensure good seed-to-soil contact. This is not needed for late fall broadcast seedings, or “frost seedings”, since the action of rainfall, melting snow and the freeze-thaw cycle embed the seed into the soil.
3. Mow weeds to a height of 6 inches in the planted area every 4-6 weeks during the *first* post-planting growing season. Mowing lower than 6 inches may result in harm to young, developing prairie plants. Apply herbicide locally, as needed to control aggressive perennials, like tall goldenrod or Canada thistle.
4. Mow or burn during the *second* post-planting growing season depending on conditions noted during monitoring.
5. Begin burning annually starting the *third* post-planting growing season. Spring burns will achieve better control of aggressive cool-season perennials than fall burns. Once the prairie is well established divide it into sections, and rotate annual burns among sections.

Monitoring:

- ✓ Monitor annually for the survival and spread of black locusts and multiflora rose.
- ✓ Monitor for the growth of prairie plants in the second post-planting growing season.
- ✓ Monitor for fuel load (e.g. abundance of dead grasses) beginning in the second post-planting growing season to determine feasibility of prescribed burning.
- ✓ Monitor for the survival and spread of aggressive, perennial grasses and forbs in the planted prairie.

Target Community: Hardwood Forest (Old Field Conversion)***Objective:***

- ✓ >80% of planted tree seedlings survive to become saplings (>3 feet tall).

Actions:

1. Prepare tree rows by broadcast-spraying herbicide in bands, with centers 9 feet apart, in September.
2. Machine or hand-plant tree seedlings in the prepared rows during the following spring. Use any of the following species: oaks, shagbark hickory, black cherry, black walnut, basswood, sugar maple, green ash and white ash. Space the seedlings 8 feet apart inside of the rows. This will result in 605 seedlings per acre.
3. Spray rows with preemergent herbicide immediately after planting to suppress weed growth in the rows.
4. Mow weeds and grasses between rows and between trees *within* rows, to diminish small mammal habitat – small mammals might feed on stems of seedlings. Continue mowing every 4-6 weeks for as many growing seasons as required for >80% of seedlings to become saplings (>3 feet tall).
5. Replant the following spring where tree seedlings have died.

Note: If desired, the seedlings may be planted in a more natural looking, random pattern, rather than in rows. However, hand-labor, rather than a mechanized tree-planter and a tractor-driven sprayer and rotary mower, would have to be used to spray, plant and mow. Also, the seedlings may have to be flagged in order to relocate them.

Monitoring:

- ✓ Monitor annually for seedling survival until >80% of the planted seedlings are taller than 3 feet.

Appendix 2: Resources

The Blue Mounds Area Project – A non-profit organization based in Mt. Horeb, WI. that promotes native biodiversity in southwestern Wisconsin.

Find their website here: <http://www.bluemounds.org/>

Going Native: A Prairie Restoration Handbook for Minnesota Landowners – An *extremely* useful guide to planting a prairie published by the Minnesota Department of Natural Resources.

Find it here: <http://files.dnr.state.mn.us/assistance/backyard/prairierestoration/goingnative.pdf>

Graham-Martin Foundation – This organization makes gifts of native grass and wildflower seed to municipalities, homeowners, schools and non-profit organizations. Contact Agrecol Corporation for details: (608) 226-2544.

Invasive Plants Association of Wisconsin (IPAW) Website – This has much information about invasive plants and their control in Wisconsin. It also has a link to a List Serv that is frequented by many professional ecological restoration practitioners.

Find it here: <http://www.ipaw.org/>

Native Plant Nurseries and Restoration Consultants in Wisconsin – This DNR website has a current list of nurseries and consultants.

Find the website here: <http://www.dnr.state.wi.us/org/land/er/invasive/info/nurseries.htm#wisc>

Natural Resource Conservation Service (NRCS) landowner assistance programs – The Wildlife Habitat Incentives Program (WHIP) provides funds to landowners for habitat work. The Environmental Quality Incentives (EQIP) program provides funds for habitat work in some counties.

Find their websites here:

WHIP - <http://www.wi.nrcs.usda.gov/programs/whip.html>

EQIP - <http://www.wi.nrcs.usda.gov/programs/eqip.html>

The Nature Conservancy Invasive Species Initiative Website – This website contains a comprehensive manual to invasive species control techniques. It contains extensive information about herbicide use.

Find it here: <http://tncweeds.ucdavis.edu/handbook.html>

Partners for Fish and Wildlife Program – This US Fish and Wildlife program assists landowners with habitat restoration.

Find their website here: <http://www.fws.gov/midwest/WisconsinPartners/>

Pheasants Forever – This non-profit organization is dedicated to the protection and enhancement of pheasant and other wildlife populations. They plant prairies and conduct prescribed burns for private landowners.

Find their website here: <http://www.pheasantsforever.org/index.php>

The Prairie Enthusiasts – This non-profit organization is dedicated to the management and protection of native prairies and savannas. One of their goals is to assist public agencies in prairie and savanna restoration.

Find their website here: <http://www.theprairieenthusiasts.org/>

A Prairie Primer – a UW Extension publication that discusses the ecology of native prairies and provides prairie planting instructions.

Find it here: <http://cecommerce.uwex.edu/pdfs/G2736.PDF>

Wisconsin State Nursery Program – The state nurseries raise seedlings of trees and shrubs for distribution to landowners as bareroot seedlings.

Find their website here: <http://www.dnr.state.wi.us/org/land/forestry/Nursery/>

Wisconsin Urban Forestry Grant Program – Provides 50% cost-sharing of approved costs up to \$25,000 annually for urban forest and natural area inventory, planning and management.

Find the website here: <http://dnr.wi.gov/org/land/Forestry/UF/grants/index.htm>

Appendix 3: Historic Air Photos

(Parcel boundary locations are approximate)

Figure 7: 1937



Figure 8: 1949



Figure 9: 1962

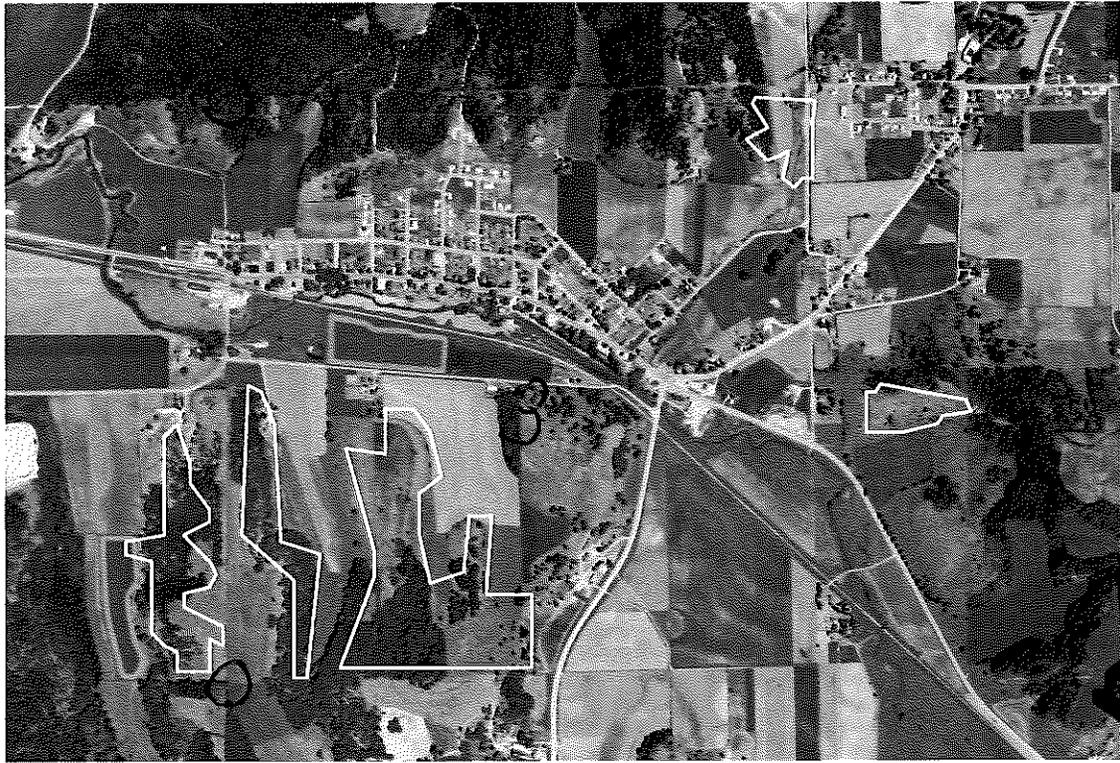


Figure 10: 1990



Appendix 4: Cost Estimates for Management Actions

(**Note:** The costs assume the use of a paid contractor billing at a rate of \$35/hour. The costs given are estimates for planning and budgeting purposes *only*. Volunteers can accomplish all of this work except prescribed burning, which should be done by professionals until Village staff gain training and experience. Trained volunteers can assist with prescribed burning.)

Control of invasive, non-natives (buckthorn, honeysuckle, Norway maple):

\$150.00/acre (light infestation) - \$400.00/acre (heavy infestation)
(30-40% of cost is for herbicide, the remainder is for labor)

Cedar removal:

\$1,000.00/acre (includes labor for cutting cedars and shrubs, piling them and burning the piles)

Prescribed burning:

\$900.00 for Old Field & Stream Corridor (1.5 acres) or oak savanna remnant (1 acre) on Ridgetop (Dorothy Statz)

\$1,000.00 for Dry Prairie (4 acres – Glacial Valley or Westview)

\$1,300.00 for Old Field (9 acres – Glacial Valley)

\$1,600 Oak Forest (17 acres – Glacial Valley)

Oak Forest restoration:

\$560.00/acre (labor for cutting trees – does *not* include cost of prescribed burning)

Oak Savanna restoration:

\$840.00/acre (labor for cutting trees – does *not* include cost of prescribed burning)

Prairie planting:

Old Field (9 acres – Glacial Valley)

Spray herbicide 6 times	\$3,090.00
Seed	\$8,100.00
Drill in seed	\$500.00
Maintenance mowing (3X)	\$1,350.00
Total	\$13,040.00

Old Field & Stream Corridor (1.5 acres – Dorothy Statz)

Spray herbicide 6 times	\$1,620.00
Seed	\$1,350.00
Drill in seed	\$200.00
Maintenance mowing (3X)	\$750.00
Total	\$3,920.00

Mechanical tree planting:

\$400.00/acre (tree seedlings)

\$150.00/acre (spray herbicide before and after planting)

\$150.00/acre (planting labor)

\$300.00/acre (mow 6 times over 3 years)

\$400.00/acre (replant where original tree seedlings died)

\$1,400.00/acre (Total)

Appendix 5: Fact Sheets

Department of Natural Resources

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Plants
Animals

Photo Gallery

Non-Native Plant
Species
Native Plant Species

Eastern Red Cedar (*Juniperus virginiana*)

DESCRIPTION: Eastern red cedar is a translocated species that rarely exceeds 30 feet high in Wisconsin. It is a coniferous tree with scale-like leaves and blue-black berries.

HABITAT AND DISTRIBUTION: Eastern red cedar is native to eastern North America. It was an important component of cedar glades, which typically do not experience fires. Although its optimal growth occurs on well-drained, alluvial soils, red cedar is most competitive on dry sites. It is most commonly found in prairies or oak barrens on thin soils, old pastureland, or on dry, limestone hillsides where competition has been reduced.

LIFE HISTORY AND EFFECTS OF INVASION: Eastern red cedar was rarely found in Wisconsin at the time of European settlement. It occurred in remote, fire-free places such as exposed cliff faces. After settlement, fires were greatly suppressed, thus removing the primary limiting factor for red cedar establishment. In the absence of fire, red cedar can dominate natural communities. This plant will often form closed stands, excluding most other plant species.

Red cedar is pollinated by wind; male and female flowers are on different trees. The seeds develop and mature from July through November. Seed crops vary annually, with peaks every two to three years. Trees initiate seed bearing at about 10 years of age. Peak seed production occurs between 25 and 75 years. Scattered and long-distance establishment of red cedar is primarily due to birds. Most seeds are dispersed by birds like cedar waxwings, thrushes (especially robins), kingbird, and downy woodpeckers. Establishment of red cedar is slow because seeds are not produced in the first 10 years. However, habitat modification accelerates once seeds are produced and scattered, and culminates in a canopy of red cedar with bare ground underneath.

CONTROLLING RED CEDAR:

Fortunately, red cedar is very easy to control. The problem is not in the control methods, but in failing to recognize the consequences of doing nothing. Prevention is always the best control method. Monitoring red cedar establishment and removing trees when found will prevent the total loss of a natural community later.

Mechanical Methods: Because the bark is very thin, red cedar is extremely sensitive to fire. Prescribed fires are the easiest and most cost-effective control method for red cedar. Small trees are killed if enough fuel surrounds the tree. Large trees should be cut and burned, or the dead trees will persist for decades and cause shading effects.

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Black Locust (*Robinia pseudoacacia*)

DESCRIPTION: Black locust is a leguminous deciduous tree that grows from 30 to 80 feet tall. It is often attacked by stem borers and other insects, causing deformed growth and dieback. It has a shallow, fibrous root system and spreads by underground rhizomes. Young saplings have smooth, green bark; older trees have deep, furrowed, shaggy, dark bark with flat-topped ridges. Leaves are alternate and pinnately compound with 7 to 21 leaflets. Leaflets are thin, elliptical, dark green above, and pale beneath. Smaller branches are armed with heavy, paired thorns. Flowers are pea-like, fragrant, white and yellow, and born in large drooping racemes. Seed pods are shiny, smooth, narrow, flat, 2 to 4 inches long, and contain 4 to 8 seeds. Black locust stands are easy to identify in spring because they typically form multiple-stemmed clones and are slow to leaf out. They produce showy flower clusters in May or June.

DISTRIBUTION AND HABITAT: Black locust is a translocated deciduous tree that is frequently found in upland prairies, savannas, roadsides, old fields, and woodlots in Wisconsin. Black locust prefers humid climates with sandy, loamy, well-drained soils in open, sunny locations.

The tree is native to the slopes and forest margins of Southern Appalachia and the Ozarks. It was introduced throughout Wisconsin in the early 1900's because its aggressive growth pattern and extensive root system discourage soil erosion. Black locust wood is also valued for its durability and high fuel value, and provides good forage for bees.

LIFE HISTORY AND EFFECTS OF INVASION: Black locust produces abundant seeds, but a thick seed coat hinders consistently successful seed germination. The plant typically reproduces vegetatively by root suckering and stump sprouting. Root suckers arise spontaneously from established root systems, sprouting new shoots and interconnecting fibrous roots to form extensive, dense groves of clones. Damage to roots or stems (e.g. from fire, wind, cutting, disease, etc.) stimulates vigorous sprouting, root suckering, and lateral spread. Black locust is susceptible to severe insect damage from locust borers, locust leaf miners, and locust twig borers.

Black locust commonly occurs in disturbed habitats like pastures, degraded woods, thickets, old fields, and roadsides. Successful reproduction via vegetative runners has contributed to the naturalization of black locust in upland forests, prairies, and savannas. Because dense clonal stands shade out most understory vegetation, such tree groves can be detrimental to native vegetation.

CONTROLLING BLACK LOCUST

Mechanical Control: Cutting black locust stimulates sprouting and clonal spread. For this reason, some suggest to avoid simply cutting the stems. Mowing and burning temporarily control spreading, but mowing seems to promote seed germination, and burning stimulates sprouting. Girdling is ineffective because it kills the stem but does not prevent sucker formation. Annual haying may be adequate to control first year seedlings and prevent spreading in prairie communities. Bulldozing may be an option on disturbed lands.

Chemical Control: The extensive root system of black locust spreads herbicides over large areas. Basal stem application is preferred for treatment because it is selective and easy to apply. The herbicide should be applied in a band at least 6 inches high all around the trunk approximately 12 inches from the ground. Triclopyr formulated for dilution in diesel fuel or mineral oil is currently the herbicide of choice for black locust. Both diesel fuel and mineral oil release volatile organic compounds into the immediate area. Although more expensive, mineral oil is potentially less toxic to neighboring organisms. The triclopyr/oil mixture may also be applied to a girdle cut at standing height or to cut stumps.

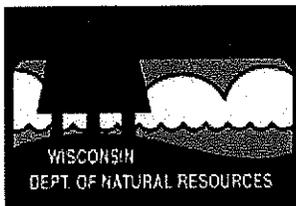
For small isolated plants or thick patches under 5 feet in height (such as those resulting from cutting or fire), florasime ammonium can be applied as a foliar spray. Florasime ammonium kills plants by inhibiting leaf bud growth and flower formation in the spring. Florasime ammonium should be applied at the end of the growing season. In order to effectively curb regeneration, every branch or stem must be sprayed because missed stems will leaf out. Triclopyr mixed with water may also be used effectively as a foliar spray in the latter half of the growing season.

Glyphosate can be applied to foliage of actively growing trees using a hand sprayer (1-1.5% active ingredient solution). However, foliar glyphosate spray should not be applied in high quality natural areas because it is a nonselective herbicide. Black locust stems can be cut at the base with brush-cutters, chainsaws, or hand tools; stumps should be treated immediately with a 20% active ingredient solution of glyphosate. The treatment works best when applied in late summer, early fall, or during the dormant season.

More Information on the Web (links exit DNR)
[Black Locust - Wisconsin State Herbarium](#)

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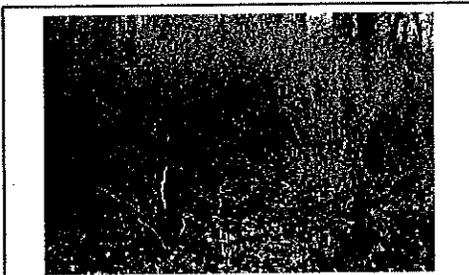
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Honeysuckle Identification and Control

Honeysuckle (species of *Lonicera*) is a nonnative plant that is a major threat to Wisconsin's woodlands.

There are several species of honeysuckle that cause problems in Wisconsin natural areas, but there is no reason to classify them since they are all nonnative and they are all bad. The native honeysuckles in our area can easily be distinguished from the bad ones because the natives are all woody vines rather than bushes.

Bush honeysuckles are upright shrubs ranging from a few feet to 15 feet tall. They form many branches from the base, and the spreading branches shade other plants. In a honeysuckle "thicket", almost nothing will be found under the canopy. (After



An area heavily infested with honeysuckles. In such areas, there may be dozens of such bushes covering the natural area. The shade they produce is so heavy that native forbs and grasses are unable to flourish.

the honeysuckle is removed, the soil is often bare.) Honeysuckles form fragrant tubular flowers, followed later by red fruits. Birds are attracted to the fruits and spread the seeds. Bush honeysuckles have a wide tolerance, but they prefer partial to full sunlight and are most commonly found in abandoned fields, forest edges, roadsides, and other open upland habitats. They are extremely invasive and can easily take over and dominate a habitat.

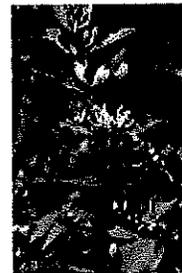
Honeysuckle is one of the plants that will invade a habitat if it is protected from fire. Once honeysuckles have conquered a habitat, there is no possibility of fire because there is no

fuel. The ground under a honeysuckle patch is often completely bare. In order to reintroduce fire, it is essential first to eliminate the honeysuckles and then reseed with native plants, preferably seed mixtures containing grasses such as Indian grass or bluestem that will carry a fire.

Control of honeysuckle

Both mechanical and chemical methods must be used together on honeysuckle. The most assured method is to cut all the stems of a plant and treat each cut stump with a 20% solution of glyphosate. The concentration given here is percent of the active ingredient. Concentrated glyphosate, such as Roundup Ultra, is around 40% out of the bottle, so that a 20% solution can be made by mixing equal parts of glyphosate and water. (Some sources recommend lower concentrations of glyphosate, but with the higher concentration resprouts are less likely to occur.)

Honeysuckle can be cut with either a brush cutter or a hand lopper. The hand lopper works well and is suitable in volunteer work parties, because each volunteer can participate in cutting. If a stem is too large to cut with a lopper, a handsaw can be used. With a brush cutter, it is important



Close up of honeysuckle flowers. In southern Wisconsin, flowering occurs in late April or early May.

that the cutting blade be sharp. With a dull blade, the cut stems are often shredded and splintered, making them harder to treat with herbicide. For the largest stems, a chain saw may be necessary. No matter which cutting method is used, it is essential that the stumps be cut sharp and straight across, so that the cut stumps can be treated with herbicide (as described below).

Here is a procedure guaranteed to work:

- Cut each stem with a hand lopper or handsaw, counting the stems as you cut.
- Cut the stems as close to the ground as possible, but still leave a small amount of stem showing above the soil layer.
- Pull all cut stems away from the base. Now treat each cut stump carefully with the glyphosate mixture. It is strongly recommended that a red or blue dye be added to the herbicide mixture, so that treated stumps can be distinguished from untreated ones. (Dyes suitable for herbicide use can be obtained from an agricultural chemical supply company.)
- As you treat, count each stump again, and do not stop treating until you have treated every stump you have cut.
- If a spray bottle is used, do not spray the whole base, since this wastes herbicide and spreads it around. Instead, place the tip of the spray bottle onto each cut stump, press gently to bring up several drops of solution, and spread them around the cut stump with the tip of the bottle.
- The whole cut stump should be covered with the dye/herbicide mixture.



The tools of the honeysuckle trade. Hand loppers, a spray bottle containing 20% glyphosate and a red dye, and persistence.

With practice, this procedure works quite well and the honeysuckle plants should not resprout. Note that with this procedure, the herbicide is confined only to the cut stumps and is not spread around the environment.



Honeysuckle cut stumps treated with glyphosate. The red dye (blue will also work) ensures that all stumps have been treated. Count the stumps as they are cut, and again as they are treated.

Research has shown that in southern Wisconsin honeysuckle can be cut at any time of the year. Winter is an excellent time to cut, and glyphosate works quite well then.

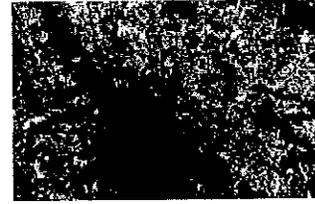
Honeysuckle is very persistent, and will resprout readily if not treated with herbicide. Please note: **There is no point in cutting honeysuckles if they are not going to be treated with herbicide.**

We do not recommend hand pulling, as some authorities do, because it disturbs the soil and opens it up for establishment of weeds.

After the honeysuckles have been taken care of, the area should be reseeded with native species. This is especially important

because when the honeysuckles are removed a "hole" has been created, into which weeds will readily move. In fact, if the honeysuckles were almost solid, it might be preferable not to remove them all at once, but to gradually cut them back, seeding with native species as you go. It may take several years to eliminate the honeysuckles in this way, but this may be preferable to creating a habitat full of weeds.

Once honeysuckles have been eliminated from a natural habitat, they can usually be kept out by controlled burning. Remember, there will be a seed bank, so that small honeysuckles will appear next year. If the habitat is not burned, these small honeysuckles will grow big and you will have the same problem again. Once established, native grasses will carry a fire and help keep the honeysuckle seedlings in check.



This honeysuckle bush was cut and the cut stumps were not treated with herbicide. Resprouting has resulted in a large number of stems.

Please note: **Eradication of honeysuckle should not begin until an approved burn plan has been developed.** For the first few years after removal of honeysuckle from an area, annual burning is recommended, so that the new seedlings are destroyed.

Buckthorn Identification & Control

European buckthorn is a troublesome exotic invasive that spreads readily through woods and savannas. It is a major threat to Wisconsin's ecosystems.



Invasion of a pine forest by buckthorn. Such a dense cover reduces light to the forest floor, thus effectively eliminating native vegetation.

Characteristics

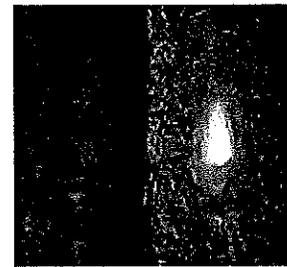
Common buckthorn (*Rhamnus cathartica*) and its relative glossy buckthorn (*Rhamnus frangula*) are serious invaders of Wisconsin's wooded areas. They also commonly invade hedge rows of open fields, from which they may gradually spread throughout a whole field. Both common and glossy buckthorn are small trees or shrubs that can reach a height of 20-25 feet. Buckthorn most often grows as a shrub, where it may send out several shoots.

The outer bark is dark gray or brown, and when cut the inner bark is brown, red, or orange.

Buckthorn has separate male and female plants; the latter are often easy to recognize because they produce copious amounts of deep purple berries. It is especially important to remove the berry-producing plants, because they will otherwise be a constant source of infection for the area.

Status

Buckthorn is of Eurasian origin and was introduced in North America as an ornamental. It was planted for hedge rows in Wisconsin as early as 1849. Despite its insidious nature, it is still legally sold in the state as an ornamental. It has become naturalized and has spread over most of the southern and eastern parts of the state. Buckthorn is an especially troublesome invader of natural oak savanna and oak woodland areas of southwestern Wisconsin.



Characteristic orange inner bark of buckthorn. "Scratching the surface" is a good way of ensuring that one has a buckthorn plant.

Many bird species relish buckthorn berries. However, the berries contain a chemical which acts as a laxative (hence the species name cathartica). The defecation by the birds insures the spread of the seeds through the habitat. Since female trees may produce abundant fruit, within a few years there can be thousands of buckthorn seedlings in the area of a mature tree. Buckthorn seeds are able to remain alive in the soil for years, and new seedlings will continue to appear for years after the plants have been removed from an area.



Leaves and fruit of common buckthorn, *Rhamnus cathartica*.

Buckthorn threats

- Destroys wildlife habitat
- Replaces native vegetation
- Forms an impenetrable understory layer
- Causes long-term decline of a forest by preventing the growth of native tree seedlings

Control

Early identification, before seed production has started, is vital. Small buckthorn seedlings can be readily removed by hand, or with the use of a "weed wrench." Although effective, mechanical removal disturbs the soil and encourages reinfestation or colonization of other weeds so that loose soil should be tamped down to make a firm surface.

Fire

Controlled burns will usually top-kill seedlings or small buckthorn trees, but does not eradicate them. In order to control buckthorn by controlled burning, it is essential that fire be continued annually until native (fire-resistant) vegetation has become established. Use of fire is best reserved for fire-dependent ecosystems such as prairies or oak savannas.

Herbicides

There are several herbicides that are very effective in control of buckthorn. One of the most effective is triclopyr (Garlon; Dow Agrochemical). When using an herbicide, it is essential that the label on the package be read completely before use.

Basal bark treatment

An effective way to control buckthorn is by the use of basal bark treatment with Garlon in oil. Treatment is best done in the late fall or winter when native vegetation has died back and will not be affected. Because buckthorn plants retain their leaves long after native vegetation has lost its leaves, they are readily recognized in the late fall. A concentration of 12-15% triclopyr (active ingredient) in diesel fuel or kerosene is recommended by the manufacturer. Use the herbicide in a backpack sprayer with a nozzle that produces a solid cone or flat fan spray. Spray the lower part of the trunk in such a manner that it becomes thoroughly wet, including the root collar, but not to the

point of runoff. Each stem of the plant must be treated. Properly done, this basal bark treatment is extremely effective and the plant will not leaf out the following growing season. Once dead, the plant can be cut and removed, or allowed to stand to rot.

Cutting followed by herbicide treatment of the cut stumps

Another very effective way of eradicating buckthorn is to cut the plant just above the ground level and treat the cut stump with triclopyr.

The same concentration of triclopyr should be used as for basal bark treatment, but only the cut stump should be treated. It is useful to include a blue or red dye in the herbicide mixture so that the cut stump treatment can be monitored. A backpack sprayer or spray bottle can be used. Be sure that the stump is thoroughly wetted with herbicide. This procedure is economical of herbicide and confines the chemical to the stump itself, but is more labor-intensive than basal bark treatment. However, it has the advantage that the buckthorn plants themselves are being removed from the habitat.

It should be emphasized that cutting buckthorn without treating the cut stumps is ill advised, because cut plants will resprout heavily from the roots, leading to a worse situation than if the plant had not been cut at all.

Although the cut stump procedure can be used at any time of the year, the fall or winter is preferable because nontarget plants are not affected. Also, this procedure is effective with plants of any size, even large ones. Place all the cut material in a pile for subsequent burning.

Basal bark or cut stump?

Bark treatment is best in large infected areas, whereas cutting and treating the cut stumps is best in relatively small areas, or in areas of high interest.



Invasive Plants Association of Wisconsin

Info@IPAW.org

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News & Events

Herbicides for Weed and Brush Control in Natural Areas

Several herbicides are well suited for use in weed and brush control in natural areas. The herbicides discussed here have been carefully established to be safe and effective if used properly. Before using any herbicide, it is essential that the label be read completely and its specifications followed.

Purpose and Need

Herbicides are used to facilitate restoration in prairie and savanna ecosystems in conjunction with other methods, including hand pulling, mowing, cutting, prescribed burning, seeding, and cultivation. Herbicides should be used as part of an integrated weed management strategy. The precise treatment method used will depend upon the target species, its life history, the extent of the problem, and the compatibility of the herbicide with the restoration objectives.

Why use herbicides?

Invasive plants are a threat to management and restoration of natural ecosystems. In many areas, due to neglect over many years, existing native vegetation has become heavily infested with invasive species. Most of these invasive species are nonnative, having been introduced from Europe, Asia, or other distant places. Examples of exotic species include sweet clover, wild parsnip, reed canary grass, purple loosestrife, garlic mustard, honeysuckle, buckthorn, and Kentucky bluegrass.

Some native plants are unusually invasive and may also be a threat to ecosystem function. Examples of native invasive plants include smooth sumac, gray dogwood, hawthorn, sandbar willow, and prickly ash.

Invasive plants compete with desired species for light, nutrients, and moisture. They may alter hydrological regimes in wetlands, or alter the structure of upland plant communities. Although invasive plants can be removed without the use of herbicides, in many cases the cost is prohibitive. In some situations, herbicide use is essential.

Only non-aquatic habitats discussed here

The discussion here deals only with non-aquatic habitats. Some herbicides are approved for use in aquatic habitats, but the kinds, uses, and requirements are different.

Spot spraying and broadcast spraying

For most herbicide applications in natural areas, **spot spraying** is preferred. This permits application of the chemical just to target species. Foliar application should be made with a low-pressure (20-50 psi) backpack sprayer equipped with a wand applicator. A sprayer nozzle which creates a flat or cone-shaped pattern is preferable. The herbicide should be allowed to dry for at least two

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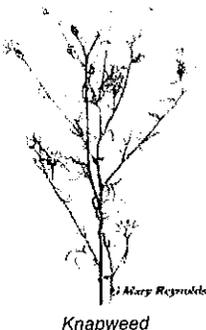
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hours to ensure adequate absorption. (Do not spray when rainfall is threatened.) Addition of a nonionic surfactant to the mixture helps ensure complete leaf coverage and increases the rate of absorption. The herbicide should thoroughly cover the foliage but not to the point of run-off. Personnel applying herbicide must be properly trained and knowledgeable about the native vegetation.

Broadcast spraying in natural area restoration is used primarily when a fallow field is to be planted to prairie. It must be ascertained first that all of the existing vegetation is undesirable. The field can then be treated with a nonspecific herbicide such as glyphosate, which kills all existing vegetation. A boom sprayer towed behind a tractor is usually used.

Summary of approved herbicides

The table below summarizes the characteristics of seven herbicides commonly used for the control of invasive plants and noxious weeds in prairie restoration activities.



Herbicide	Trade names	Target species	Unaffected species	Environmental characteristics	Label Info
2,4-D	Generic	Broadleaf herbaceous plants	Most monocots, including grasses	Half-life in soil 7-10 days; safe for aquatic uses	AgriSolutions, PDF file
Glyphosate	Generic	Nonselective; grasses, forbs, vines, trees, shrubs	None	Half life in soil several weeks; is inactivated by soil particles	Generic-glyphosate, PDF file
Sethoxydim	Vantage	Grasses	Broadleaf herbs, sedges, woody plants	Half-life in soil 4-5 days	Micro Flo Company, PDF file
Triclopyr	Garlon	Broadleaf herbs and woody plants	Most monocots, including grasses	Half-life in soil 30 days	Dow AgroSciences, PDF file
Clopyralid	Transline, Stinger	Broadleaf weeds	Grasses	Half-life in soil 40 days	Dow AgroSciences, PDF file
Fosamine	Krenite	Woody plants	Herbaceous plants less affected	Rapid degradation and high binding to soil particles	Dupont, PDF file
Imazapic	Plateau	Grasses; some broadleaf species	Many broadleaf species	Half-life in soil several months	USDA, PDF file

For all these herbicides, the label should be read and followed!

It should be emphasized that herbicide use should be used as part of a total management system. As the table shows, none of these herbicides is completely specific. Care must be taken to ensure that sensitive non-target species are not treated.

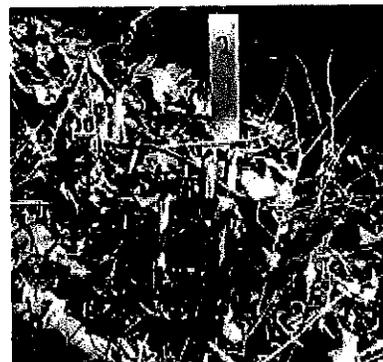
Procedures for herbicide use

1. Herbicide label directions must be carefully followed.
2. Protective gear should be worn as per the label directions.
3. Herbicides must be labeled and stored appropriately, and used containers must be disposed of properly.
4. Empty containers should be rinsed at least three times with clean water and the rinse water must be disposed of per Environmental Protection Agency (EPA) guidelines.
5. If an herbicide is used in a public area, notices must be posted near all treated areas.
6. Livestock should not be permitted in treated areas until the herbicide has dissipated.
7. Wind speeds must be less than 10 mph to minimize herbicide drift.
8. Areas to be treated should be surveyed first to ensure protection of non-target species. Only spot applications should be used in areas containing sensitive plant species.
9. Personnel who function as commercial herbicide contractors must be certified.

Wisconsin DNR web page on herbicide use and certification:
<http://www.dnr.state.wi.us/org/land/er/invasive/info/herbicides.htm>

Examples of herbicide use for invasive plants

1. **2,4-D**. This herbicide is widely used for weed control in lawns and other urban settings. It is active against broadleaf plants (dicots) only; grasses are unaffected. In natural areas, 2,4-D can be used for spot spraying broadleaf weeds such as wild parsnip. However, if there are desirable broadleaf species nearby, hand pulling is preferable.
2. **Glyphosate** is a broad-spectrum herbicide and kills virtually all plants within a few days after spraying. Its use in natural area restoration is usually restricted to use to prevent woody plants from resprouting after they are cut. The cut stem (stump) is treated with a concentrated (20%) solution of glyphosate. The chemical moves to the roots and kills the root system. With care, the chemical is confined to the cut stem only, and nearby vegetation is not affected.
3. At approved concentrations, **sethoxydim** is active only against grasses; neither sedges nor broadleaf plants are affected. It has been found effective in the control of reed canary grass in wetland situations.
4. **Triclopyr** is widely used for the control of woody vegetation. Like glyphosate, it can be used to treat cut stems to prevent resprouting. One chemical form, Garlon 4, is soluble in oil and can be used to control woody vegetation by treatment of a zone of bark along the lower part of the trunk. The hydrophobic Garlon moves through the bark to the phloem and is translocated to the roots. This basal bark treatment is effective even in the winter. After treatment, the tree or shrub does not leaf out the following spring. Eventually the roots die and the plant topples to the ground.
5. **Clopyralid** is unusually effective against plants of the legume and



sunflower (Composite) family. It is used for the control of legumes such as crown vetch and black locust, and of composites such as Canada thistle and spotted knapweed. Although it is active against other plant species, the effective concentration required is much higher.

6. **Fosamine** is used for control of woody plants such as brush and brambles in noncropland areas. It is applied as a foliage treatment during the growing season. Treated woody plants remain green for the remainder of the growing season but fail to leaf out the next spring.
7. **Imazapic** will control most broadleaf weeds as well as cool-season grasses such as smooth brome and quack grass.

Summary

Properly used, herbicides have wide utility in elimination of invasive plants and the restoration of natural areas. For specific recommendations, consult the herbicide label or use the manufacturers advice. Use of herbicides as part of an integrated system for control of honeysuckle, buckthorn, and garlic mustard are given elsewhere on this web site.

(Content by Thomas D. Brock)

See also the Herbicide Dilution table.

For a guide on herbicide use designed for landowners, see the Wisconsin DNR Forestry site. (PDF)

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Invasive Species

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Non-Native Plant Species
Native Plant Species

Japanese Barberry (*Berberis thunbergii*)

DESCRIPTION: Japanese barberry is a compact, spiny shrub that commonly grows from two to three feet tall (although it can grow up to six feet in height). Roots are shallow but tough. The smooth-edged leaves range from oval to spatulate in shape and are clustered in tight bunches close to the branches. The single spines bear small leaves in their axils. Yellow flowers bloom in May, are about one third of an inch wide, and are solitary or in small clusters of 2-4 blossoms. The bright-red fruits mature in mid summer and hang from the bush during autumn and into winter. The berries are small, oblong, and found singly or in clusters. Several cultivars of this species are sold as ornamentals.

A similar species, European barberry (*Berberis vulgaris*) is also an invasive non-native. It can be distinguished from the Japanese barberry by its spiny toothed leaves and flowers in a long raceme. Both species can be controlled using the techniques discussed below.

DISTRIBUTION AND HABITAT:

Japanese barberry prefers well-drained soils, although it has been found in wet, calcareous situations, (specifically in a black ash swamp). It is typically found in locations of partial sunlight such as a woodland's edge; it can survive well under the shade of an oak canopy. It is also found along roadsides, fences, old fields, and open woods.

LIFE HISTORY AND EFFECTS OF

INVASION: Japanese barberry was introduced from Japan around 1875. It is commonly planted for ornamental reasons (its scarlet fruit and autumnal foliage in shades of orange, red, and crimson make it an attractive hedge), as well as for wildlife and erosion control. It easily naturalizes because its fruit is often eaten by birds, which subsequently disperse the seed. Its range in North America extends from Nova Scotia south to North Carolina, and westward to Montana.



Japanese Barberry
(c) John M. Randall/The Nature Conservancy

Japanese barberry can be found invading oak woodlands and oak savannas; it is widespread in Wisconsin woodlands south of the tension zone. A related non-native species, *B. vulgaris*, was widely planted for similar purposes, but has been exterminated because it is the alternate host of black rust, a disease that affects wheat crops.

The plant regenerates by seed and creeping roots. Birds and rabbits are known to eat the seeds and distribute the species. Branches root freely when they touch the ground; thus allowing single plants to become quite large. Japanese barberry competes poorly with grasses and may succumb to drought conditions.

CONTROLLING JAPANESE BARBERRY

Very little is known about the control of Japanese barberry. What information is available has been gathered from the notes of natural resource managers.

Mechanical Control: Mechanical removal of the plant is recommended in early spring because barberry is one of the first shrubs to leaf out, thereby making identification easier. Cutting, pulling or digging are effective in areas where there are only a few plants. A hoe, weed wrench, or mattock should be used to uproot the bush and all connected roots. Thick gloves are recommended for protection from the shrub's spines.

Japanese barberry may be relatively easy to control in fire-adapted communities. Fire is thought to kill these plants and prevent future establishment.

Chemical Control: Triclopyr has been used as a cut-stump treatment with success. Other herbicides labeled for brush control, such as glyphosate, may prove to be effective. Care in application is essential because glyphosate is a non-selective herbicide that can kill native species as well. Herbicides are suggested only for plants that are difficult to remove mechanically.

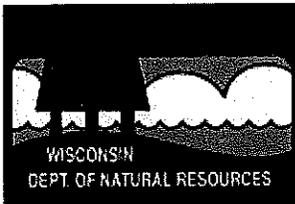
More Information on the Web (links exit DNR)

[Japanese Barberry - Wisconsin State Herbarium](#)

[Japanese Barberry - Invasives on the Web](#)

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Department of Forest Ecology and Management • School of Natural Resources

No. 41

January, 1989

Brief Look At Tree Planting

Leigh Klein

1. Know why you want to start a plantation:

- ◆ What are your long term goals: what will you do when the trees are mature?
- ◆ What are your short term goals: will you use your land while the trees grow?
- ◆ What time and resources can you give to the care of your plantation?

2. Select tree species which will meet your goals.

3. Ensure that the species you select will grow well on your site.

- ◆ Does your soil provide what the trees need?
- ◆ Is your climate the correct one for those trees?
- ◆ Are there diseases or insects in your area which might damage your seedlings?

4. Determine what kind of SITE PREPARATION is required.

- ◆ Site Preparation is based on soil type, desired tree species and existing vegetation.
- ◆ On sandy soils, you may only need spot weed control.
- ◆ On heavy soils and old fields, start your site preparation the fall before planting.

5. Design your plantation and draw a sketch of where you will plant your trees.

- ◆ Your design ("layout") should include access, harvest and fire roads.
- ◆ Your goals should be reflected in the design (wildlife openings, stream buffers, etc).

1. Keep seedlings cool (35° F) and moist (90-95% humidity); handle them gently.

- ◆ During transportation, vigorously protect your seedlings from all sources of heat.
- ◆ If packages are warm, open and remoisten the roots. Reseal the package
- ◆ Optimal storage is refrigerated and short term (maximum 2 days).

2. Move only a 1/2 day's seedlings to the planting site at a time.

- ◆ Protect your seedlings on site from heat, wind and physical damage.

3. Cull weak seedlings from your planting stock.

University of Wisconsin, United States Department of Agriculture, and Wisconsin counties cooperating. UW-Extension provides equal opportunities and programming, including Title IX requirements.

PLANNING

PLANTING

4. When planting, make sure that the roots hang freely in the hole or planting slit.

- ◆ Place the seedling so that the old soil line is 1/2" below the surface.

5. Make sure no air holes remain in the soil, and that you do not shear off roots.

- ◆ Hand planting: fill the hole with soil and firmly press the soil into place.
- ◆ Machine planting: hold the seedlings in place until the packing wheels take over.

TECHNIQUES

Planting with a shovel



1. Insert shovel; pull back to open a hole, or dig a hole



2. Place seedling at proper depth. (May require a second person)



3. Rake soil into the bottom of the hole; pack



4. Put remaining soil into hole ensure that seedling is upright.



5. Using the ball of your foot, firmly pack soil.

Planting with a hoedad



1. Make a vertical cut with the hoedad.



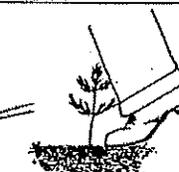
2. Pull back on the handle to open a hole



3. Place seedling and use tip of hoedad to pack soil at base of the hole.



4. Scrape remaining soil into the hole.

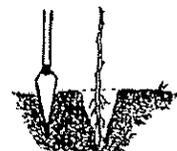


5. Using the ball of your foot, firmly pack soil.

Planting with a planting-bar



1. Plant "bar" vertically and rock back and forth to open a slit.



2. Place seedling in slit; plant bar two inches to left of hole.



3. Rock the planting bar to close soil around seedling.



4. Plant bar again, and rock it to pack soil around seedling.



5. Using the ball of your foot, firmly pack soil.

1. Be vigilant about reducing competing vegetation.

- ◆ You must control weeds and grasses to obtain maximum seedling growth.

2. Watch for browsing or clipping injuries.

- ◆ These indicate the presence of an animal population you may need to control.

3. Watch for signs of disease or insect infestation; contact your forester for advice.

- ◆ Look for yellowed, brown, mottled or withered shoot tips, needles or leaves.
- ◆ Look for mushrooms around base of seedlings.
- ◆ Look for localized swelling or lesions on the stem or branches.
- ◆ Frost and drought may cause similar symptoms; evaluate the problem carefully.

4. Check the survival rate of your plantation.

- ◆ Estimating survival allows you to identify problems and find appropriate solutions.

For more information: see the Wisconsin Woodlands Tree Planting Series from UWEX and contact your local forester.

FOLLOWUP



LAKE STATES WOODLANDS

Plantation Establishment Series: Planting



Leigh Klein, Paul Pingrey, John Trobaugh and A.J. Martin

Tree seedlings, once thought hardy and able to withstand the rigors of handling and environmental changes, are now recognized as relatively fragile. In fact, the successful establishment of transplanted seedlings can often be traced to careful handling. This publication explains how to handle seedlings carefully—from transporting and temporary storage to planting seedlings.

Planting is only one part of a three-part process consisting of planning, planting and maintaining your plantation. Before you plant your seedlings, we recommend that you read all three parts of this *Plantation Establishment Series*, which focuses on establishing plantations on open fields, and that you consult with a professional forester. Contact your DNR forester for help or referral.

Handling Seedlings

Why be careful

Keeping seedlings healthy requires minimizing physical damage and providing them with a constant low temperature and high humidity. The point is to keep the seedlings in "suspended animation" from the time they are lifted out of the nursery bed until you plant them.

Seedlings are typically transplanted in early spring at the end of their dormant period. Spring is the preferred planting season because it gives seedlings a chance to establish their roots and build energy reserves before winter sets in.

Assuming favorable weather, adequate site preparation and appropriate species, carefully handled seedlings can have a survival rate of over 90%. In contrast, poorly handled seedlings have a much lower

survival rate. The term "transplant shock" is used to describe seedlings showing signs of overheating, drying out, or physical damage. While seedlings may recover from mild transplant shock, initial growth will be slow compared to other seedlings. Few seedlings can recover from severe shock. We explain how to avoid transplant shock throughout this publication.

Overheating. Between the time they are removed from the nursery bed and the time they are planted, overheating is the most severe problem faced by seedlings. Although any temperature between 33° and 40°F is "safe," 35°F is the best temperature for storage and transportation. Overheating is a problem because, as temperatures increase, plants respire more quickly and seedlings not in the ground can deplete their energy reserves. Such seedlings have a greatly reduced chance for survival.

Besides respiration, the other danger with higher temperatures is mold growth. Given the right conditions, high temperature and high humidity, certain molds can destroy seedling roots.

Fluctuating temperatures can be as damaging as high temperatures and are a very common problem in on-site storage. Consequently, plan to provide very cool, constant temperatures for your seedlings.

Moisture Stress. The second major problem when moving seedlings is keeping them from drying out (desiccating). To prevent desiccation, keep humidity between 90% and 95%. At lower humidities, the roots—especially the vital root hairs—dry out. Damage to root hairs is permanent and if enough are damaged the seedling can no longer absorb adequate water and nutrients. If the temperature has been kept between 33°-40°F from the time of packaging to the time of planting, moisture should be adequate.

Physical Damage. The most vital parts of a seedling are also the most fragile parts—particularly the smallest root hairs, the young shoot tips and the buds. The smallest roots take up nutrients and water from the soil while larger roots anchor plants. Similarly, the very tip of the shoot grows most actively while the rest of the shoot serves as the framework. Consequently, handle seedlings so as to minimize damage to these fragile parts as well as the rest of the plant.

Packaging

Packaging allows seedlings to be shipped, with minimal damage, to their planting site. Seedlings are shipped either as “bare root,” without any soil, or as containerized stock. Bare root is the most common form, because it is inexpensive and easy to transport. Bare root seedlings are usually packaged in one of three ways: in boxes, bags or bales.

Boxes are rectangular corrugated cardboard containers lined with plastic. They are easy to transport and stack, and provide excellent seedling protection. You can control the temperature well by leaving space between boxes for air circulation. Also, the plastic-lining provides adequate moisture retention. Boxes are relatively large, the dimensions are 30"x17"x11", so be prepared to provide extra space in your vehicle if you receive boxed seedlings.

Bags are generally used for small quantities of seedlings. Lacking rigid packaging, they do not protect the seedlings from physical damage as well as boxes do, so it is important to handle bagged seedlings carefully. Further, it is difficult to control temperatures because bags are typically stacked on their side and less surface area is exposed for air circulation to cool them down.

Bales are packages made by wrapping moisture-retaining materials around seedlings. A variety of packing materials are used to surround the seedling roots, from sawdust to sphagnum moss. Baling is a relatively inexpensive packaging technique, and adequate for very short storage or transportation. However, bales often leave shoots exposed and subject to drying. Also, stacking bales too high can crush the seedlings.

Containerized seedlings come in a “plug” of the soil they grew in at the nursery (Figure 1). Consequently, the roots are usually well-protected during shipping. However, because the shoots remain exposed, transportation requires special refrigerated trucks with racks to keep them upright.

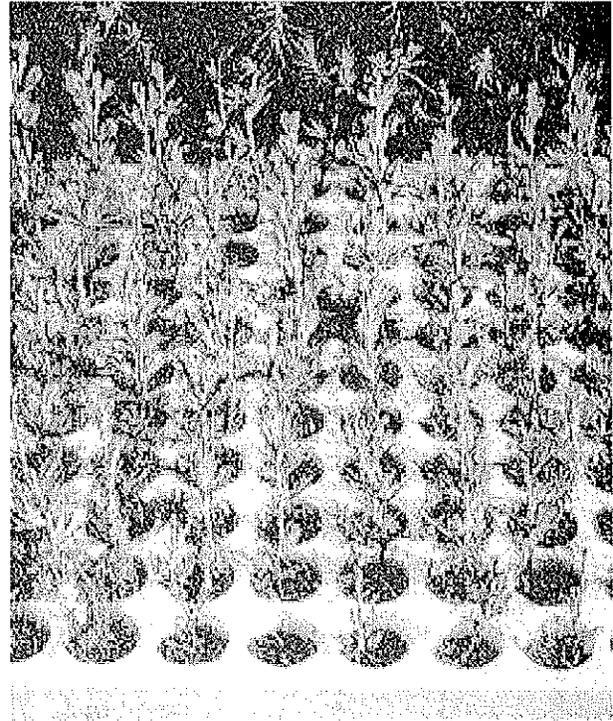


Figure 1. Containerized seedlings.

No matter how you receive your seedlings, until you are ready to plant, do not handle them individually. To reduce physical damage to roots and shoots, leave seedlings in their packaging. If you have bales or bagged seedlings, minimize stacking the packages. In all cases, handle and place the packages carefully when moving the seedlings from one place to another. Even boxed seedlings can be damaged if they are tossed around inside their box.

Transportation

Most handling damage occurs during transportation. When planning how to transport your seedlings, consider the size of your order and the type of vehicle you will need to accommodate your seedlings. For example, two-year-old conifer seedlings are packed approximately 1000 per box or bale. Three-year-old conifers will come approximately 500 to a box or bale. A box or bale of two-year-old hardwoods or transplants will hold between 250 and 500 seedlings. To maintain vigorous seedlings, follow these recommendations closely.

For Large Orders (over 1000 seedlings). A refrigerated truck is optimal, but if one is not available, then follow these precautions which are based on using a pickup truck.

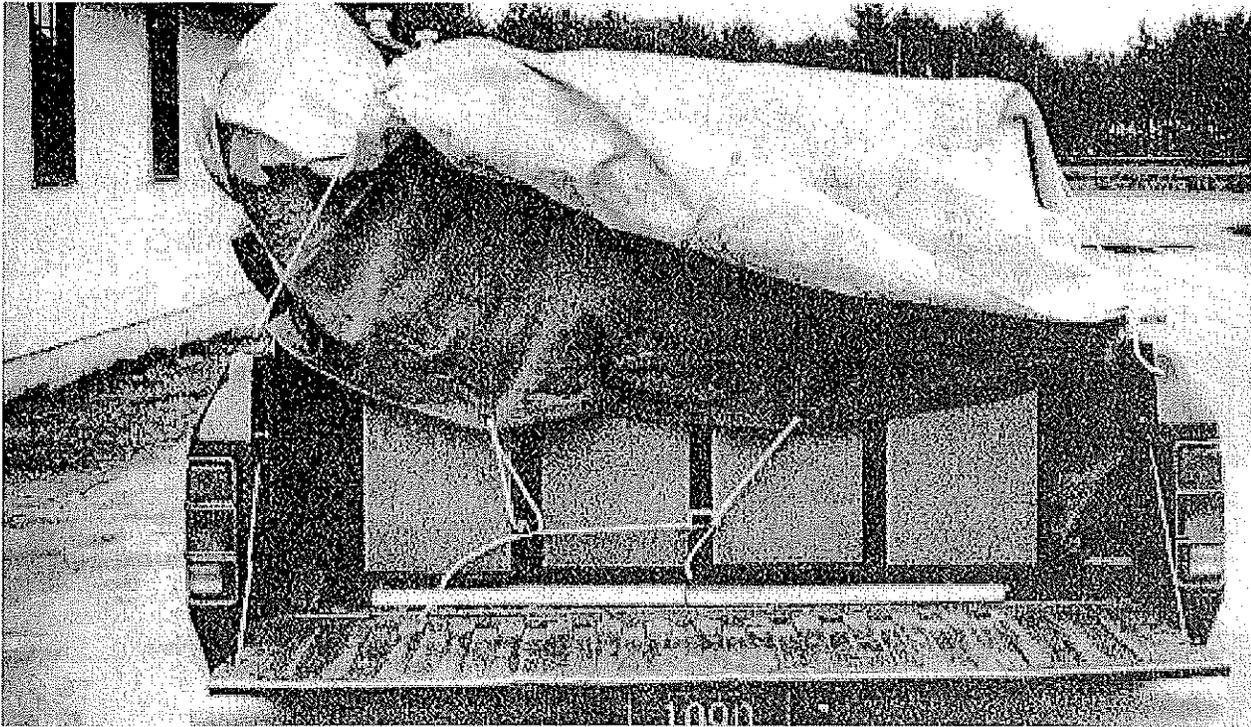


Figure 2. Transporting large orders if a refrigerated truck is not available. Note the foam sheets on the truck bed, the spacer boards under the boxes and both the canvas and solar reflecting tarp over the boxes.

1. Protect seedlings from the heat of the truck bed by placing plastic foam sheets on the bed and spacer boards (for ventilation) between the foam and the boxes (Figure 2).
2. If you are transporting bags or bales, build a frame to provide air flow around the packages.
3. Cover the packages with a damp canvas tarp.
4. Cover the canvas tarp with a solar reflecting tarp. This critical step will help shield seedlings from the sun's heat.
5. Fasten the load securely.

For Small Orders (under 1000 seedlings). Only a few minutes in a hot trunk can permanently damage seedlings. A refrigerated truck or van is always the best form of transportation. Your forester maybe able to tell you if other landowners near you also have small orders. Renting a refrigerated van together will cut costs and provide the best protection for your seedlings. However, if refrigeration is not possible, and the packages fit into the back seat of your car, air conditioning (on high) is advised. At the very least use insulation and ice packs, crushed snow or large coolers.

Storage

A seedling's home is the soil. When at all possible, plant your seedlings as soon as they are delivered. Storage only allows more time for problems to develop.

If you must store seedlings for 1 or 2 days before planting, provide adequate cold storage to keep the seedlings healthy. If you don't have cold storage facilities, ask your forester if there are nearby farms, businesses or orchards with cold storage space for rent. If you cannot get access to refrigerated storage space, remember that a constant, low temperature is the key factor in deciding where to store seedlings. Root cellars or unheated basements may work if they can be kept below 40°F. Avoid using shaded, non-refrigerated storage (e.g., sheds or sides of buildings) because the temperature there may fluctuate widely.

If you suspect your seedlings have not been kept consistently cool since leaving the nursery, you may consider opening your packages and sprinkling the roots with water. After misting the seedlings, immediately reseal the packages tightly to keep in the moisture.

Common Storage Mistakes

Do not heel-in seedlings. Until fairly recently, the practice of 'heeling in' or planting seedlings in shallow soil pits for long-term storage was widely recommended. Research shows that this extra step in handling can damage seedlings severely. Fragile root hairs, in particular, are damaged, and temperature fluctuations in the shallow soil cover further weakens the seedlings.

Do not immerse seedlings in water. Often people will try to keep their seedlings moist by submerging them (or the roots) in water. However, roots, especially the root hairs, may drown during even a short water bath. The best way to raise humidity is by sprinkling water on the roots and resealing the package.

Do not plan on long-term storage/do not delay planting. Occasionally, people delay planting until they feel the soil conditions are optimal. However, because few people have truly adequate long-term storage facilities, seedlings have a better chance in the ground than out of it. Also, if you have a particularly large order, consider receiving your seedlings in staggered shipments.

Planting Preparations

By the time your seedlings arrive, your site preparation should be complete. For more information about site preparation, see the first extension bulletin in this series, *Plantation Establishment Series: Planning* (G3480). Also, be sure you know your planting layout and tree spacing and have tools and workers ready.

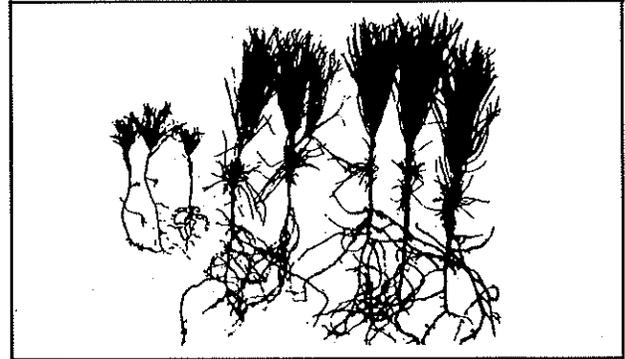


Figure 3. Note the variation in seedlings. The seedlings at the left are stunted and should be culled. Note the small size, small stem diameter and poor root formation. The seedlings at the right have the best size and form. The 2 center seedlings will generally grow well when transplanted.

When transporting seedlings from storage to the planting site, move only the number of seedlings you can plant in a half day or less. The less time your seedlings spend out of ideal storage conditions, the more vigorous they will be.

Culling Weak Seedlings

In every group of seedlings, a few will be weaker than the majority. When you order bulk seedlings, the nursery includes extra seedlings in your shipment to account for weak seedlings. Part of the planting operation is to separate healthy from weak stock. Plant only the healthy stock. Although there is no hard and fast rule to tell a "cull" seedling from a healthy one, foresters frequently cull out scraggly, wilted, discolored or particularly thin-stemmed seedlings. Quality

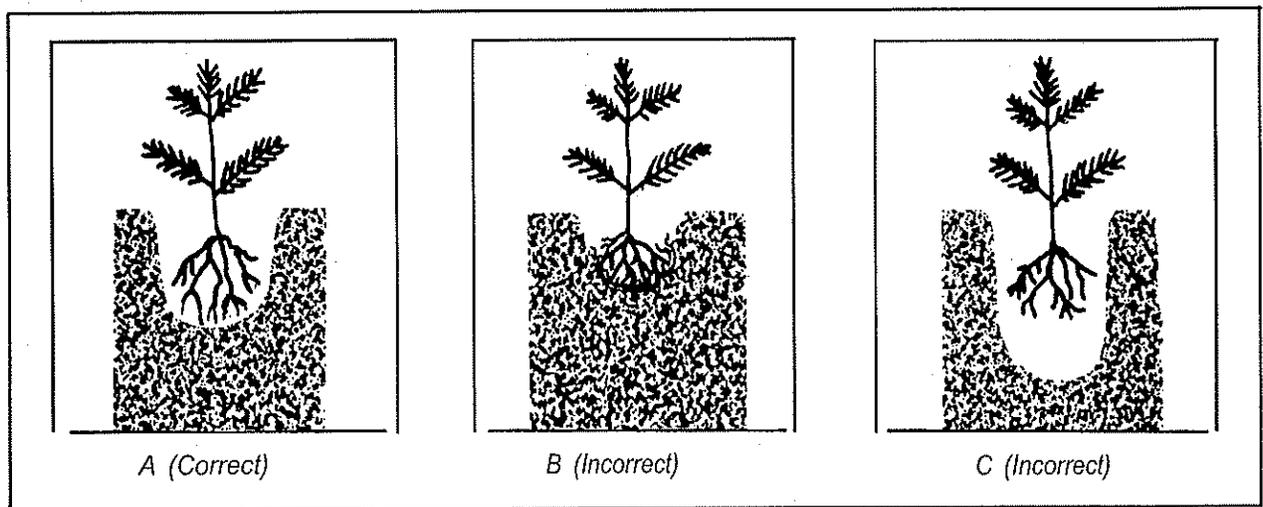


Figure 4. Proper placement of a seedling in a hole. Place the root collar—where the seedling originally broke above the soil—even with the soil line. The incorrect diagrams (B & C) give the roots too little room or too much room. With too much room, seedlings will sink when the soil settles.

hardwoods have more main roots than cull seedlings. A 1- or 2-year-old seedling should have 6 to 8 main roots. Figure 3 shows several examples of the root systems and general form of healthy and cull seedlings. Although culling involves extra work initially, it will help you increase your odds for a healthier and faster growing plantation.

Moisture Enhancers for Roots

Moisture enhancers, which have become popular recently, are gels intended to help the root retain moisture. If you're planting on a windy day or on particularly dry sites, dipping the roots into the gel may help prevent the roots from drying out. Consult your forester for advice and ordering information.

Planting Procedures

The important points to keep in mind for planting are:

- at the planting site, keep seedlings shaded and cool until planted.
- handle roots as little as possible.
- place seedlings so roots hang freely and just reach the bottom of the hole.
- new soil line should be just above the seedling's old soil line.
- pack the soil after planting.

Minimize exposure. Planting has great potential for doing physical damage to the seedlings. In particular, separating seedlings from the others in the box or bale can be extremely damaging if you tear the roots or break off buds. Other physical damage can result from careless carrying or placement of the seedlings. Exposure to sun or wind during planting or on-site storage can dry out seedlings. A cool, shaded on-site

storage facility is imperative. Recognizing and avoiding potential problems is critical for good seedling survival.

Correct placement and depth. Your planting hole or slit should always be deep enough to accommodate a seedling's root system. Roots curved inside the planting hole will not establish themselves correctly (Figure 4). For seedlings with extremely long roots, prune the long anchor roots so they hang straight in the hole. Plant both conifers and hardwoods by placing the root collar at the soil line or no more than 1/2 inch below. The root collar is the point on the shoot where it broke above the soil at the nursery. You can recognize it by the change in color and slight swelling on the shoot. To help sort the roots vertically when you plant, gently place the seedling deeply into the hole, and then pull it up to the appropriate depth.

Packing the soil. Packing the soil thoroughly and carefully anchors the seedling and removes air pockets which would allow the roots to dry out, killing the seedling. Once the seedling is placed correctly in the hole, replace the soil and pack it firmly around the seedling. To keep from sheering off the roots, use the balls of your feet rather than your heels when packing the soil.

Hand Planting

Hand planting is necessary in rough terrain or when the seedling stock is too large for a machine planter. It is also commonly used for smaller plantings (fewer than several thousand seedlings). Depending on the field conditions, expect each person to plant between 500 and 1000 seedlings a day.

When carrying your seedlings to the site, never carry them with the roots exposed to the air. Use a container

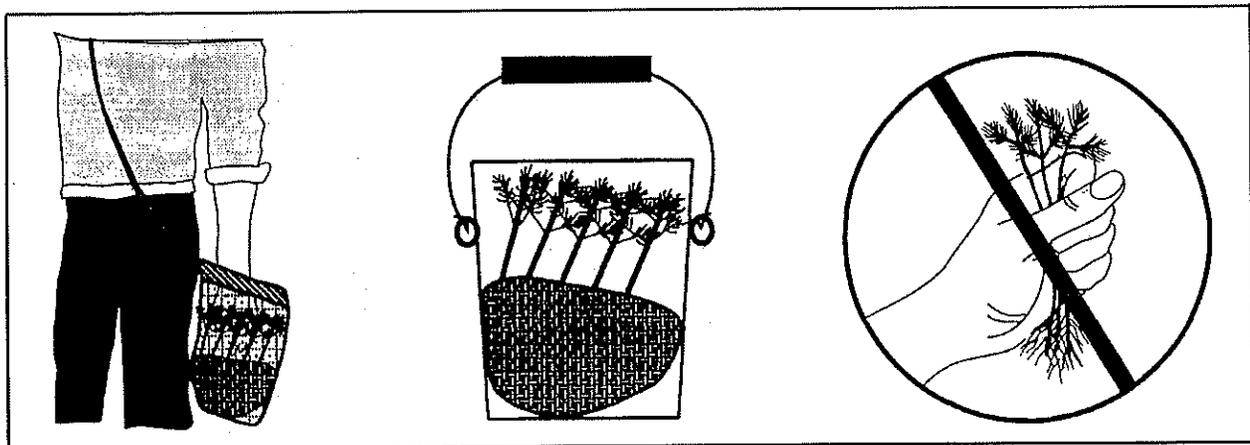
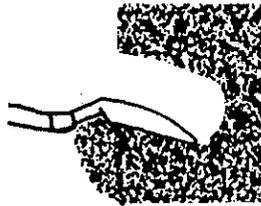
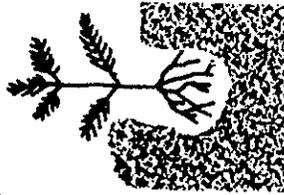


Figure 5. Proper and improper ways of carrying seedlings to the site. CARRY your seedlings in a bucket or planting bag. Always cover the roots with wet burlap or other material. DO NOT CARRY your seedlings exposed to the air or immersed in water.

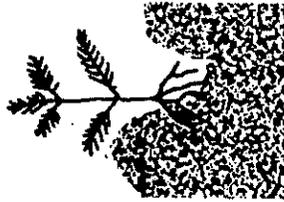
Planting with a shovel



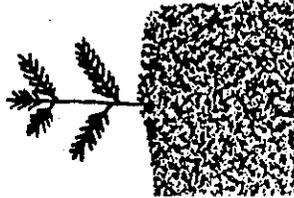
1. Insert shovel; pull back to open a hole, or dig a hole.



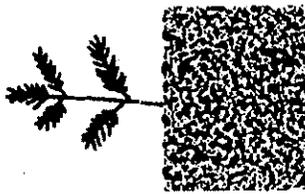
2. Place seedling at the same depth as it was grown at the nursery. May require a second person.



3. Rake soil into the bottom of the hole. Pack.



4. Put remaining soil into hole, make sure the seedling is upright.

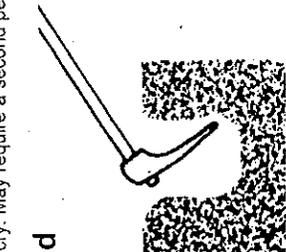


5. Using the ball of your foot, firmly pack soil.

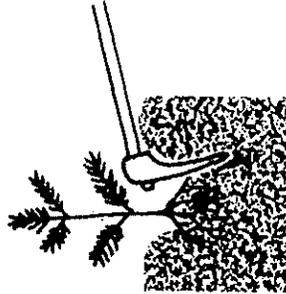
Planting with a hoedad



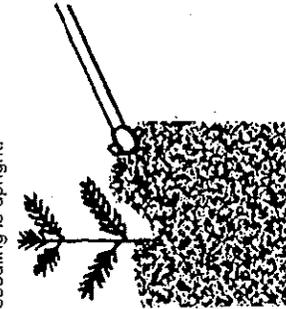
1. Make a vertical cut with the hoedad.



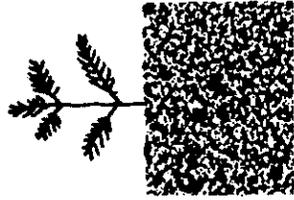
2. Pull back on the handle to open a hole.



3. Place seedling and use tip of hoedad to pack soil at base of the hole.

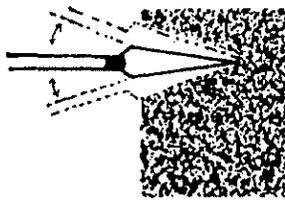


4. Scrape remaining soil into the hole.

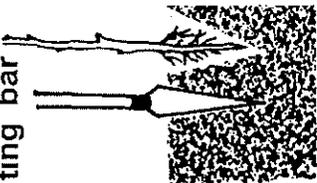


5. Using the ball of your foot, firmly pack soil.

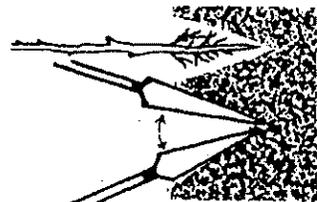
Planting with a planting bar



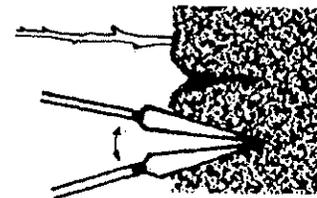
1. Insert bar vertically and rock back and forth to open a slit.



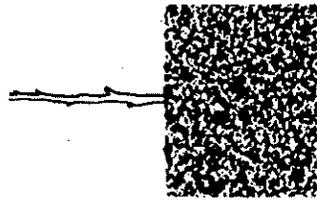
2. Place seedling in slit. Plant bar two inches to left of hole.



3. Rock the planting bar to close soil around seedling.



4. Plant bar again and rock it to pack soil around seedling.



5. Using the ball of your foot, firmly pack soil.

Figure 6. Different hand planting techniques using shovel, hoedad and planting bar.

(bucket or planting bag) and always cover the roots with a moist material such as burlap or peat moss (Figure 5). Do not immerse the seedlings in water. Remove only one at a time when planting.

Many tools are available for hand planting. Of these, the most common in the Lake States are shovel, planting bar (dibble) and hoedad. For heavy soils, a shovel is the recommended tool. See Figure 6 for techniques on planting with these three tools.

If you intend to plant by hand, but do not plan to do the work yourself, your forester may be able to provide you with names of planting crews that work in your area. You may need to book a planting crew many months before planting, so ask your forester early.

Machine Planting

Planting machines are used extensively in the Lake States because they are well suited for large orders and even terrain.

While quick and efficient, planting machines cannot be used if a site is extremely rocky or steep. Also, the machine may bog down in wet areas so be sure to know the layout of your land before beginning the work. Generally, a 30-50 horsepower tractor and a crew of three is sufficient; one person driving the tractor, one sorting the trees and keeping things moving smoothly and the third inserting the trees into the furrow. On a good day, a machine planter can plant 5000 trees. This will vary according to weather, field conditions and unexpected mishaps. It may be helpful to stake out each row beforehand or to have someone walking beside the planter to assist in spacing. To prevent drying out, protect the seedlings that are on the planting machine. If the seedlings are not covered, place them under a solar reflecting tarp and keep the roots moist by covering them with moist burlap or other material.

Planting machines plow a slit about 10 inches deep in the soil. As the machine drives forward, a person places seedlings at regular intervals along the slit. Angled packing wheels at the back end of the machine apply pressure to the sides of the slit and close the soil (Figure 7). To prevent seedlings from slipping too deep or falling at an angle before the wheels close them into place, the person planting should hold on to each seedling as long as possible.

On level sites and most soils the machine will work well and the packing wheels will close the slit. However, if planting on thick sods, heavy clay soils or slopes, or if the tires are improperly inflated, the packing wheels may not be able to close the slit adequately. If trees are loose when tugged gently use your foot or a planting bar to pack the soil properly. Checking your work as you go saves you from correcting problems later.



Figure 7. Tree planting machine. While there is some variety, all operate in basically the same way. Note the packing wheels closing the sides of a furrow and the seedlings NOT being properly shaded.

Hardwoods, with their long roots, need deeper planting slits than conifers. It is important to have a machine which can plow a deep enough slit.

Planting machines are often available from various public agencies or private firms. Consult your forester for more information.

Final Word

This publication is a detailed guide, but many problems can not be anticipated. When planting your plantation, work with your local forester. Foresters are familiar with the sorts of problems which may be encountered on your land, and can help you through the whole process.

Remember that successful planting is a critical part of establishing your plantation, but it is not the only part. After your trees are in the ground, it is important to care for them and watch for diseases, insects, animal damage, etc. The maintenance bulletin in this series will help introduce you to some of the important concerns in plantation maintenance. For concerns specific to your area, consult your forester.

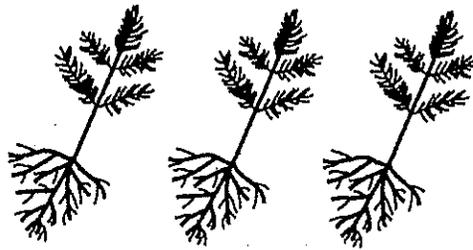
Further Reading

Tree Planting in Michigan (E-771). Cooperative Extension Publications, Michigan State University, East Lansing, MI 48824.

Planting Trees in Minnesota (CD-FO-0481). Agricultural Extension Service, University of Minnesota, St. Paul, MN 55108.

Main Steps in Planting Your Plantation

1. Seedlings are fragile; they require cool temperatures (35°F), high humidity (90-95%), and careful handling.
 - If packages feel warm, open them and check the moisture; sprinkle the roots with water if necessary. *Reseal the package.*
 - Protect your seedlings from all sources of heat when transporting or storing them,
 - Provide cold storage for short-term storage. Long-term storage will damage your seedlings,
2. Cull weak seedlings from your planting stock.
3. Move only as many seedlings as you can plant in a day or less to the planting site. Protect your seedlings on site from heat, wind and physical damage.
4. When planting, make sure that the roots hang freely in the hole or planting slit and that the new soil line is just above the old soil line.
5. After the seedling is positioned correctly, fill the hole with soil and firmly press the soil into place. Make sure no air holes remain in the soil, and that you do not accidentally shear off roots. If you use a planting machine, make sure the seedlings are in place when the packing wheels close the soil.



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So, What Should I Plant?

Trees, Shrubs and Vines with Wildlife Values

Tree nurseries and garden catalogs are a lot like candy stores. The color, shape, texture, flowers, fruit and many other factors provide a multitude of choices that can entice you to purchase more plants than you really need, or to buy something you don't need at all. Before you buy, consider the following: What plants are already attracting wildlife to your property? What good wildlife trees and shrubs are missing? What wildlife do you want to attract? Can a particular plant grow in your location and in your soils? This publication will give you the information you need to make the best plant selections for wildlife on your land.



Before you begin making decisions about what trees, shrubs or vines you should plant on your property to attract wildlife, it is essential that you understand some fundamental concepts in wildlife management. Be sure to read **Calling All Wildlife** in this series to help you with these concepts and with basic habitat evaluation on your land. Then look around your neighborhood, find out what naturally grows in your area, and decide how you can enhance the native habitat or landscape features on your property. For habitat inventory information, mapping tips and assistance in creating a wildlife management plan for your property, refer to **Putting Pen to Paper** in this series.

Also, read the **Wisconsin Wildlife Primer** to help you understand which animals occur in your region of Wisconsin, what they eat,

what habitats they prefer and what they need for nest or den sites. The more information you have, the better you'll understand your land and the wildlife it supports.

The publication you are now reading will help you evaluate the wildlife value of plants currently growing on your property. Once you've read the other publications mentioned above, use this bulletin to help decide which plants you could add to your property to attract wildlife native to the habitats on your land.

All plants described in this publication were selected for their value to wildlife. Some of the plants were selected because they provide good-to-excellent food sources. Some were selected because they provide maximum winter shelter. Others were selected because they are common on the Wisconsin landscape, offer some wildlife value, and could very well be growing on your property already (e.g., mulberry or boxelder).

When creating a wildlife management plan for your property, keep in mind that—per square foot of land invested—shrubs will provide more food and cover for wildlife than trees. That's because shrubs bear fruit at an earlier age, and they bear that fruit from year to year more consistently than trees. You will receive a much faster payback by planting more wildlife shrubs than trees. Nevertheless, the wildlife trees described here provide excellent food and/or shelter and should be included in your plans. You'll just have to wait a little longer to reap the benefits.

The geographical location of your property in Wisconsin, its soil types and moisture levels, depth to bedrock, the kinds of wildlife that already live on your property, and your own personal wildlife management goals will determine what plants you should consider using to attract wildlife.

Native vs. Non-Native

Since the arrival of European settlers, our native Wisconsin landscape has changed dramatically—its overall biological diversity has decreased. Today, natural resource managers are dealing with many problems associated with the widespread invasion of non-native, or alien, plants. Often, these alien plants are so aggressive in their growth

Note: Emphasis is placed on native plants, since these are best adapted to Wisconsin's climate and soils. Not every plant described here is one that you can readily purchase at your local nursery. You may have to order seeds or potted plants from one of Wisconsin's native plant nurseries listed in **Getting the Help You Need**.

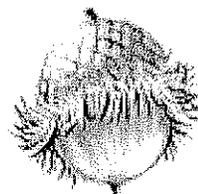
Not all native plants described in this publication are ones that you would want to plant (boxelder, for example); they have wildlife value, nevertheless and you may want to keep them on your land if they are already there.

they choke out, shade out or otherwise out-compete the more beneficial native plants that originally grew on Wisconsin's soils.

To help maintain our state's native biodiversity, choose plants native to Wisconsin since they are especially suited for our state's climate and are part of our natural history. In particular select those native plants which are adapted for your property and soil types. Some plants introduced from other parts of the United States or other countries may not be hardy enough to withstand the extremes of drought and cold peculiar to Wisconsin. Others may survive all too well and become invasive pests. *Cultivars*—horticulturally-altered or "improved" varieties of native plants—may work well as landscape plants around your house, but are inappropriate for native restorations or wildland plantings.

Sometimes the best thing you can do to improve your property's ability to attract a high-quality assemblage of native wildlife is to control the alien plants that may have taken hold. This may mean conducting a controlled burn, pulling new invaders, cutting brush and treating the stumps with a brush herbicide, or controlling alien grasses or weeds with an approved herbicide. Contact the Bureau of Endangered Resources, Madison, to receive a copy of **Invasive Species Control Recommendations**.

If you don't have a problem with exotics on your land, you may find that the best way of enhancing your property for wildlife is to plant trees, shrubs and vines native to your area. Sometimes, the best tools of the wildlife management trade are the axe, the match and the spade.



Plant for Diversity

It is rare in nature to find "monocultures"—large stands of a single plant type. You and your wild neighbors will be better off if you plant a good assortment of native trees, shrubs and vines adapted to the habitats on your property. The greater the variety of native plants you select, the more wildlife your land can support. By selecting an assortment of native plants, you can minimize your risk of losing all your plants should disease strike a particular species of plant. Also, if one species should fail to produce a nut or fruit crop in a given year, another kind of nut- or fruit-bearing plant could provide alternative food sources.

Where Can I Get The Plants I Need?

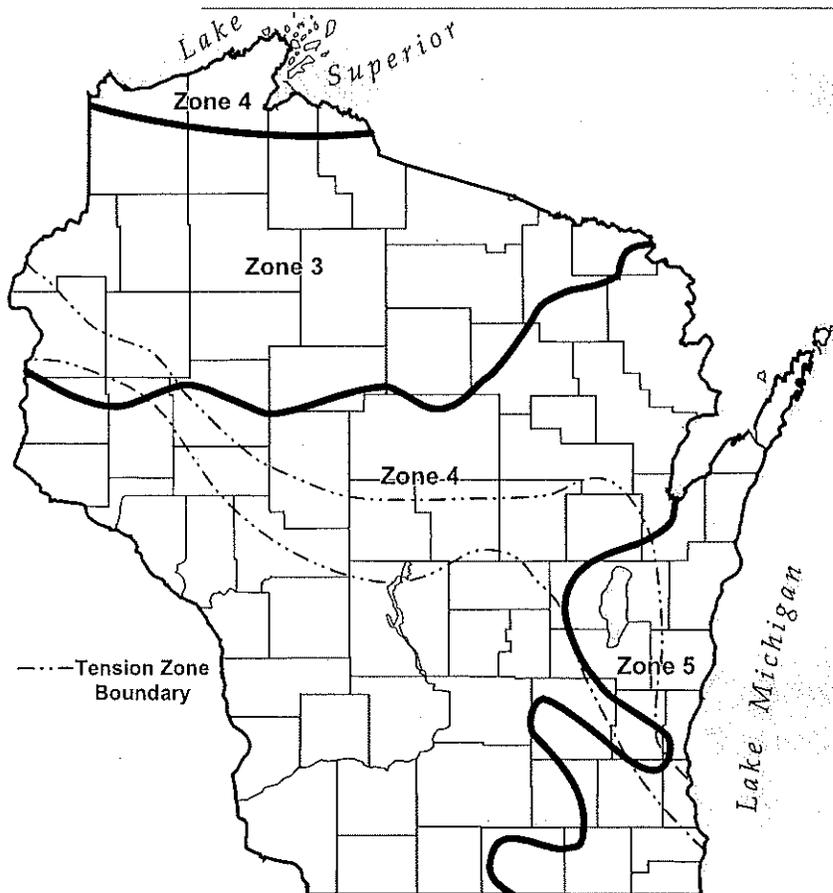
You can purchase some plants from local or native plant nurseries or from one of the Department of Natural Resources nurseries listed in **Getting the Help You Need** in this publication series. DNR's Wilson Nursery in Boscobel specializes in wildlife trees and shrub packets. Contact your local DNR office for a trees and shrubs order form. If you have questions, or want to make an extensive planting, contact your local DNR wildlife manager or forester. They can give you detailed advice about planting, weed control, and special concerns associated with your specific property and the plants you're interested in growing.

Plant Hardiness Zones and the Tension Zone

Be sure plants are hardy for your zone, or if your planting area is borderline, pick a sheltered area for tender species.

Wisconsin is divided into two distinct floristic provinces, the southern *Prairie-Forest Province*, and the northern *Hardwoods Province*. The area of overlap of these two floral realms is called the **Tension Zone**.

Many of the state's native plant species survive, or grow well, only in their natural province, and should not be planted far outside of their natural ranges and preferred zones.



Using This Publication

The trees, shrubs and vines are divided into 6 categories:

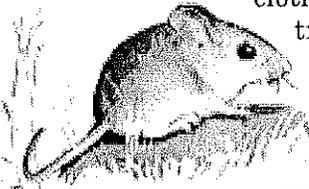
1. Vines
2. Shrubs
3. Fruit-bearing Trees
4. Nut-bearing Trees
5. Other Deciduous Trees
6. Evergreen Trees

We describe the wildlife benefits, geographical range and any special soil characteristics for each tree, shrub and vine. If a specific soil type is not listed, assume that the plant grows on "average" soils that are neither too wet nor too dry, nor too infertile or too organic. When you purchase trees and shrubs, be sure to use the scientific name to avoid getting the wrong plant. Also, carefully read and follow the planting instructions that come with your purchase.

Warning: Rabbits, mice and voles are active all winter. Since leaves, grass and other typical summer foods are unavailable, they often resort to eating the tender outer bark from young trees and shrubs in order to survive. To protect your landscaping investment from damage by these bark-eating mammals, encircle young yard trees and shrubs with chicken wire, hardware

cloth, plastic tree-guards or tree wrap. For wildland plantings, mow the grass surrounding your plantings to remove the cover that rabbits, mice and voles use. You may want to install

raptor perch poles as well. Your local garden center can assist you with which choice is appropriate.



Key for the Following Listing:

- Common name of tree, shrub or vine
- Scientific name
- Planting zones
- Season it provides food
- Descriptive paragraph about the life cycle of the plant and the wildlife that uses it.

All the plants in this publication provide some form of nesting, resting or hiding cover for one animal or another. However, the evergreens are of extreme importance in winter since their green boughs provide the greatest shelter from harsh weather. Vines also provide excellent year-round shelter for rabbits, some songbirds, pheasants and bobwhite quail.

1. Vines

American Bittersweet

Celastrus scandens

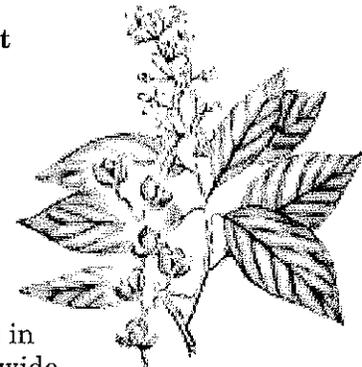
Zone 3

Winter fruit

American climbing bittersweet is a low rambling vine that grows along fencerows, streams and woodlands in well-drained soils statewide.

The bright red berries are set off by capsules that split open to reveal a brilliant yellow-orange interior, which helps verify that it is the native plant, rather than the similar, but alien bittersweet *Celastrus orbiculatis*.

Beware of this alien; it can be particularly invasive and nurseries often sell it instead of the native bittersweet. American bittersweet may retain its fruit throughout the winter. Buy from nurseries or propagate this plant from seed or stem cuttings. Do not dig up wild bittersweet—it is becoming rare in some places. Many birds eat its seeds, including



bluebirds and robins. Grouse, pheasants, turkeys and quail eat the seeds and buds. Leaves are often nibbled by rabbits and squirrels.

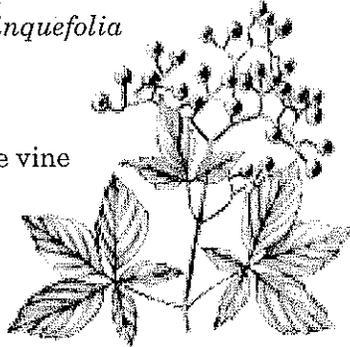
Virginia Creeper

Parthenocissus quinquefolia

Zone 4

Fall food

Look for this native vine creeping along the forest floors, growing up tree trunks in Wisconsin's southern forests, climbing the sides of abandoned farm buildings, growing along roadsides, and trailing along fences. Its striking scarlet autumn foliage and deep blue berries on bright red stalks make it a popular choice for backyard trellises and garden walls. Brown thrashers, bluebirds and robins like the fruit, as do woodpeckers, white-breasted nuthatches and scarlet tanagers. A variety of vireos, warblers, thrushes, finches and small mammals also enjoy the fruit.



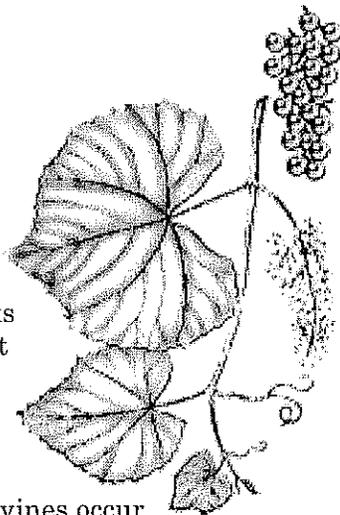
Wild Grape

Vitis species

Zones 3 to 5

Fall food

Wild grapevines grow along woodland edges and up tree trunks or along the forest floor in open woodlands. They also are common growing along fencerows. These vines occur throughout Wisconsin, but are most common in southern farmlands. Summer grape (*Vitis aestivalis*) and riverbank grape (*Vitis riparia*) are two native grapes. Grapes can be very aggressive and cover and shade out other vegetation. The berries are consumed by



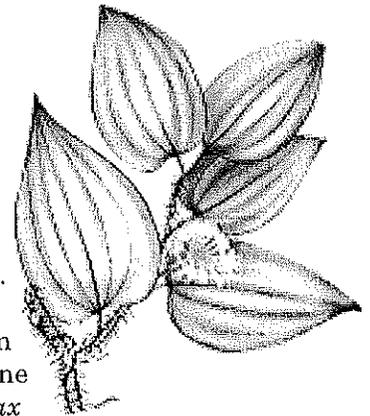
raccoons, red foxes, black bears, opossums, skunks, quail, wild turkeys, ruffed and sharp-tailed grouse, and such songbirds as blue and gray jays, thrushes, brown thrashers, gray catbirds, cedar waxwings, Baltimore orioles, scarlet tanagers, cardinals, and some vireos, warblers, blackbirds, grackles and finches. Deer like the leaves and twigs. Some birds use the shredded bark to build their nests.

Bristly Greenbrier *Smilax hispida*

Zone 5

Summer fruit

This native climbing vine, covered with tiny thorns, forms tangled, prickly thickets in forests throughout the state. Some forms of greenbrier are known as carrion flowers. One carrion flower (*Smilax ecirrhata*) can be found growing in lowland woods in southern Wisconsin, while common carrion flower (*Smilax lasioneura*) is found growing in open woods and along fencerows. Another carrion flower (*Smilax herbacea*) is generally uncommon. The tangled nature of greenbriers make them excellent cover for wildlife. Deer and rabbits browse the vine, and small mammals, ring-necked pheasants, gray catbirds, cardinals, thrushes and sparrows eat the blue-black berries.



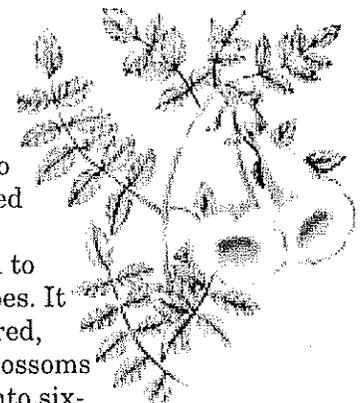
Trumpetvine

Campsis radicans

Zone 5

Summer nectar

This vine, native to the southern United States, makes an attractive addition to backyard landscapes. It has large, orange-red, trumpet-shaped blossoms which later turn into six-



inch-long, slender fruit pods. The blooms of this ornamental landscape plant attract ruby-throated hummingbirds.

2. Shrubs

Blackberry

Rubus

allegheniensis

Black Raspberry

Rubus occidentalis

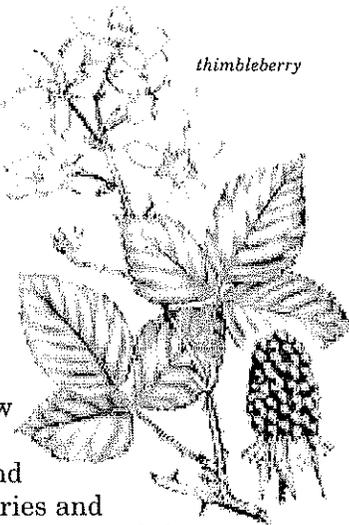
Thimbleberry

Rubus parviflorus

Zones 3 to 4

Summer fruit

Blackberries, raspberries and thimbleberries grow along woodland edges, fencerows and clearings. Blackberries and raspberries grow statewide, while thimbleberries grow only in the Lake Superior region. Blackberries need full sun; raspberries and thimbleberries tolerate some shade. All provide excellent summertime food for more than 100 different kinds of birds and mammals. Just about every kind of woodland edge bird feasts on the berries, from catbirds, brown thrashers, pine grosbeaks, orioles, robins and other thrushes to scarlet tanagers, blue jays, cardinals, pheasants, yellow-breasted chats and fox sparrows. Ruffed and sharp-tailed grouse, bobwhite quail, turkeys and woodcock also consume the berries, as do black bears, raccoons, chipmunks and squirrels. The dense, prickly thickets provide good escape cover for rabbits, chipmunks and birds. Beware of planting these berries in small areas. They tend to spread quite aggressively and can quickly take up a great deal of space, as well as prevent you from moving about in the area.



thimbleberry

Green Alder

Alnus viridis

Speckled Alder

Alnus incana

Smooth Alder

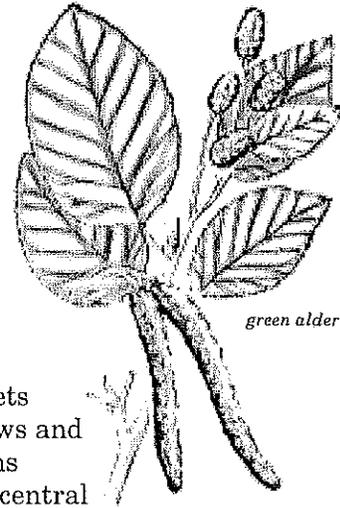
Alnus serrulata

Zones 3 to 5

Spring and summer

food

Alders thrive in thickets found in moist meadows and streambank floodplains throughout northern, central and southern Wisconsin. The green alder is found in bogs, cool woods, and shores. The shrubs can grow to a height of over eight feet. Speckled alder is hardy farther north and tolerates more shade. Green alder is often found growing along lakeshores. Grouse and small mammals take cover in these thickets and woodcock find them ideal for nesting. Goldfinches, pine siskins, redpolls and sharp-tailed grouse eat the seeds, while ruffed grouse consume the buds, catkins and seeds. Beavers, snowshoe hares and deer browse on the leaves and twigs. None of these are ornamental plants. Beware of the alien European alder (*Alnus glutinosa*); it is very invasive.



green alder

Gray Dogwood

Cornus racemosa

Zone 4

Late summer and fall

food

This shrub grows up to 7 feet high on a variety of soils throughout Wisconsin. It needs full sun, and since it regenerates from underground stems, it forms clumps. Gray dogwood has high wildlife value, especially in August when its small, white berries ripen. Woodcock and songbirds take cover in gray dogwood thickets, and evening grosbeaks, cardinals, cedar waxwings, pheasants, ruffed grouse and bobwhite quail relish its fruit. Black



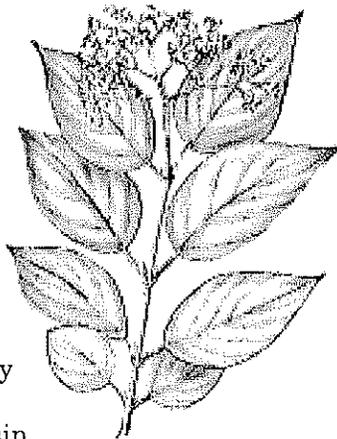
bears, squirrels, beavers, raccoons and skunks eat the fruits and leaves. It can be invasive in prairie areas and can spread aggressively. Controlled burning provides a good management tool. Better yet, cut stems in summer or fall and apply herbicide to the cut stems.

Red-osier Dogwood *Cornus sericea*

Zone 3 to 5

Fall food

This dogwood with bright red stems and showy white flowers is common in swamps and wet meadows, and is a dominant shrub in special habitats known as shrub carrs. It is extremely winter-hardy throughout Wisconsin.



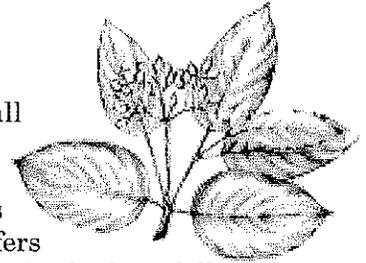
Its colorful appearance makes it a popular ornamental for landscaping. May flowers produce a clump of small white berries by mid-summer. Red-osier dogwood grows from 4 to 10 feet tall on wet to well-drained soils in sun or shade. In late winter and early spring, the stems turn from a brown-red to a bright red, providing an exciting splash of color to an otherwise white, snow-covered landscape. Wild turkeys, ruffed grouse, bobwhite quail, woodpeckers, flycatchers, catbirds, brown thrashers, cedar waxwings, cardinals and grosbeaks feed heavily on the berries. This shrub provides excellent cover, but can spread in wetland areas and needs to be controlled with prescribed burning.

Silky Dogwood

Cornus amomum

Zone 5

Late summer and fall food



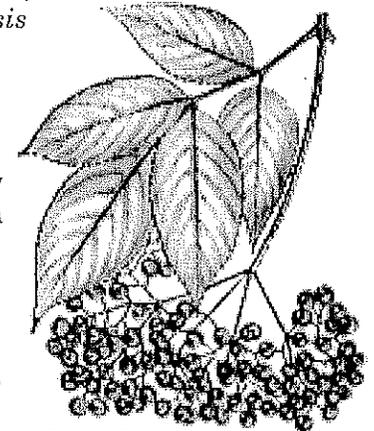
Silky dogwood grows to 4–10 feet tall, prefers moist soils, and grows in shade or full sun along the edges of marshes or wet meadows. Landowners like the white flowers that bloom in May and mature into blue berry-like fruits in August. Silky dogwood is prime food for the cardinal, evening grosbeak, robin and pine grosbeak, which glean the berries off by September. Wild turkeys, ruffed grouse, bobwhite quail and ring-necked pheasants relish both the buds and the berries. Deer, squirrels, black bears and beavers browse on the stems and leaves.

Common Elderberry

Sambucus canadensis

Zone 5

Summer food



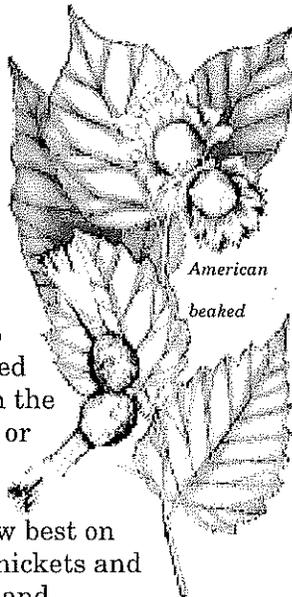
Elderberry is a tall shrub that can grow up to 10 feet high in average to moist soils statewide except in the far north, in disturbed areas like roadsides and fencerows. The fruits are eaten by people and wildlife. Beware—the red fruits from the related *Sambucus pubens* can be toxic. The showy white flowers of common elderberry make this a landscape shrub to consider. However, it has straggly long stems and relatively few leaves. It makes a good ornamental if bunched with other shrubs. Eastern bluebirds, ring-necked pheasants, wild turkeys, mourning doves, grouse, grosbeaks, woodpeckers, squirrels and rabbits eat the fruits; white-tailed deer browse on the leaves.

American Hazelnut*Corylus americana***Beaked Hazelnut***Corylus cornuta*

Zones 3 to 4

Fall and winter food

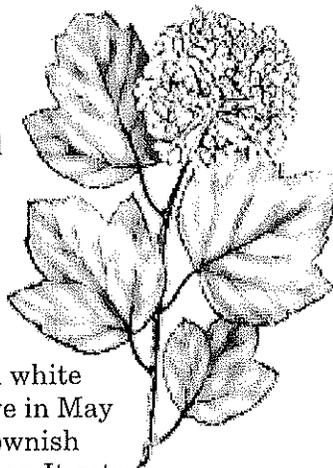
If you live north of the tension zone, (see map on page 3), plant beaked hazelnut; if you live on the south side of the zone, or in dry, sandy woods, plant American hazelnut. These bushes grow best on moist, fertile soils in thickets and make good hedgerows and woodland border plants. Hazelnuts are consumed by fox and red squirrels, eastern and least chipmunks, blue jays, hairy woodpeckers, wild turkeys and ring-necked pheasant. Ruffed grouse readily ingest the catkins. Deer, moose, snowshoe hares and beavers eat the leaves and twigs. The dense thickets make good cover for woodcock, grouse and small mammals.

**Ninebark***Physocarpus**opulifolius*

Zones 3 to 5

Fall and winter food

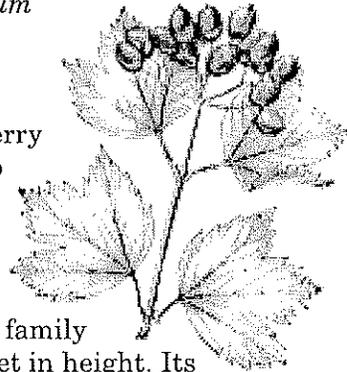
Ninebark is a good choice for very dry sites and is found from blufftop "goat prairies" to sedge meadows. The small white flowers are attractive in May and develop into brownish capsules in September. It gets its name because its bark peels off in papery strips resembling "9s." This shrub may reach 10 feet high at maturity. Ruffed grouse eat the buds and some songbirds eat the small seeds. The primary wildlife value of ninebark is the cover its multi-stemmed, arching branches provide to small mammals and nesting birds.

**American Highbush Cranberry***Viburnum trilobum*

Zones 3 to 5

Winter Food

Highbush cranberry grows in moist to medium-moist woods but it can tolerate full sunlight. This shrub in the Viburnum family reaches 10–13 feet in height. Its attractive white flower clusters in May turn into bright orange-red fruits by September, making it a popular landscape shrub. The tart fruits are not very palatable to most birds and so persist on the shrub throughout winter. They provide a late-winter emergency food source for songbirds, grouse, pheasants, wild turkeys, white-tailed deer, cottontail rabbits and small mammals. Rabbits and small rodents eat the bark of young plants. Cedar waxwings prefer these berries as a late winter food after freezing has "sweetened" them. Be sure not to plant the alien European highbush cranberry (*Viburnum opulus*), for it is an invasive and persistent non-native.

**Nannyberry***Viburnum lentago*

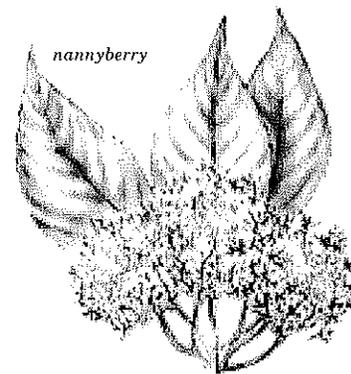
Zone 3

Mapleleaf**Viburnum***Viburnum**acerifolium*

Zone 3

Arrowwood*Viburnum dentatum*

Zone 4

Late summer, fall,
and winter food

These are three other popular Viburnums. Arrowwood and nannyberry grow best in the shade of woodland borders across southern Wisconsin. Mapleleaf viburnum is a three- to six-foot shrub preferring forest shade. They are planted in backyards for their flowers and

showy dark blue-to-black fruits. Nannyberry makes excellent winter food. Ruffed grouse, brown thrashers, cedar waxwings, thrushes, woodpeckers, several finches, red squirrels and deer eat the fruit of these *Viburnum* shrubs.

Staghorn Sumac

Rhus typhina

Smooth Sumac

Rhus glabra

Fragrant Sumac

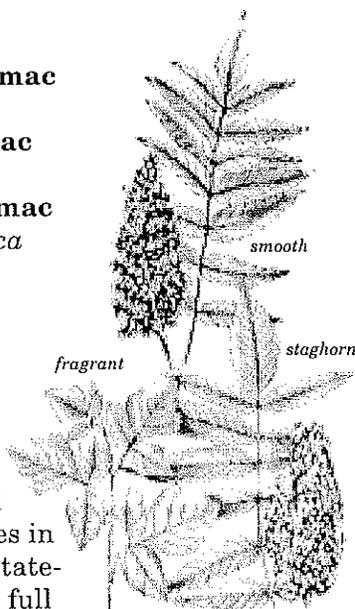
Rhus aromatica

Zone 4

Winter food

Sumacs form thickets along roadsides, clearings, fencerows and woodland edges in sandier soils statewide. All need full sun. Staghorn sumac

has brilliant scarlet foliage in the fall and showy red fruit throughout winter. Sumac is beneficial for a variety of wildlife; however, you should consider carefully before establishing these shrubs if they are not presently on your property. Smooth and staghorn sumacs grow rapidly in spreading, circular colonies, and spread as well by seed; it can be difficult to control once established. Fragrant sumac is a beautiful landscape plant, and is adapted to dry-to-average, moist rocky woodlands. Sumac fruit clusters are an important winter survival food for ring-necked pheasants, ruffed grouse, bobwhite quail, woodpeckers, blue jays, chickadees, cardinals, goldfinches, deer and cottontail rabbits. Deer, cottontails and squirrels nibble on the bark and twigs. In addition, staghorn sumac attracts butterflies.



Wild Rose

Rosa species

Zones 3 to 5

Winter Food

Wild roses grow in thickets in meadows, open woods, stream margins, fencerows, roadsides and woodland edges across the state. Too many varieties exist to mention individually. Most have beautiful flowers, and their rosehips are eaten as emergency winter food by ring-necked pheasants, sharp-tailed grouse and prairie chickens. Deer, cottontail rabbits and small mammals browse the twigs. If you intend to plant wild roses, **do not plant** the alien multiflora rose (*Rosa multiflora*). This invasive non-native is illegal to plant under the Wisconsin nuisance weed law because it is very aggressive and spreads rapidly.



3. Fruit-bearing Trees

Prairie Crabapple

Pyrus ioensis

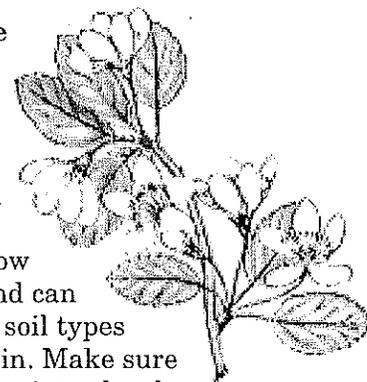
Sweet Crabapple

Pyrus coronaria

Zone 5

Fall and winter food

Some crabapples grow up to 25 feet high and can be planted on many soil types throughout Wisconsin. Make sure the tree you plant is winter hardy in your area. The alien Siberian crab (*Malus baccata*) is a large crab hardy throughout Wisconsin. It occasionally escapes to the wild. The Sargent crab (*Malus sargentii*) is also an alien. It produces abundant white to pink blossoms in May. The tiny 1/4 inch red, yellow or orange fruits mature in September. Landowners cherish crabapples for their fragrant and colorful spring blossoms, and wildlife also consume the fruit. Crabapples



make good winter food. Nearly 30 different kinds of birds eat the small apples, including cedar waxwings and robins. White-tailed deer and mallard ducks will also eat fruit that has fallen on the ground. Cottontail rabbits and deer will nibble on the leaves and bark.

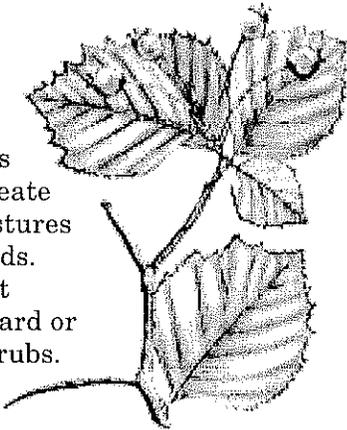
Hawthorn

Crataegus species

Zone 5

Winter food

These thorny trees or large shrubs create thickets in old pastures and open woodlands. They make a great shelterbelt, backyard or woodland edge shrubs. Numerous kinds of hawthorns are native to Wisconsin. Be sure to avoid the cultivars. In spring, honeybees and bumblebees swarm to the sweet-smelling, nectar-rich blossoms. In winter, fruits provide food for ruffed and sharp-tailed grouse, cedar waxwings, fox sparrows, thrushes and finches. Black bears and raccoons also consume the fruits, while white-tailed deer and cottontail rabbits browse on the twigs and bark. Many animals take cover in the thickets that hawthorns form. Brown thrashers often find these shrubs to be prime nest sites, and northern shrikes use the thorns to impale their prey before feeding.



Black Cherry

Prunus serotina

Pin Cherry

Prunus pensylvanica

Choke Cherry

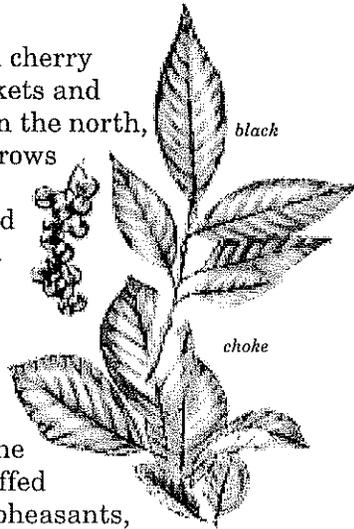
Prunus virginiana

Zones 3 to 4

Summer food

Black cherry grows most commonly in southern hardwood forests. This is the largest cherry and can reach 75 feet in height. Pin cherry and choke cherry reach approximately

25 feet in height. Pin cherry grows in woods, thickets and clearings primarily in the north, while choke cherry grows along thickets, woodland borders and shorelines statewide. All native cherries make good plantings around the border of your yard. Cherries are one of the best wildlife food trees. The fruit is favored by ruffed grouse, ring-necked pheasants, robins, brown thrashers, gray catbirds, blue jays, cedar waxwings, thrushes, vireos, grosbeaks, finches, flycatchers and red-bellied and red-headed woodpeckers. Black bears, red foxes, cottontail rabbits, raccoons, squirrels, eastern chipmunks and mice eat fruit that has fallen to the ground. Deer and rabbits nibble on the leaves and twigs. Do not plant where cattle graze since the bark and leaves contain hydrocyanic acid, which is a poison to livestock.



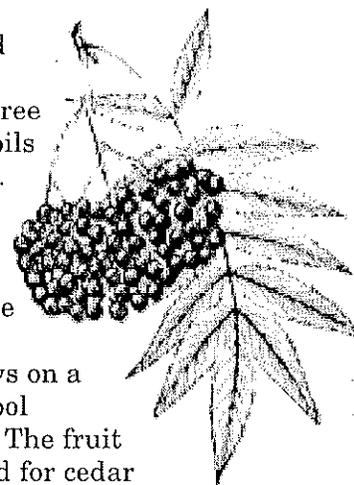
American Mountain Ash

Sorbus americana

Zone 3

Fall and winter food

In Wisconsin, this tree is found on moist soils or shallow dry soils. Attractive leaves, blossoms and bright orange fruit make this small tree popular with landowners. It grows on a variety of soils in cool climates statewide. The fruit provides winter food for cedar waxwings, evening and pine grosbeaks, sharp-tailed and ruffed grouse, red-headed woodpeckers, and thrushes. Watch for tipsy birds as they get intoxicated on fermented berries in late winter. Protect new plantings from deer or they'll nip the



tender twigs and leaves. Mountain ash also attracts eastern tent caterpillars and is very susceptible to fire blight disease. Avoid the alien European Mountain Ash (*Sorbus acuparia*), which is non-native and can be invasive.

Wild Plum

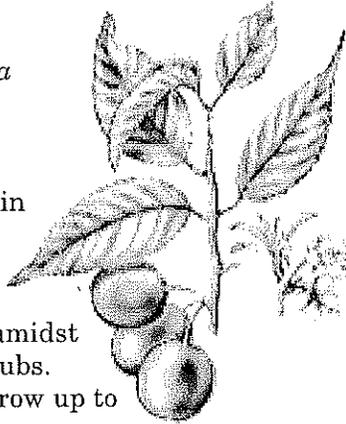
Prunus americana

Zone 3 to 5

Fall food

Wild plum grows in dense thickets along sunny roadsides and fencerows, often amidst other trees or shrubs.

Individuals can grow up to 15 feet tall. Landowners like the white blossoms that bloom in May. The one-inch, red-orange to blue sweet plums mature in August. Avoid cultivars and exotics. Wild plums provide excellent nesting habitat for many songbirds and cover for small mammals. Foxes and other mammals eat the fruit and deer browse on the leaves and twigs. The fruit also makes excellent jelly and jam.



Eastern Serviceberry or Shadbush

Amelanchier canadensis

Downy Serviceberry

Amelanchier arborea

Smooth Serviceberry

Amelanchier laevis

Zones 3 to 5

Early summer food

Serviceberries are also referred to as Juneberry or shadbush.

Eastern serviceberry can be found in swamps and moist woods in Wisconsin. The downy serviceberry grows in dry upland woods, while the smooth serviceberry prefers dry or moist upland woods. These small trees are known for their delicate white flowers and delicious fruit. Serviceberry bears fruit in late June, making



it one of the earliest summer berries. Several native varieties provide a good selection for landowners. Robins and other thrushes, woodpeckers, eastern kingbirds, cedar waxwings, Baltimore orioles, scarlet tanagers, red-eyed vireos, cardinals and rose-breasted grosbeaks relish the sweet, purple fruit, as do fox and gray squirrels, eastern chipmunks and black bears. White-tailed deer and cottontail rabbits browse the leaves and twigs. The fruit tastes and can be used much like blueberries.

Red Mulberry

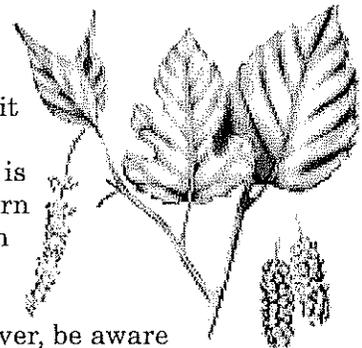
Morus rubra

Zone 5

Early summer fruit

The red mulberry is a native to southern Wisconsin and can be found in rich woods, especially floodplains. However, be aware that this wildlife tree's fruit can be messy and can stain sidewalks and cars in urban areas. The tree is particularly abundant in farmyards and even in cities and suburbs. An excellent fruit-bearer, the red mulberry is attractive to many kinds of wildlife.

Songbirds from Baltimore orioles, robins, rose-breasted grosbeaks, blue jays and crows to brown thrashers, cedar waxwings, scarlet tanagers, indigo buntings, woodpeckers, vireos and finches quickly consume the large, juicy fruits that ripen so early in summer before most other berries. Raccoons and opossums also gorge on the plentiful harvest. Avoid the invasive alien white mulberry (*Morus alba*).

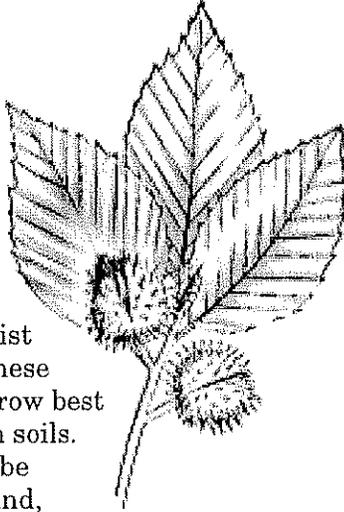


4. Nut-bearing Trees

Beech

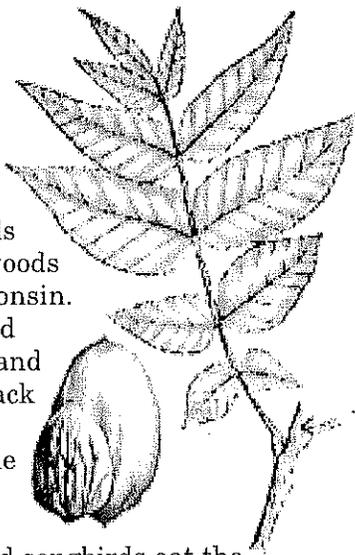
Fagus grandifolia
Zone 3
Fall and winter
food

Beech trees grow near Lake Michigan where the lake creates the cool, moist environment that these trees prefer. They grow best on good quality, rich soils. While beeches may be planted farther inland, hard winter freezes may kill them. This tree is beautiful in fall and its nuts provide excellent wildlife food for squirrels, chipmunks, bears, porcupines, grouse and many songbirds such as blue jays, chickadees, tufted titmice, blackbirds and woodpeckers. The nut crop is large about every 2 or 3 years.

**Butternut**

Juglans cinerea
Zones 3 to 5
Fall food

This hardy tree grows on rich soils with other hardwoods in southern Wisconsin. Woodpeckers, wild turkeys, and fox and gray squirrels crack open the tough shells to get at the tasty butternuts inside. Wood ducks, finches and songbirds eat the buds. Keep a watchful eye on these trees, they are very susceptible to Butternut canker disease. For more information on this disease or other forest diseases, contact DNR's forest pathology office at (608) 275-3273. An extensive search is underway to find butternut trees resistant to the canker disease, so please

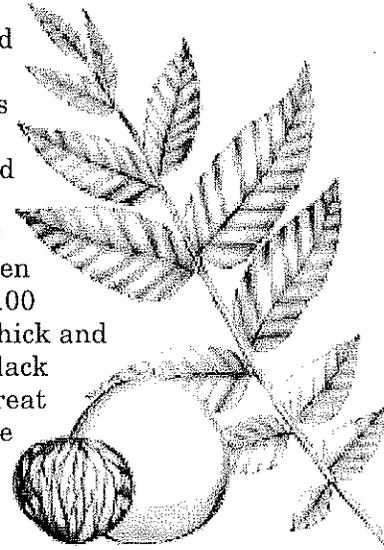


report the existence of **uncankered** mature trees to this same contact.

Black Walnut

Juglans nigra
Zones 4 to 5
Fall and winter food

Black walnut trees grow mainly in southern hardwood forests on deep, well-drained, silty loam soils, and often reach a height of 100 feet. Despite the thick and coarse bark, the black walnut makes a great cavity and den tree for a variety of animals. They're also highly valued for their wood. Fox and gray squirrels and red-bellied woodpeckers crack the very hard nuts of black walnut to get at the nutmeat inside. Squirrels bury the nuts in the fall and make use of them in early spring when the ground thaws. Avoid planting black walnuts near vegetable gardens; they secrete juglantic acid into the soil which inhibits plant growth, especially those plants in the tomato-potato family.



Shagbark Hickory

Carya ovata

Bitternut Hickory

Carya cordiformis

Zone 5

Fall and early winter food

Shagbark hickory grows in southern Wisconsin on fertile soils. It is slow growing, long-lived and may reach a height of 100 feet. When its leaves turn deep yellow in fall, many people collect the tasty nuts. Bitternut hickory is found statewide in association with other hardwood trees, and reaches a maximum height of around 75 feet. The nuts of the bitternut hickory are just that—bitter. Shagbark and bitternut hickories produce large nuts that are a favorite of fox and gray squirrels, eastern chipmunks and red-bellied woodpeckers. Wood ducks, ring-necked pheasants, bobwhite quail, wild turkeys, red foxes and black bears also consume these small, hard-shelled nuts. Deer browse the leaves and twigs.



White Oak

Quercus alba

Bur Oak

Quercus macrocarpa

Swamp White Oak

Quercus bicolor

Red Oak

Quercus rubra

Black Oak

Quercus velutina

Northern Pin Oak

Quercus ellipsoidalis

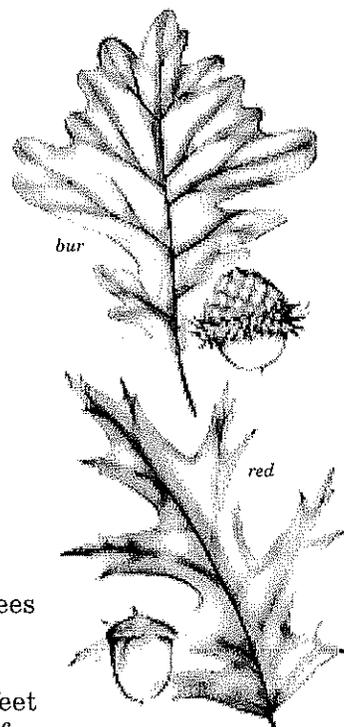
Zones 4 to 5

Fall and winter food

Oaks are considered one of the most important wildlife trees in Wisconsin. These slow growers vary in height from 45–100 feet and have very long life spans.

Though found statewide, red oak is more common on better soils. White oak and black oak grow in dry to average-moisture forest soils statewide. The bur oak is found in the average to dry soils of southern Wisconsin prairies and savannas. The less common northern pin oak is found mostly in northern Wisconsin forests on sandy soils. Swamp white oak is common in the floodplains along the Mississippi and Wisconsin rivers and their tributaries. Northern pin, black, and red oaks are susceptible to oak wilt if it is in the area. Larger oaks are difficult to transplant, so your best bet is to plant them as acorns or young seedlings. Protect the seedlings from browsing rabbits and deer. All oaks provide excellent wildlife benefits.

Grouse, wood ducks, quail, wild turkeys, blue jays, white-breasted nuthatches, thrushes, rufous-sided towhees, brown thrashers, red-headed and red-bellied woodpeckers, yellow-shafted flickers, grackles, black bears, raccoons, gray, fox, flying and red squirrels, deer, eastern chipmunks, white-footed mice and many other animals feast on acorns each fall. Oak trees also make good den trees for cavity-dwelling birds and mammals.



5. Other Deciduous Trees

Green Ash*Fraxinus pennsylvanica***White Ash***Fraxinus americana***Black Ash***Fraxinus nigra*

Zones 3 to 4

Fall and winter food



Ashes are fast-growing, moderately shade-tolerant trees found in hardwood stands statewide.

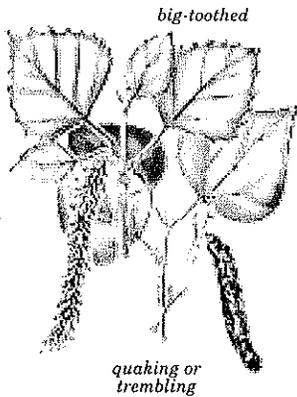
Growing up to 90 feet at maturity, they make great shade trees, especially on rich, moist soils. Plant black ash in floodplains in low, swampy sites; white ash in upland areas; green ash in either place. If you're planting green or white ash, avoid all cultivars.

Interestingly, ashes are either male or female trees and only the females produce seeds. It is difficult to tell the males from females when the trees are seedlings. Ash seeds are a preferred food of pine grosbeaks in winter; flocks alight on trees and strip the seed-wing off to get at the kernel inside. Ashes provide a supplementary source of nutrition for red foxes, snowshoe hares and opossums. Beavers and deer browse on tender twigs and stems. Porcupines will eat the bark.

Big-Toothed Aspen*Populus**grandidentata***Quaking Aspen***Populus tremuloides*

Zones 1 to 4

Winter and spring food



Quaking and big-toothed aspen grow rapidly on average to dry soils statewide, though they are more common in the north. Aspen, also called poplar or popple, grows up to 60 feet and reaches maturity at 50 years, after which it rapidly declines and can make a good cavity

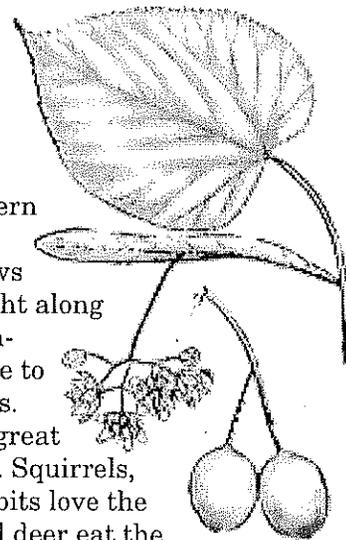
tree long before other hardwood trees. Avoid planting the alien weedy white or silver poplar (*Populus alba*) and the disease-prone Lombardy poplar (*Populus nigra italica*). Aspen is the favorite food of many animals, especially deer, grouse and beavers. Prairie chickens, sharp-tailed and ruffed grouse and northern finches feast on the resinous buds and catkins. White-tailed deer, snowshoe hares, porcupines and beavers browse on leaves and young stems. To regenerate aspen, clearcut an existing aspen stand—the trees are shade intolerant and regenerate very well by root sprouts. Aspen are short-lived and their soft, punky wood is used by woodpeckers and chickadees for nest cavities. The trunks and branches of aspen are important for beaver when building their dams and lodges. Do not plant aspen near prairies or savanna areas; the trees will spread and out-compete prairie vegetation. Excessive spread of aspen is best controlled by girdling.

Basswood*Tilia americana*

Zones 3 to 5

Summer food

Basswood is a component of northern and southern hardwood stands. It grows up to 80 feet in height along well-drained bottomlands and in average to moist woodland soils. Basswood makes a great den tree for wildlife. Squirrels, chipmunks and rabbits love the nutlets. Rabbits and deer eat the leaves and tender twigs.



Yellow Birch

Betula alleghaniensis

Paper Birch

Betula papyrifera

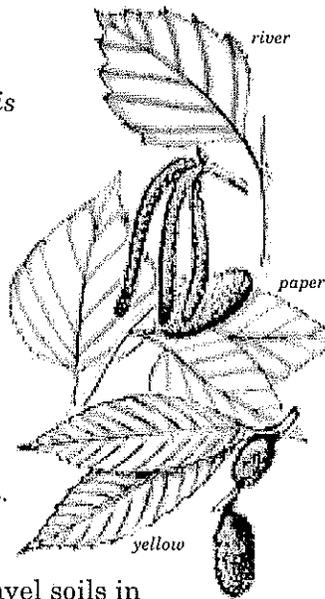
River Birch

Betula nigra

Zones 3 to 4

Fall and winter food

Yellow birch, which grows on moist soil types in northern Wisconsin, reaches heights up to 85 feet. Paper birch, found statewide on better quality sand and gravel soils in association with pine and aspen, grows to 65-70 feet in height. Paper birch is planted widely for its attractive papery white bark, but it is susceptible to numerous diseases and such insects as the bronze birch borer. River birch, with its bronze papery bark, grows along the floodplains of the Mississippi and Wisconsin rivers and their tributaries. All birches provide good browse for white-tailed deer and moose. The shreddy bark provides nest material for vireos, warblers and tanagers. Ruffed and sharp-tailed grouse feed on the catkins, buds and seeds, while the pine siskin and common redpoll consume the seeds. Beavers, snowshoe hares and porcupines prefer to eat leaves and stems. Chickadees, titmice and several woodpeckers use dead or dying birch for nesting cavities.



American Elm

Ulmus americana

Slippery (Red) Elm

Ulmus rubra

Rock Elm

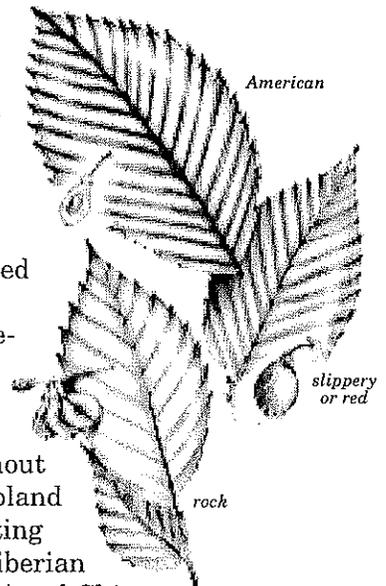
Ulmus thomasii

Zone 3

Late winter and early spring food

American and rock elm trees can reach 100 feet in height, while slippery elms generally only reach a height of 70 feet. Slippery elm is found statewide along streambanks and fertile hillsides, though it is rare in the north.

American elm is found statewide in rich moist soils, especially in floodplains, but Dutch Elm disease has significantly reduced its numbers. New varieties of disease-resistant elms have been developed. Rock elm is also found throughout the state in rich upland woods. Avoid planting the alien, weedy Siberian elm (*Ulmus pumila*) and Chinese elm (*Ulmus parvifolia*). Elm buds and winged seeds are used by various songbirds, gamebirds and squirrels, especially since the seeds ripen early in spring, long before other seeds are available. Wild turkeys, ring-necked pheasants, bobwhite quail, sharp-tailed grouse, prairie chickens, wood ducks, and songbirds such as black-capped chickadees and purple finches favor the seeds and buds. Gray and fox squirrels eat the swollen buds in early spring. Beavers and cottontail rabbits consume the bark off of tender twigs. Baltimore orioles often select elms from which to weave their pendulous nests.



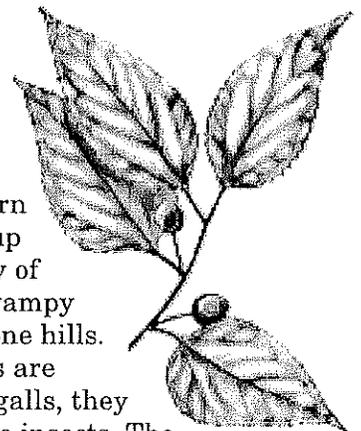
Hackberry

Celtis occidentalis

Zone 5

Fall and winter food

This native of southern Wisconsin can grow up to 75 feet on a variety of soils ranging from swampy floodplains to limestone hills. Although hackberries are susceptible to insect galls, they are not harmed by the insects. The hackberry fruit is a winter food source for cedar waxwings, yellow-bellied sapsuckers, brown thrashers, robins, finches and thrushes. Gray foxes, opossums and flying squirrels also eat the fruits.

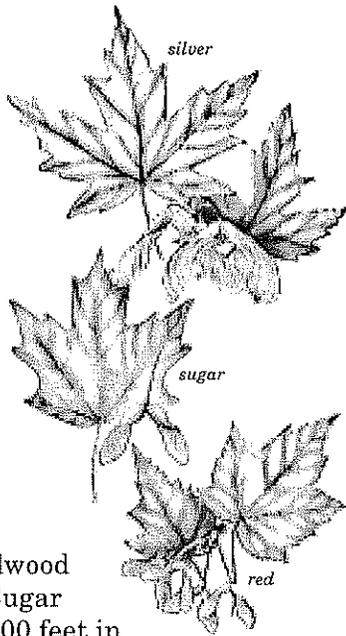


Sugar Maple*Acer saccharum***Red Maple***Acer rubrum***Silver Maple***Acer saccharinum*

Zones 3 to 4

Spring and fall
food

Sugar and red maples, noted for their stunning fall foliage and cooling shade, are common components of hardwood stands statewide. Sugar maple grows over 100 feet in height on fertile soils. Red maple, reaching up to 65 feet tall, can be found not only on fairly infertile, dry hillsides but also in low wet forests. Fast-growing, weak-wooded silver maples are found growing in floodplains and other moist soils in Wisconsin. They reach a maximum of 100 feet in height. Avoid planting the invasive, non-native Norway maple (*Acer platanoides*) and the alien Amur maple (*Acer ginnala*) and all cultivars. Sugar maple, also known as "hard maple," produces its winged "helicopter" seeds in summer and fall. Silver and red maple, referred to as "soft maples," bear their seeds in spring and early summer. Evening grosbeaks, pine grosbeaks, purple finches and red-breasted nuthatches eat the seeds, buds and flowers of the maple. Porcupines gnaw on the bark, while red, gray and fox squirrels and eastern chipmunks store and eat the winged seeds. Prairie warblers nest in 3-6 foot tall red maples. White-tailed deer browse heavily on twigs and leaves. Maples also make great, long-lived cavity trees.

**Boxelder***Acer negundo*

Zone 3 to 5

Summer food

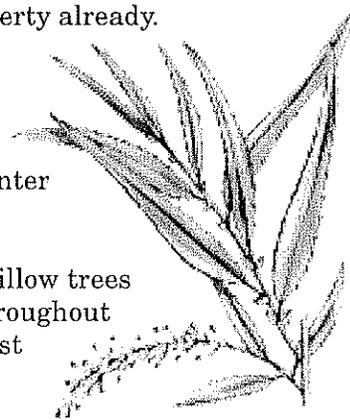
You'll find boxelder growing up to 50 feet high along fencerows and old farmsteads, primarily in southern Wisconsin's prairie savanna region as well as along floodplains. It is an ungainly tree with brittle branches. Female trees produce huge seed crops that mature in late summer and persist through winter. Evening grosbeaks, finches and other songbirds eat the seeds, buds and flowers of the boxelder. Deer and squirrels browse on its leaves. These trees also attract boxelder beetles that will often seek out the warmth in your house come fall; however, they are not harmful to the trees or your home. Boxelder's fast-growing, weak wood frequently forms cavities that make good dens for flying squirrels, gray and fox squirrels, raccoons and woodpeckers. Although boxelder has some good wildlife attracting qualities, we don't recommend planting this weedy, invasive tree if you don't have it on your property already.

**Willow***Salix* species

Zones 3 to 5

Summer browse-winter
food

Many varieties of willow trees and shrubs grow throughout Wisconsin. These fast growers are often planted near water where they range in height from shrubs to tall trees. Most have very weak wood. The buds and twigs are eaten by grouse and deer, while grosbeaks eat just the buds. Beavers and snowshoe hares nibble on the bark, buds and twigs. Be aware that the familiar weeping willow (*Salix babylonica*) is not native to Wisconsin.



6. Evergreens

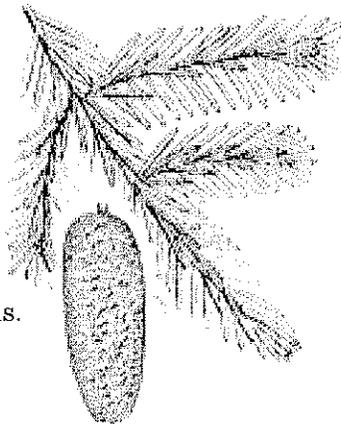
Balsam Fir*Abies balsamea*

Zone 3

Fall and winter food

A tree of northern forests, balsam fir prefers cool, moist, shady places out of reach of strong winds. Its soft needles and symmetrical shape make it a popular Christmas tree choice.

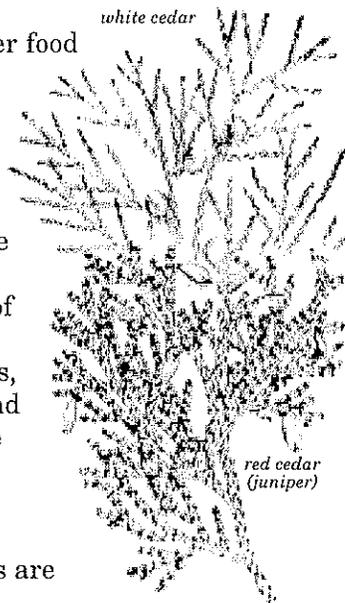
Mature trees reach 60 feet and are very long-lived, though they are susceptible to spruce bud worm and balsam woody aphid. Balsam fir stands make good cover for many birds and small mammals. Seeds are nibbled by the black-capped chickadees, red-breasted nuthatches, blue jays and red crossbills. Seeds, bark and wood are gnawed by red squirrels, voles, mice, snowshoe hares and eastern chipmunks. White-tailed deer, moose and spruce grouse also browse on the twigs of balsam fir.

**Northern White Cedar or "Arbor Vitae"***Thuja occidentalis*

Zone 3

Fall and early winter food

A popular deer food, white cedar grows in northern Wisconsin swamps where it forms dense stands. This tree is rare in other areas of the state unless planted. Pine siskins, common redpolls, and red squirrels eat the winged seeds of this long-lived tree that grows up to 60 feet. White cedar swamps are



critical overwinter habitat for deer in northern Wisconsin. Because white cedar is a favorite browse of deer, these mammals are preventing natural regeneration in many areas.

Eastern Red Cedar*Juniperus virginiana*

Zone 4

Fall, winter and spring food

Red cedar grows on dry, gravelly soils and rocky ledges in southwestern Wisconsin. It is also common in abandoned farm fields, fence-rows and along country roadsides. These evergreens reach up to 60 feet in height, forming dense cedar glades. Red cedar provides cover for the robin, chipping sparrow, junco and a variety of warblers. Cedar waxwings, evening and pine grosbeaks, purple finches, eastern chipmunks and white-footed mice prefer the bluish-black, berry-like fruit. Deer will eat twigs and leaves of red cedar. If planted as an ornamental, be aware that red cedar is an alternate host for cedar rust, which damages crabapple trees. Many ornamental varieties of cedar exist and should be avoided. Be aware that cedars can shade out prairie vegetation and any ground flora in yards, and will spread rapidly. They should be aggressively controlled in native prairie areas by cutting.

Hemlock*Tsuga canadensis*

Zone 4

Fall and winter food

A stately, tall tree, the hemlock occurs in the northern forests of Wisconsin. It prefers cool, moist, heavily-shaded less-disturbed forests with rich soils. Hemlock can reproduce under the shade of evergreen and hardwood forests, and at maturity can reach a height of 100 feet. Hemlock is a highly valued wildlife food. Deer prefer hemlock and will heavily



browse the branches and tips, seriously limiting the trees' growth and reproduction, especially of those trees located near deer wintering yards. Dense branches provide cover for ruffed grouse, white-tailed deer and warblers such as black-throated green warbler and blackburnian warbler. The slate-colored (dark-eyed) junco, goshawk, raven and other wildlife of northern Wisconsin find refuge amongst its boughs. Pine siskins, crossbills and boreal chickadees eat the seeds, while porcupines enjoy the bark, twigs and seeds.

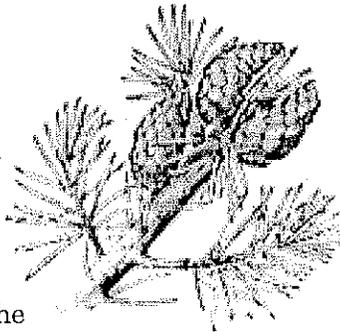
Jack Pine

Pinus banksiana

Zones 3 to 5

Fall and winter food

This sun-loving conifer can be found growing on the sandy soils of the northern half of Wisconsin and along the Wisconsin River in the south. It can reach 70 feet in height at maturity. It requires fire to release seeds from the tightly closed cones. Jack pine makes great cover for songbirds, deer, rabbits and small mammals. The red squirrel, pine siskin and purple finch eat the seeds once released by fire.



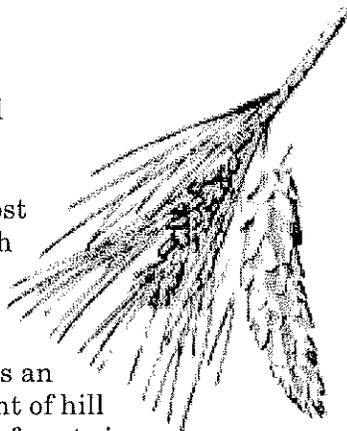
White Pine

Pinus strobus

Zones 3 to 5

Fall and winter food

White pine grows statewide, but is most common in the north where majestic individuals can reach 150 feet in height. White pine is an important component of hill and rocky bluff pine forests in south central and southwest Wisconsin. It prefers fertile, well-drained soils, but can tolerate sandy soils. This fast-growing conifer is often planted as an ornamental



near houses, as well as planted in shelter-belts. Young pine stands provide good thermal cover during winter for deer and birds. Seeds are eaten by red squirrels, mice, chickadees, red-breasted nuthatches, woodpeckers, grosbeaks, pine warblers, brown creepers, pine siskins and crossbills. Deer and spruce grouse nibble the needles. Beavers and snowshoe hares consume the bark. Large white pines provide roosts for wild turkeys and ruffed grouse, and nesting sites for ospreys and eagles.

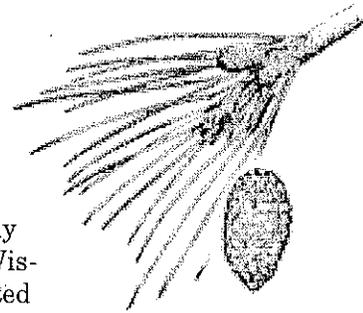
Red Pine

Pinus resinosa

Zones 3 to 5

Fall and winter food

Red pine grows in pure stands in many parts of northern Wisconsin and in isolated stands as far south as Dane County. These conifers occasionally reach 120 feet in height, but are generally only 90 feet tall. Because of its general freedom from disease and insect attacks, red pine is frequently planted in pine plantations. Such plantations have little value to wildlife because of a lack of understory growth. Nevertheless, as a small conifer, these trees can provide thermal shelter to wildlife in winter. Seeds are eaten by red squirrels, mice, chickadees, red-breasted nuthatches, woodpeckers, grosbeaks, pine warblers, brown creepers, pine siskins and crossbills. Ospreys and eagles nest in large red pines.



White Spruce

Picea glauca

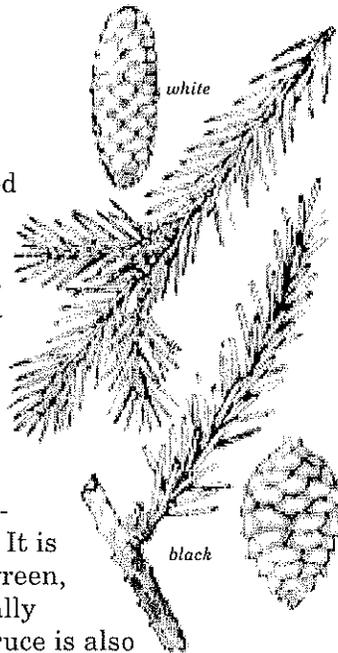
Black Spruce

Picea mariana

Zone 3

Fall and winter food

White spruce grows up to 80 feet high on moist well-drained soils in northern forests. It can also be found in mixed conifer-hardwood stands and balsam-tamarack swamps. It is an attractive evergreen, planted ornamentally statewide. This spruce is also planted for shelterbelts and plantations. Black spruce grows only in wet northern forests, including bogs, and reaches up to 60 feet tall. It is often associated with tamarack, balsam fir and white spruce. Both spruces have dense branches, which they retain low to the ground. This provides some of the best winter cover for songbirds and rabbits, and nesting cover for songbirds in spring. Woodpeckers, chickadees, red-breasted nuthatches, grosbeaks, finches and crossbills glean the winged seed from the cones. Porcupines browse on twigs and bark. Woodpeckers, thrushes, kinglets, warblers and finches nest amidst the boughs. Spruce grouse and snowshoe hares feed heavily on the needles. As a last resort in hard winters, deer will browse on spruce twigs and needles.



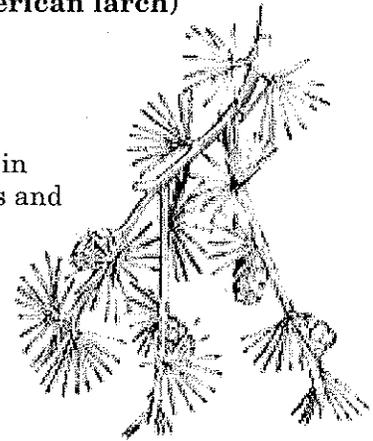
Tamarack (American larch)

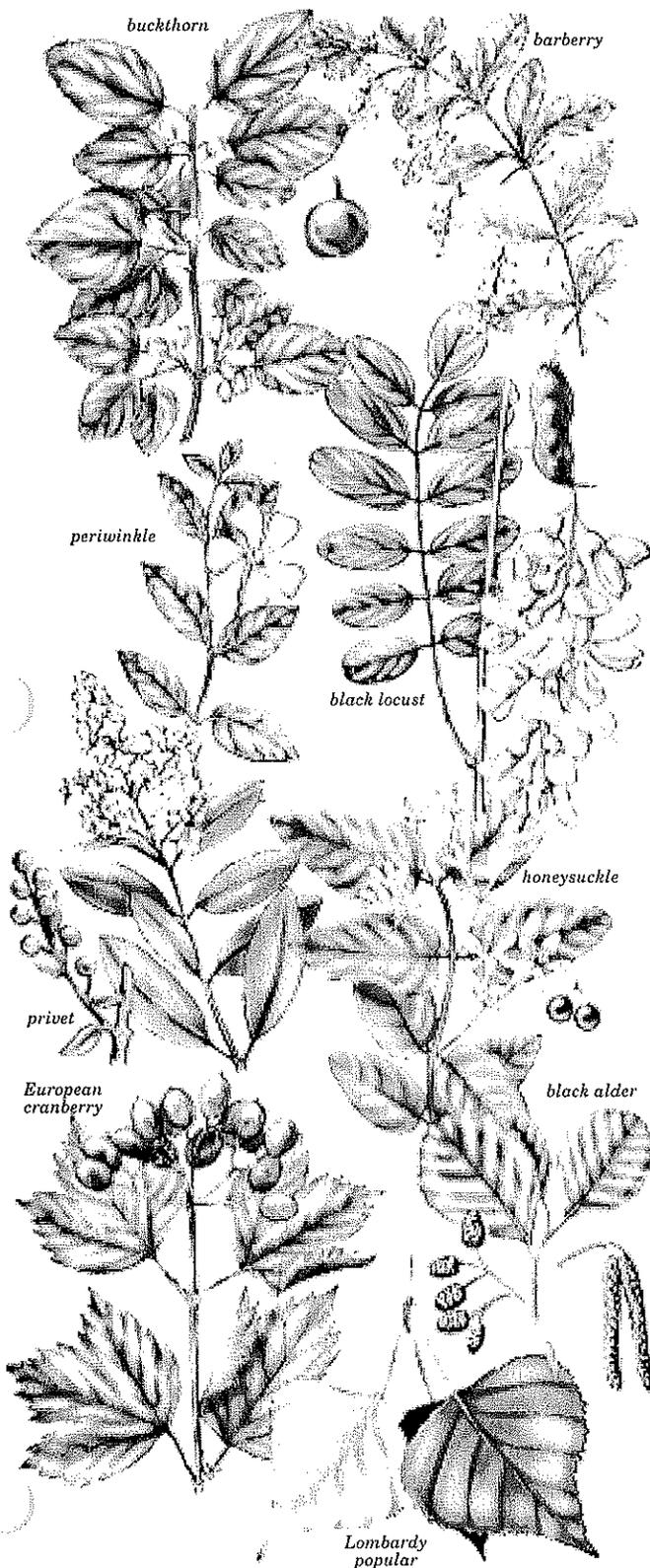
Larix laricina

Zone 3 to 5

Fall food

Tamarack grows in northern swamps and in scattered southern lowlands that have wet soils. It will not do well if planted on upland sites. It is Wisconsin's only conifer that sheds its needles each fall, after the needles turn a bright golden color that stands out in stark contrast to neighboring spruces. Songbirds eat the seeds of the tamarack. This tree will not survive in upland areas.





Plants to Avoid

The following plants and their cultivars have the potential to invade wild areas and out-compete native species, degrading habitats and causing extensive ecological damage.

Trees

common buckthorn (*Rhamnus cathartica*)
 glossy/columnar buckthorn (*Rhamnus frangula*)
 European Mountain Ash (*Sorbus aucuparia*)
 Amur maple (*Acer ginnala*)
 Norway maple (*Acer platanoides*)
 black locust (*Robinia pseudoacacia*)
 Chinese elm (*Ulmus parviflora*)
 Siberian elm (*Ulmus pumila*)
 European or black alder (*Alnus glutinosa*)
 white poplar (*Populus alba*)
 Lombardy poplar (*Populus nigra italica*)

Shrubs

all bush honeysuckles (*Lonicera tatarica*,
L. x bella, *L. morrowii*, *L. aackii*)
 Japanese barberry (*Berberis thunbergii*)
 European barberry (*Berberis vulgaris*)
 multiflora rose (*Rosa multiflora*)
 European cranberry bush (*Viburnum opulus*)
 common privet (*Ligustrum vulgare*)
 burning bush/winged euonymus
 (*Euonymus alatus*)
 autumn olive (*Elaeagnus umbellata*)
 Russian olive (*Elaeagnus angustifolia*)
 smooth sumac (*Rhus glabra*)

Vines

round-leaved bittersweet (*Celastrus orbiculatus*)
 wintercreeper (*Euonymus fortunei*)
 Japanese honeysuckle (*Lonicera japonica*)
 porcelain berry (*Ampelopsis brevipedunculata*)
 periwinkle (*Vinca minor*)
 English ivy (*Hedera helix*)

