Ecological Assessment & Management Plan
~
Conservancy Parks & Storm Water Management Areas

Village of DeForest
Dane County, Wisconsin

August 2015

Prepared for:

Ms. Joleen Stinson
Parks & Natural Resources Supervisor
Village of DeForest
306 DeForest St.
DeForest, WI. 53532
(608) 846-6751

Prepared by:

Mr. Scott O. Taylor
Taylor Conservation, LLC
3856 Schneider Dr.
Stoughton, WI. 53589
(608) 444-7483

TAYLOR CONSERVATION LLC

Table of Contents

Table of Contents

I. EXECUTIVE SUMMARY 1

I. INTRODUCTION 3

Overview of Conservancy Parks & Storm Water Management Areas 3
Park Geology & Soils 3
Surrounding Watershed 4
Presettlement Vegetation of Surrounding Landscape 5
Park Management Philosophy 5
Principles of Ecological Restoration 6
The Natural Heritage Inventory & State Natural Areas 6

II. ECOLOGICAL ASSESSMENT: NATURAL COMMUNITY & STORM WATER MANAGEMENT AREA DESCRIPTIONS 8

Natural Community 1: Riparian Forest 8
Community Description 8
Wildlife Habitat 9
Natural Community 2: Wet Meadow 10
Community Description 10
Wildlife Habitat 10
Natural Community 3: Sedge Meadow 11
Community Description 11
Wildlife Habitat 12
Natural Community 4: Upland Forests 12
Community Description 12
Wildlife Habitat 13
Natural Community 5: Native Prairies 14
Community Description 14
Wildlife Habitat 15
Natural Community 6: Grasslands 16
Community Description 16
Wildlife Habitat 16
Natural Community 7: Degraded Native Prairies 17
Community Description 17
Wildlife Habitat 17
Natural Community 8: Marshes & Aquatic Beds 17
Community Description 17
Wildlife Habitat 18
Storm Water Management Areas 18
SWMA 1 – Alliant 19
SWMA 2 – Autumn Blaze I 19
SWMA 3 – Autumn Blaze II 20
SWMA 4 – Bakke Pond 20

SWMA 5 – Campbell Hill *21*
SWMA 6 – Chapel Green to I-90 ..... *21*
SWMA 7 – Chapel Green *22*
SWMA 8 – Chase Pond *22*
SWMA 9 – Dahl Park *23*
SWMA 10 – Highfield Terrace & Heritage Gardens Swales & Dry Basins *24*
SWMA 11 – Highfield Terrace & Heritage Gardens Pond *24*
SWMA 12 – Highway 19 ..... *25*
SWMA 13 – Innovation Drive Pond *25*
SWMA 14 – Innovation Drive to Conservancy Place Drainage-way & Basins *26*
SWMA 15 – Liberty Land Park *26*
SWMA 16 – Mayapple Court *27*
SWMA 17 – Meadowview Park *27*
SWMA 18 – North Industrial Park *28*
SWMA 19 – Old Indian Trail *28*
SWMA 20 – Prairie Fire Court Basin *29*
SWMA 21 – River Road & Innovation Drive Basin *30*
SWMA 22 – River's Turn Park *30*
SWMA 23 – Sunnybrook Park *31*
SWMA 24 – Veteran's Park *31*
SWMA 25 – Vinburn Road North *32*
SWMA 26 – Vinburn Road South *32*
SWMA 27 – Walgreens *33*
SWMA 28 – Western Green Infiltration Basins *33*
SWMA 29 – Western Green Ponds *34*
SWMA 30 – Woods Glen Court *35*
SWMA 31 – Yahara Park *35*
SWMA 32 – Yankee Conservancy *36*

III. MANAGEMENT PLAN 37
INTRODUCTION 37
INVASIVE PLANT CONTROL 37
TIMBER MANAGEMENT 38
VOLUNTEER INVOLVEMENT 38
MANAGEMENT PRIORITIES 39
NATURAL COMMUNITY 1: RIPARIAN FORESTS 42
Management Overview *42*
Timber Management Opportunities *42*
NATURAL COMMUNITY 2: WET MEADOWS 44
Management Overview *44*
NATURAL COMMUNITY 3: SEDGE MEADOWS 46
Management Overview *46*
NATURAL COMMUNITY 4: UPLAND FORESTS 48
Management Overview *48*
Timber Management Opportunities *49*
NATURAL COMMUNITY 5: NATIVE PRAIRIE 51
NATURAL COMMUNITY 6: GRASSLAND 52
NATURAL COMMUNITY 7: DEGRADED NATIVE PRAIRIE 54
NATURAL COMMUNITY 8: MARSHES & AQUATIC BEDS 55
STORM WATER MANAGEMENT AREAS 57

FIGURES **60**

REFERENCES **61**

APPENDIX 1: MANAGEMENT TECHNIQUES **63**

Garlic Mustard Control 63
Japanese Hedgeparsley Control 63
Buckthorn & Honeysuckle Control 63
Crown Vetch, Spotted Knapweed, Burdock & Canada Thistle 63
Wild Parsnip & Sweet Clover Control 63
Oak Savanna/Woodland Restoration 64
Prairie Establishment 64
Tree & Shrub Establishment 65

APPENDIX 2: GLADE MALLOW & SMALL WHITE LADY'S-SLIPPER **66**

APPENDIX 3: PLANT SPECIES LIST **67**

I. Executive Summary

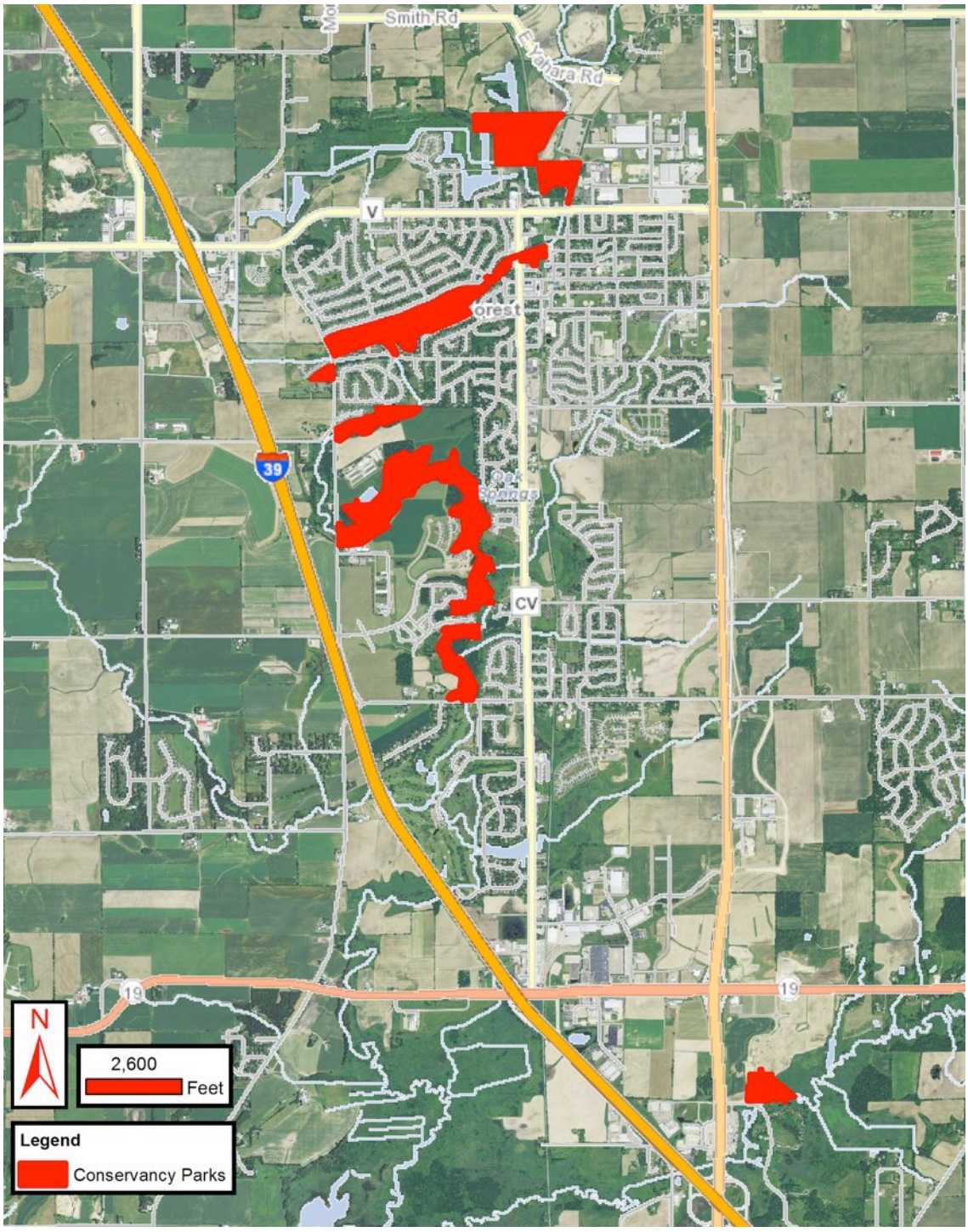
The village conservancy parks are a network of natural areas – primarily woods and grasslands – centered on the Yahara River and its tributaries. Many of the conservancy parks are tied together, and to surrounding neighborhoods, by a trail network that the village has expanded incrementally over the years. Hence the public enjoys access and views of most of the conservancy parks. The presence of a public, centrally located network of natural areas connected by trails distinguishes the Village of DeForest from most other communities in Dane County.

This document is an update of the earlier Ecological Assessment & Management Plan created in 2007 by Taylor Conservation LLC. It is based on the same set of natural area management principles. In particular, the need to control invasive plant species to protect and encourage native species diversity, and the importance of restoring native plant communities when this can be done affordably and relatively easily. Hence, the highest priority management actions are eradication or control of the most aggressive invasive exotic plants, like Japanese hedgeparsley, crown vetch and buckthorn. In addition, the plan strongly recommends continuation of the restoration projects the village has already started, such as oak woodland restoration at Mayapple Ct. and native prairie establishment and wetland restoration at Marvin & Marie Schweers Natural Area.

The plan recommends aggressive tree removal in some locations for the purpose of encouraging more wildlife-friendly trees and shrubs. It also encourages utilization of cut trees for timber and firewood when that is practical. The plan urges cutting of dense thickets of exotic shrubs alongside trails to open up views of natural areas. The plan also specifies continuation of prescribed burning in native prairie and oak woodland habitats.

Unlike the 2007 plan, this document discusses vegetation management in storm water management areas (SWMAs), which include storm water ponds, dry detention basins, swales and ditches. SWMA vegetation management is primarily oriented to control of brush encroachment and control of the most aggressive of invasive plant species to discourage their spread outside SWMA boundaries.

Overview of Conservancy Parks



I. Introduction

Overview of Conservancy Parks & Storm Water Management Areas

Scott Taylor of Taylor Conservation LLC completed the investigation of conservancy parks and storm water management areas in the summer and fall of 2014. Taylor is a trained plant ecologist and forester (University of Wisconsin-Madison, M.S. 1999). He has been investigating and managing natural areas in southern Wisconsin since 2000.

The conservancy areas comprise 271 acres distributed across eight village parks (Figures 1-3). Roughly one-half of conservancy areas were wooded (riparian & upland forests – 121 acres), the remainder were open, grassy habitats. The majority of conservancy areas (185 acres) occupied wet or flood-prone lands. This would be expected since almost all of the parks were centered on the Yahara River or its tributaries.

The most significant ecological features in the conservancy parks system are the sedge meadows in the Upper Yahara River Corridor (Figures 7 & 8). Sedge meadows are a native wetland plant community that has become scarce in southern Wisconsin due to the spread of invasive reed canary grass in wetlands. The sedge meadows are the only high quality remnant native plant community in the parks. There are 45 acres of sedge meadows distributed across 8 management units. They are a regionally significant resource and deserve the utmost protection.

The village planted a native prairie of 13 acres in Western Green park many years ago, and it planted a native prairie of 16 acres (distributed across 4 management units) in Marvin & Marie Schweers Natural Area in 2014. Although planted native prairies are usually not as biologically diverse as remnant native prairies, they feature native grasses and wildflowers that are relatively rare in the surrounding landscape. Therefore these are important ecological resources.

The village maintains numerous storm water management areas (SWMAs) comprised of ponds, dry-detention basins and drainage-ways (ditches & swales). SWMAs are built and maintained to manage the quantity and quality of storm water draining from village streets to the Yahara River and its tributaries. The investigator evaluated 32 SWMAs for invasive species presence and for encroachment of woody vegetation, which impairs the function of SWMAs. Most SWMAs were steep-sided basins holding open water or marsh vegetation and surrounded by well-drained grassy areas maintained by frequent mowing.

Park Geology & Soils

Glacial deposits from the last glacial period, the Wisconsin Stage (70,000-10,000 years before present), dominate the landscapes of the village parks. In this period, the glacier reshaped southeastern Wisconsin by scouring ridges and valleys and depositing a thick layer of glacial drift, i.e. sediment and rocks. The drift formed a diversity of landforms, some quite rugged, such as terminal moraines where debris accumulated on the margins of glaciers, and others more gentle, like ground moraines and outwash plains spread evenly over the landscape (Shultz 1986).

DeForest's glacial landscape is a mix of ground moraine and drumlins in higher areas, and lake deposits and outwash plains in low areas (Mickelson & McCartney 1979). Drumlins are low hills amassed into elongated ovals by the creeping ice sheet. Two drumlins overlook Western Green Park, one from the north and one from the south. Formed by flowing ice, most drumlins in Wisconsin are oriented in the southwest-to-northeast direction of glacial movement, as are the drumlins in DeForest.

A short-lived glacial melt water lake probably once filled this part of the Yahara River valley. It would have formed as a finger of glacial ice blocked the flow of water through the valley. Sand, silt and clay, would have been deposited in the lake bottom in a sorted fashion. Even after the glacial ice dam melted and lake waters drained, the river valley probably continued to receive gravel, sand and silt-choked melt-water from the thawing glacier, which formed broad outwash plains along its flanks. Hence the river valley filled with water-deposited sediment.

Since the end of the glacial period, poorly drained lands have accumulated deep organic deposits from centuries of growth of marsh vegetation. In addition, fine sediments were lofted out of the Mississippi Valley by westerly winds and deposited across Wisconsin (Hole 1976). Consequently many soils of this region contain surface layers of silt, rich in nutrients and having excellent moisture retention.

The low-lying park areas, e.g. Marvin & Marie Schweers Natural Area and Western Green Park, had soils formed primarily in lake deposits and outwash. The soils were composed of deep silt underlain by sand and gravel at depths greater than 2 feet (Glocker & Patzer 1978). The soils were originally very poorly to somewhat poorly drained; although drainage of most was improved by river channelization and ditching.

The higher park areas, e.g. the upland forest units in all parks, had soils formed in ground moraine. These soils were well drained and contained loess at the surface and sandy loam material underneath (Glocker & Patzer 1978).

Surrounding Watershed

The lands of the Yahara River watershed are predominantly agricultural, but the urbanized area of the Village of DeForest also comprises a significant area. The Yahara begins in southernmost Columbia County before winding its way through farmland and emptying into Lake Mendota (WDNR 2001).

The river suffers from the effects of polluted agricultural and urban surface water runoff. In the mid-90's, the Dane County Regional Planning Commission ranked the Yahara-Mendota watershed, an area drained by several tributary rivers of Lake Medota besides the Yahara, highly for a priority watershed study, an effort that would pave the way for water quality improvements. The Wisconsin DNR completed the Lake Mendota Priority Watershed Project study in 1996. Subsequently state funds were released to control water pollution, mostly by working with farmers to decrease barnyard runoff and cropland soil erosion.

In addition to highlighting farm runoff, this study emphasized that the loss of wetlands in

the watershed — approximately 1/3 of them have been drained — due to ditching and the straightening of small tributary streams has contributed to excessive nutrients and sediment in surface waters, both of which are key causes of habitat degradation, algae blooms and overabundant aquatic weeds. The study noted that north of Co. Highway V, the river is considered a very degraded warm water fishery but south of Highway V the river showed better conditions and is a quality warm water fishery; it was identified as a "priority for enhancement and protection of a warm water sport fishery" by the study. The study also identified large drained wetland complexes throughout the Yahara-Mendota watershed whose restoration could measurably improve downstream water quality. Most of the lands in Marvin & Marie Schweers Natural Area were part of one such area.

Presettlement Vegetation of Surrounding Landscape

Before Europeans arrived, prairies and oak savannas dominated south central Wisconsin (Finley 1951). For millennia, fire checked the growth of forests and kept the landscape open. Fires were probably ignited by Native Americans (Curtis 1959). 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 developed into oak savannas and woodlands. Like the prairie, these oak communities contained a high diversity of grass and forb species. Bur oaks and white oaks were the dominant trees in this landscape since their thick bark protected them from fire. Areas protected from fire, usually leeward sides of lakes and major rivers, developed into sugar maple-basswood forests. Low, poorly drained areas contained extensive marshes, sedge meadows and wet prairies.

Following European settlement, wildfires sharply decreased and eventually halted. No longer fire-suppressed by fire, oak seedling-sprouts grew rapidly and formed closed-canopy oak forests within a generation (Curtis 1959). Eventually fire-sensitive hardwoods, like maples, ashes, elms and hickories, began spreading and displacing oak trees. Lands that were prairies or savannas are now mostly wooded, farmed or developed. Only 0.5% of the original area covered by prairie and only 0.01% of the area covered by savanna in Wisconsin still exists (WI DNR 1995).

Park Management Philosophy

This plan is based on the same set of principles as the 2007 Ecological Assessment & Management Plan. These principles form the basis for the goals and actions in each natural community:

1) Increase native plant and animal species diversity.
   (This is the basis for control of invasive exotic species, like Japanese hedgeparsley, honeysuckle and buckthorn, which can suppress diversity by out-competing many native plant species.)
2) Contribute to the biological diversity of the greater landscape.
   (This justifies focusing efforts on restoration of habitats that are regionally rare or declining, such as oak woodlands with diverse, native ground-layer vegetation or sedge meadows that are relatively free of invasive reed canary grass.)
3) Enhance wildlife viewing opportunities for park visitors.
   (This justifies any management action results in continued or increased use of the

parks by animals. For examples, planting fruit-bearing shrubs and nut-bearing trees, creating shallow marsh habitat for waterfowl, reptiles and amphibians, establishing native wildflowers or retaining standing dead trees and course woody debris for wildlife food and shelter.)

4) Improve water quality in the Yahara River.
(This justifies wetland restoration and conversion of agricultural land to native grasses and wildflowers.)

Principles of Ecological Restoration

Management recommendations in this document are guided by the principles of ecological restoration, "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, ecological restoration attempts to re-create the historic conditions of an ecosystem.

Since European arrival, most natural areas in Wisconsin have changed dramatically. 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 factors like drainage of wetlands, river channelization, invasion of exotic species and fragmentation of ecosystems. The DeForest parks have suffered from all of these forces. Restoration tries to reverse or mitigate 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 embrace an experimental approach to their work, called "adaptive management". This approach requires constant monitoring of restoration results and flexible work-plans. Information gained from monitoring is used to refine subsequent treatments. Hence, the recommended actions in the management plan should not be view as fixed programs, but only as a starting point.

The Natural Heritage Inventory & State Natural Areas

The Natural Heritage Inventory (NHI) is a system for locating and documenting occurrences of rare species and natural communities. In Wisconsin, it is managed by a partnership between the Nature Conservancy and the Bureau of Natural Heritage Conservation 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. The NHI is not a complete catalogue of the locations of the state's rare species. There could be rare species in the DeForest conservancy parks that are not documented by the NHI. 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 Natural Heritage Conservation).

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 Natural Heritage Conservation).

"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.

A NHI search was done for records of occurrences of rare species in the parks and in the surrounding region by the staff of the DNR Bureau of Endangered Resources in 2007 (for Marvin & Marie Schweers Natural Area, Bakke, Veteran's and Western Green Parks) and 2008 (Upper Yahara River Corridor). No records of rare species were found for park lands but two were found within one mile of the parks. The locations of these occurrences were shared with Village staff but shall not be made available to the public. This information is exempt from state open records statutes in order to protect rare species:

- Small white lady's slipper (*Cypripedium candidum*) — **Threatened**
  (This plant prefers wet prairies and fens. It blooms from mid-May to mid -June, the optimal times to identify it.)
- Glade mallow (*Napaea dioica*) — **Special Concern**
  (This plant prefers wet meadows. It blooms from early -June through mid-August, the optimal times to identify it.)

See photos of these species in flower in Appendix 2.

These species could be present in the parks. They are likeliest to be found in Natural Community 3, Sedge Meadow, since it has suffered the least amount of invasion by reed canary grass. This area and all other wet communities should be searched for these species before undertaking activities that could harm them, like spraying herbicide or conducting burns.

In addition to rare species, the NHI also catalogues the native plant communities in the state that are recognized by ecologists. Much of Wisconsin's landscape is covered by plant communities dominated by exotic species from Europe and Asia. Consequently many areas do not correspond to any NHI-recognized natural community. This is true of many of the natural communities in the parks. However some do resemble NHI communities as indicated in the natural community narratives in Chapter II.

II. Ecological Assessment: Natural Community & Storm Water Management Area Descriptions

Natural Community 1: Riparian Forest

Community Description

The riparian forests occupied low, riverside lands. This community was divided among 16 management units (Figures 4-8) across 6 parks. Surface topography was rugged in these units and there were many closed depressions and swales holding 1 to 3 feet of standing water. Small, groundwater-fed springs and seeps were also common.



Riparian Forest

The rugged topography could reflect past earth moving associated with river channelization, especially in units V-RF and WG-RF2 (Figures 4 & 5), where the course of the river was probably altered. Some of the swales could have been old, abandoned river channels. A topographic map from 1904 showed several river meanders that no longer exist, most notably in Unit V-RF in Veteran's Park, where the river formed a long southward loop through the present day woods. A swale observed in this area was most likely the old river channel.

Box elders, cottonwoods, peach leaf willows, black willows and walnut trees dominated this natural community. Silver maple, American elm, basswood and hackberry were also present. Tree density varied, with some areas having small, closely spaced trees and others having large, widely spaced trees with spreading crowns. The vast majority of tree seedlings and saplings were of box elder. This suggests this species will continue to dominate the riparian forests.

The abundance of large, sunny canopy openings resulted in a dense understory of grasses, wildflowers, vines and shrubs. Groundcover was either predominantly grassy - reed canary grass and brome grass — or shrub and vine-dominated — sandbar willow, black raspberry, honeysuckle, wild grapes and woodbine. Other common herb, shrub and vine species noted were stinging nettles, jewelweed, burdock, giant ragweed, white avens, dame's rocket, garlic mustard, enchanter's nightshade, black raspberry, red osier dogwood, black wild currant, elderberry and wild cucumber.

Nearly all of the plants noted in this community are common species adapted to highly

disturbed sites, especially the dominants: box elder, reed canary grass, nettles, honeysuckle, etc. This probably reflects these sites' disturbance history of excavation and filling associated with river channelization. Hence, the riparian forests do not resemble any native plant community recognized by ecologists. However, they have similarities to the NHI community, Floodplain Forest, a community of trees such as silver maple, river birch, hackberry, green ash and swamp white oak that occupies wet, river-side sites.

Several invasive exotic plant species were noted: Japanese hedge parsley, garlic mustard, honeysuckle, buckthorn, crown vetch, wild parsnip and reed canary grass. All but Japanese hedgeparsley and crown vetch were abundant. Many experts consider box elder a native invasive species. See Appendix 1 for more information about the ecology and control of these invasive species.

Wildlife Habitat

The key elements of wildlife habitat in the riparian forests were:

- Tree and shrub cover next to a permanent water body. Birds and mammals that feed on aquatic organisms, like fish and frogs, will find nesting and screening cover amid the trees and brush in proximity to their food sources.
- Layered forest vegetation. The presence of vertically stratified vegetation — herb, shrub, sapling and tree layers — provides a variety of foraging sites for songbirds, allowing a greater diversity of them to coexist.
- Shallow isolated, ephemeral pools. The presence of shallow standing water that draws down by late summer could provide predator-free breeding habitat for frogs and salamanders.
- Wildlife travel corridor. The linear shapes of these habitats and their locations along a river joining many small patches of natural habitat into a continuous corridor, lend themselves to wildlife movement.

There are also factors limiting the potential of the riparian forests for wildlife habitat. These factors may be difficult to change given the urban setting:

- Polluted runoff. Storm water runoff from the surrounding urban area and overspill from the river, which itself is affected by polluted runoff, could introduce contaminants harmful to plants and animals. Heavy metals and hydrocarbons could be directly toxic to amphibians; high levels of nutrients, like phosphorus, could favor invasive plant species, like reed canary grass and garlic mustard, over native ones.
- Abundance of aggressive, urban-adapted animals. Animals that thrive in an urban environment, like raccoons, opossums and European starlings, could limit the survival of less common species, like wood ducks, warblers and bluebirds, by preying on their young or taking over nest sites.
- Small habitat area. Some species of songbirds are "area-dependent", meaning they rely on a minimum acreage of suitable habitat for successful reproduction and population persistence. None of the riparian forest units are larger than 14 acres. Many species of forest songbirds are too vulnerable to edge-dwelling predators in a forest smaller than 200 acres (Kopiztke & Sweeney 2000).

Natural Community 2: Wet Meadow

Community Description

Like the riparian forests, wet meadows occupied low-lying, riverside lands. They were essentially the same habitat as riparian forests, but without the trees. They are divided among 22 management units across 6 parks (Figures 4-9).



Wet Meadow

Wet meadow soils are poorly drained. They are probably water-saturated in the spring and early summer of most years, and inundated with shallow water during wet periods. The Western Green wet meadow units were fed by a series of storm water pipes that drain the streets of the neighborhood overlooking the park.

This natural community was open and dominated by reed canary grass and asters in wet soil areas and by cattails and sedges in shallow water areas, which were few and small. Cattails included a mix of narrow-leaved cattail, broad-leaved cattail and a hybrid cattail species. Sedges were primarily tussock and lake sedge. Asters were comprised of purple-stem aster, marsh aster and swamp aster. Other species noted were joe-pye weed, boneset, marsh milkweed, dark-green bulrush, water smartweed, arrowhead, sawtooth sunflower, path rush and blue vervain. Small sandbar willow thickets were scattered across this community as well.

Wet meadow areas with shallow standing water have similarities to the Emergent Marsh NHI community. Those areas with wet soil most of the year are similar to the Southern Sedge Meadow community. However, similarities to these native communities are faint due to the prevalence of the invasive exotic plants, reed canary grass and hybrid cattails.

The invasive plant species noted in this community were reed canary grass, which comprised the majority of plant cover, narrow-leaved cattails, hybrid cattails, wild parsnip, Japanese hedge parsley and Canada thistle. See Appendix 1 for more information about the ecology and control of these species.

Wildlife Habitat

The key elements of wildlife habitat in the wet meadows were:

- Grass, herb & shrub cover. This plant cover could harbor small mammals, like meadow voles, deer mice, least weasels, woodchucks and cottontail rabbits, or song birds like song sparrows, field sparrows or meadowlarks. These creatures would also serve as a food source for predators who hunt grasslands but nest and cover in nearby brushy areas and woods of the riparian and upland forests, like raccoons, opossums,

skunks, foxes, red-tailed hawks and owls.

- Amphibian habitat. Shallow standing water in this community provides frog and salamander breeding habitat that is free of fish who would predate their larvae. Proximity of upland forests benefits amphibian species that spend part of their life cycle in drier uplands.

There are also factors limiting the potential of the wet meadows for wildlife habitat. These factors may be difficult to change given the urban setting:

- Abundance of aggressive, urban-adapted animals. Animal species that thrive in an urban environment, like raccoon and opossums, could limit the survival of grassland species, like song sparrow and field sparrows, by preying on their young.
- Small habitat size. Some songbirds are "area-dependent", meaning they rely on a minimum-sized acreage, often 40 acres or more, of suitable habitat for successful reproduction and population persistence (Sample & Mossman 1997). However most of the wet meadow units are small – they range from 0.5 —15 acres.

Natural Community 3: Sedge Meadow

Community Description

The sedge meadows occupied low, riverside lands that, unlike other riverside areas in the park system, experience steady groundwater inflow. The dominant, native sedge species – tussock sedge – and its native wildflower associates thrive in groundwater-saturated soils. The sedge meadows are divided among 8 management units across 2 parks (Figures 4, 7 & 8).



Sedge Meadow

Unlike the wet meadows, this natural community was largely free of reed canary grass. Many native species besides tussock sedge were noted, including blue-joint grass, hairyfruit sedge, joe-pye weed, marsh aster, swamp aster, mountain mint, marsh fern, blue vervain, jewel-weed, narrow-leaved loosestrife, turk's cap lily, narrow-leaved hedge nettle and bugleweed. Many of these native species are considered "conservative", meaning they are sensitive to disturbance and found only in relatively undisturbed sites.

In the investigator's experience it is rare in south central Wisconsin to find sedge meadows of the scale and quality observed in the Upper Yahara River Corridor. They are truly ecological gems. Further survey work could uncover rare plants in this community. Small white lady's slipper and glade mallow, both rare species with recorded occurrences in this region (see "The Natural Heritage Inventory & State Natural Areas"), are more likely to occur here than

anywhere else in the parks.

This community is a good example of the NHI community, Southern Sedge Meadow. The extent of this community has shrunk dramatically in southern Wisconsin due to agricultural drainage. It has also suffered from invasion by reed canary grass, which has completely overtaken many sedge meadows.

Reed canary grass was noted around the margins of the sedge meadows. So long as the steady ground water inflow is maintained, and storm water inputs are controlled, the sedge meadow could continue to resist reed canary grass invasion.

Wildlife Habitat

The key elements of wildlife habitat in the sedge meadow were:

- Grass & herb cover. The heavy plant cover in the sedge meadow, much of which stays standing well into fall and winter unlike reed canary grass-dominated communities, could harbor many small mammals and birds. These creatures would also serve as food sources for predators who hunt grasslands but nest and cover in nearby brushy areas and woods of the upland forest, like raccoons, opossums, skunks, foxes, red-tailed hawks and owls.
- Diversity of food sources for birds & insects. The diversity of native wildflowers could support a high diversity of insects, including butterflies, that feed on plant tissue, nectar or pollen.
- Amphibian habitat. Shallow standing water in this community provides frog and salamander breeding habitat that is free of fish who would predate their larvae. Proximity of upland forest benefits amphibian species that spend part of their life cycle in drier uplands.

There is also a factor limiting the potential of the sedge meadow for wildlife habitat:

- Small habitat size. The largest sedge meadow unit (Unit UY-SM3) covers only 19 acres. However some species of grassland-nesting songbirds rely on larger habitats, 40 acres or more, for successful reproduction and population persistence (Sample & Mossman 1997).

Natural Community 4: Upland Forests

Community Description

The upland forests occupied high benches and hillsides overlooking the riparian lowlands. They are divided among 15 management units across 6 parks (Figures 4-9). By contrast to the riparian forest sites, upland forest site soils are well drained.



Upland Forest

White oaks, bur oaks, black cherries, basswoods, box elders and shagbark hickories dominated the upland forests. Some of the oaks were probably over 100 years old. Many had open-grown form, indicating they were the earliest occupants of the sites. The non-oak tree species noted were generally smaller and younger, although some cherries exceeded 16 inches in diameter. Tree seedlings and saplings in the upland forests were mostly box elders, white ashes, black cherries and basswoods. The absence of very young oaks suggests that oaks will decrease in numbers in coming decades.

The upland forests contained shrub layers of varying density. Some units had relatively sparse tree cover and heavy brush consisting of honeysuckle, buckthorn, sumac, grey dogwood, chokecherry, red osier dogwood, gooseberry, blackberry, black raspberry and elderberry. These units also contained openings dominated by common grasses and wildflowers — brome grass, goldenrod, queen anne's lace and daisy fleabane, among other species. Other units had dense tree canopies and sparse shrub layers.

The herb-layers of the upland forests contrasted sharply in species composition with those of the wet, riparian forests. White avens, enchanter's nighshade, creeping charlie, stickseed, solomon's seal, solomon's plume and wild geranium were prevalent. Mayapple, Virginian waterleaf, red baneberry, fragrant bedstraw, trillium, and violets were also noted.

The upland forests match the NHI community type, Southern Dry-Mesic Forest, a mixed community of oaks and shade tolerant hardwoods — maples, elms, ashes and hickories. Since the upland forests were probably grazed at some point, the herb-layer species composition has probably shifted toward dominance by grazing-tolerant species.

Invasive plant species were prevalent in many upland forests. Honeysuckle and buckthorn shrubs were the most abundant invasive species however garlic mustard was widespread as well. Small, scattered patches of Japanese hedge parsley and spotted knapweed were also noted. See Appendix 1 for more information about the ecology and control of these invasive species.

Wildlife Habitat

The key elements of wildlife habitat in the upland forests were:

- Standing dead trees and fallen logs. Decay cavities in standing trees become nesting sites for birds and mammals, including woodpeckers, owls, chickadees, raccoons, squirrels and bats. Fallen logs harbor frogs and amphibians seeking cool, moist conditions. Dead wood provides a substrate for insects, which are then a critical food

source for birds and mammals.

- Layered forest vegetation. The presence of vertically stratified vegetation — herb, shrub, sapling and tree layers — provides a variety of foraging sites for songbirds, enabling a greater diversity of them to coexist.
- Mast-producing tree species. Oaks, cherries and hickories produce nuts and berries that are critical food sources for wildlife. Deer, wild turkeys and squirrels rely on acorns and hickory nuts as high-energy food source to prepare for winter. Many songbirds rely on the fleshy fruit of black cherries as a mid-summer food source.

There are also factors limiting the potential of the upland forests for wildlife habitat. These factors may be difficult to change given the urban setting:

- Abundance of aggressive, urban-adapted animals. Animal species that thrive in an urban environment, like raccoons, opossums and European starlings, could limit the survival of less common species, like warblers and bluebirds, by preying on their young or taking over nest sites.
- Small habitat size. Some species of songbirds are "area-dependent", meaning they rely on a minimum-sized acreage of suitable habitat for successful reproduction and population persistence. None of the upland forest units are larger than 7 acres. Many forest songbirds are vulnerable to edge-dwelling predators in small forests (Kopiztke & Sweeney 2000).

Natural Community 5: Native Prairies

Community Description

The native prairies occupied the broad, level terrain of Western Green Park and Marvin & Marie Schweers Natural Area (Figures 4 & 6). There was also a small native prairie overlooking the Yahara River in Veteran's Park. The prairies occupy low, moist but well-drained soils. Park staff and volunteers established these native prairies. The prairie in Marvin & Marie Schweers Natural Area was just established in 2014. The native prairies consisted of native grasses and wildflowers that were for the most part absent elsewhere in the park; hence, this community plays a critical role in species diversity of the parks.



Native Prairie

Big bluestem, switch grass and indian grass were the dominant prairie grasses. Rosinweed, cup-plant, sawtooth sunflower, black-eyed susan, yellow coneflower and bergamont were the dominant forbs. Ironweed, New England aster, false sunflower, prairie dock, compass plant, mountain mint, spiderwort, rattlesnake master, obedient plant, white wild indigo and stiff goldenrod — all native prairie

species – were also observed. The village may have records of what species were originally planted and therefore a more complete species list than is provided in this report.

The newly planted prairie in Marvin & Marie Schweers Natural Area consisted of a mix of annual weeds, as expected for a young prairie, and native seedlings, including indian grass, Canada wild rye, New England aster and evening primrose.

The native prairies resemble the NHI community, Mesic Prairie, a community of tall grasses, like big bluestem and Indian grass, and forbs, including prairie dock, spiderwort, rattlesnake master and many others. Mesic Prairie is one of the most rare native communities in Wisconsin since the lands it once occupied were largely converted to cropland.

Invasive species were few and scattered in the native prairie. Regular prescribed burning has probably kept them in check. Nonetheless, small amounts white sweet clover was noted in the newly planted prairie in Marvin & Marie Schweers Natural Area. See Appendix 1 for more information about the ecology and control of this invasive species.

Wildlife Habitat

The key elements of wildlife habitat in the native prairies were:

- Grass & herb cover. The heavy native plant cover, much of which stays standing well into fall and winter, in the prairies could harbor small mammals, like meadow voles, deer mice, least weasels, woodchucks and cottontail rabbits, or song birds like song sparrows, field sparrows or meadowlarks. These creatures would serve as food sources for predators who hunt grasslands but nest and cover in nearby brushy areas and woods of the riparian and upland forests, like raccoons, opossums, skunks, foxes, red-tailed hawks and owls.
- Diversity of food sources for birds & insects. The diversity of native wildflowers supports a diversity of insects, including butterflies, that feed on plant tissue, nectar or pollen. Some prairie plants, especially those in the *Silphium* genus — cup-plant, rosinweed, compass plant, prairie dock — produce seed that is an excellent food source for birds. These species are abundant in the native prairies.

There are also factors limiting the potential of the native prairies for wildlife habitat. These factors may be difficult to change given the urban setting:

- Abundance of aggressive, urban-adapted animals. Animal species that thrive in an urban environment, like raccoon and opossums, could limit the survival of grassland species, like song sparrow and field sparrows, by preying on their young.
- Small habitat size. The largest native prairie unit (Unit WG-NP1) covers only 13 acres. However some species of grassland-nesting songbirds rely on larger habitats, 40 acres or more, for successful reproduction and population persistence (Sample & Mossman 1997).

Natural Community 6: Grasslands

Community Description

The grasslands were small areas – they ranged in size from a fraction of an acre to 3 acres – occupying high, level locations. They are divided among 7 units across 3 parks (Figures 4-8).



Grassland

The grasslands were dominated by common Eurasian (i.e. plants species of European and/or Asian origin) grasses and forbs: brome grass, blue grass, reed canary grass, queen anne's lace, sow-thistle, red-top grass, wild parsnip, bull thistle and Canada thistle. However many common native species were also extremely abundant: Canada goldenrod, yarrow, daisy fleabane and common milkweed.

Tree and shrub cover was sparse in this community. Although some units contained shrub thickets – sumac and sandbar willow – and scattered saplings of box elder and walnut. In addition small numbers of elderberry, red osier dogwood, grey dogwood, honeysuckle and buckthorn shrubs were noted.

Dominated by exotic plant species, this natural community did not resemble any NHI natural communities. However ecologists classify exotic grasslands as "surrogate grasslands" since they fill a similar role as native grasslands as habitat for grassland-dependent animals.

No large infestation of invasive exotic plants were noted (although many experts consider the dominant species in this community— brome grass, reed canary grass, goldenrod, queen anne's lace and bluegrass – to be invasives). However, scattered individuals and small patches of the invasive plants, wild parsnip, white sweet clover and Canada thistle were noted. See Appendix 1 for more information about the ecology and management of these species.

Wildlife Habitat

The key elements of wildlife habitat in the exotic grasslands were:

- Grass & herb cover. The heavy plant cover in the grasslands could harbor small mammals, like meadow voles, deer mice, least weasels, woodchucks and cottontail rabbits, or songbirds like song sparrows, field sparrows or meadowlarks. These creatures would serve as food sources for predators who hunt grasslands but nest and cover in nearby brushy areas and woods of the riparian and upland forests, like raccoons, opossums, skunks, foxes, red-tailed hawks and owls.

There are also factors limiting the potential of the exotic grasslands for wildlife habitat. These factors may be difficult to change given the urban setting:

- Abundance of aggressive, urban-adapted animals. Animal species that thrive in an urban environment, like raccoons and opossums, could limit the survival of grassland species, like song sparrow and field sparrows, by preying on their young.
- Small habitat size. The largest grassland unit (Unit B-Gr1) covers only 3 acres. However some species of grassland-nesting songbirds rely on larger habitats, 40 acres or more, for successful reproduction and population persistence (Sample & Mossman 1997).

Natural Community 7: Degraded Native Prairies

Community Description

The degraded native prairies consisted of two units in Western Green Park (Figure 6). They occupied similar landscape positions and soils as the nearby native prairie. They were distinguished from native prairie by high abundances of reed canary grass and Canada goldenrod, which are both considered invasive (Canada goldenrod is native but still considered invasive by many experts.). Many of the native prairie grasses and forbs of the native prairie were present in the degraded native prairies but they were not dominant.



Degraded Native Prairie

The degraded native prairies were seeded to native grasses and wildflowers but subsequent management was not successful at halting the spread of reed canary grass and Canada goldenrod.

Wildlife Habitat

The habitat values of these areas are similar to the native prairie. However the quality of vegetative cover for wildlife and the diversity of food sources are lower. The stems of reed canary grass do not stay as rigid in the fall and winter as those of most native grasses; hence they provide inferior screening cover for animals. However goldenrod is a valuable source of pollen and nectar and therefore supports many invertebrates while in flower in late summer.

Natural Community 8: Marshes & Aquatic Beds

Community Description

The marshes and aquatic beds occupied the shallow-water margins of ponds, including Sunfish Pond, two storm water ponds in Western Green Park, and a storm water pond in Bakke Conservancy. This natural community was also found in a series of recently constructed "wildlife scrapes" (dug depressions for the purpose of creating marsh habitat) in

Marvin & Marie Schweers Natural Area.



Sunfish Pond

In the ponds, this natural community consisted of a shoreline fringe of marsh plants, including soft-stem bulrush, water plantain, bur-reed, narrow-leaved cattail and broad-leaved cattail, and floating-leaved and submergent plants, including white water lily, pondweeds (*Potamogeton* sp.), and elodea in the deeper water.

The wildlife scrapes were excavated in the fall of 2014. Hence they are currently just shallow pools of water and bare, freshly scraped side slopes. The water levels will fluctuate seasonally. They will also be adjusted using the water control structure installed in Unit MM-WM1. Unless native vegetation is planted immediately, cattails and bulrushes will probably colonize the low areas and reed canary grass will colonize the high areas.

Wildlife Habitat

Although these habitats occupy small areas, they are valuable as amphibian habitat. Frogs and salamanders will breed and lay eggs amid the emergent vegetation. Dragonflies and damselflies will likewise reproduce in the shallow waters. In Sunfish Pond, the floating-leaved and submergent vegetation provide cover for panfish. This is also true for Bakke Conservancy pond, although the presence of panfish was not confirmed in this pond.

Storm Water Management Areas

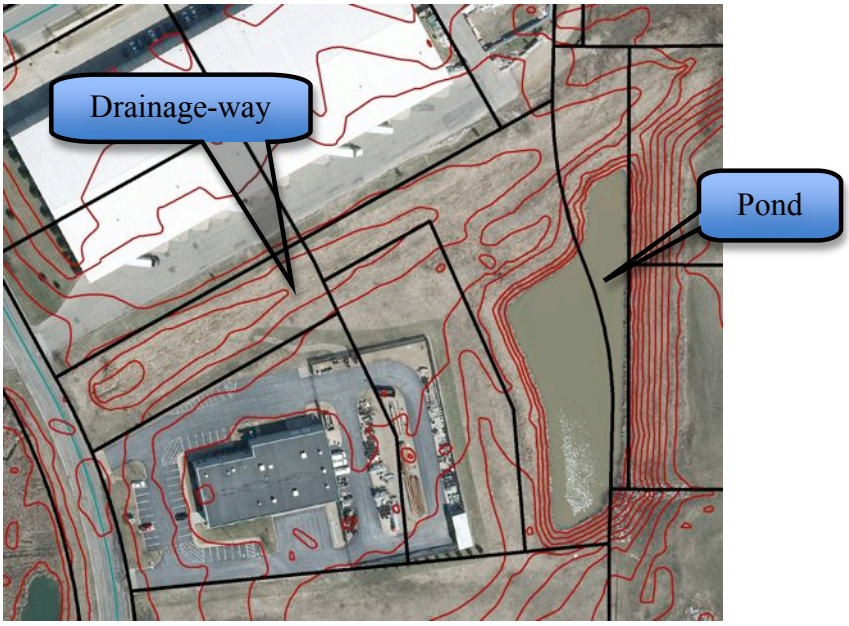
The storm water management areas consisted of ponds, dry detention basins and drainage-ways, and the immediately surrounding uplands. In many cases, ponds had become cattail marshes (referred to as "pond-marsh basins"). The uplands were generally open, grassy areas managed by regular mowing. Some were mowed weekly or biweekly. Others were "rough-mowed" less frequently, allowing grasses and wildflowers to grow tall between mowings.

The species composition of SWMA vegetation was uniform across all areas. The wet pond margins supported cattails, bulrushes and reed canary grass. The uplands supported common cool-season (i.e. usually non-native) plants, including Kentucky blue grass, quack grass, tall fescue, brome grass and red clover, among other plant species. Woody seedlings and saplings were relatively uncommon in the SWMAs. However, small, recently established willows and cottonwoods occurred in the un-mowed pond margins in some areas.

Exotic species like reed canary grass, quack grass and cattails are highly invasive. However, they are not highlighted in this section since they are too abundant to eradicate and since they perform the important function of stabilizing shorelines and basin side slopes. Instead, invasive exotic plants that can be eradicated without harm to the storm water system and that

have potential to spread into nearby natural areas and domestic landscapes are highlighted. These included Canada thistle, crown vetch, wild parsnip, burdock and purple loosestrife. The following SWMA air photos show parcel boundaries in black and 2-foot contours in red.

SWMA 1 – Alliant



SWMA 1 is a pond. The basin side slopes are rough-mowed periodically. Large **crown vetch** and small **white sweet clover** colonies were noted around the basin. In addition, large amounts of willow brush occupied the bases of slopes, just above the waterline. Small numbers of native plants, like yellow coneflower, New England aster and switch grass, were observed, suggesting that native plants were seeded on the pond margins after it was constructed. The pond discharges to a drainage-way comprised of open, grassy vegetation.

SWMA 2 – Autumn Blaze I



SWMA 2 consists of two pond-marsh basins. The upland area surrounding the ponds was un-mowed. There were large **Canada thistle** populations across the upland. There were smaller, scattered populations of **wild parsnip**. Willow seedlings were noted on bare soil areas along the pond margins. These could develop into large shrub thickets if they are not controlled.

SWMA 3 – Autumn Blaze II



SWMA 3 had the same characteristics as SWMA 2 – a pond-marsh basin surrounded by un-mowed grassy upland with large **Canada thistle** colonies. Unlike SWMA 2, there were also significant numbers of **burdock** plants here. No woody plant populations were observed.

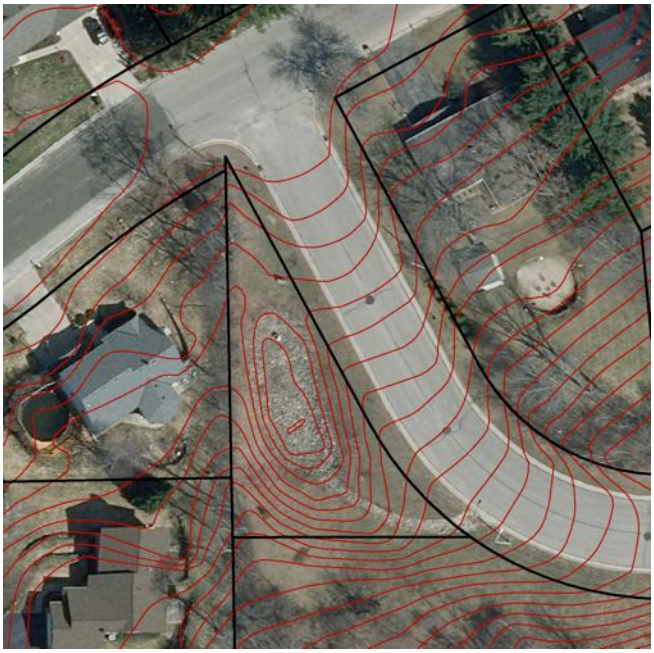
SWMA 4 – Bakke Pond



Bakke pond was created in the 2000s to treat storm water runoff from the surrounding industrial area. It discharges to the Yahara River, which sits immediately to the south. The pond appeared to support good wildlife habitat. The investigator observed fish jumping and a great blue heron hunting. The pond contained a significant population of white water lilies.

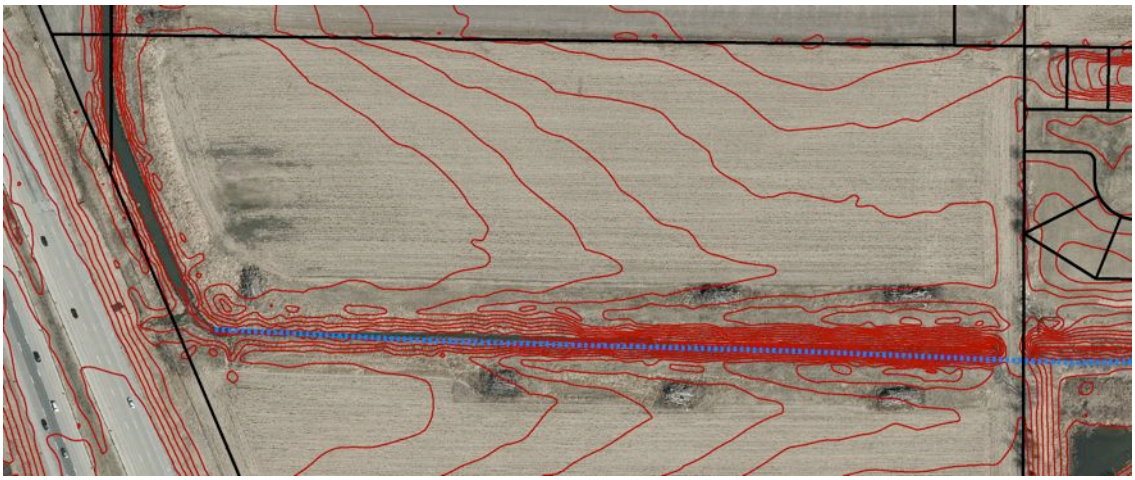
Purple loosestrife colonies were noted on the margins of the water. Small numbers of native plants, like indian grass and big bluestem, were observed surrounding the pond, suggesting that native plants were seeded around the pond after it was constructed. Most of the area surrounding the pond was un-mowed; however, a 20-30-foot-wide walking trail is regularly mowed along the south margin of the pond.

SWMA 5 – Campbell Hill



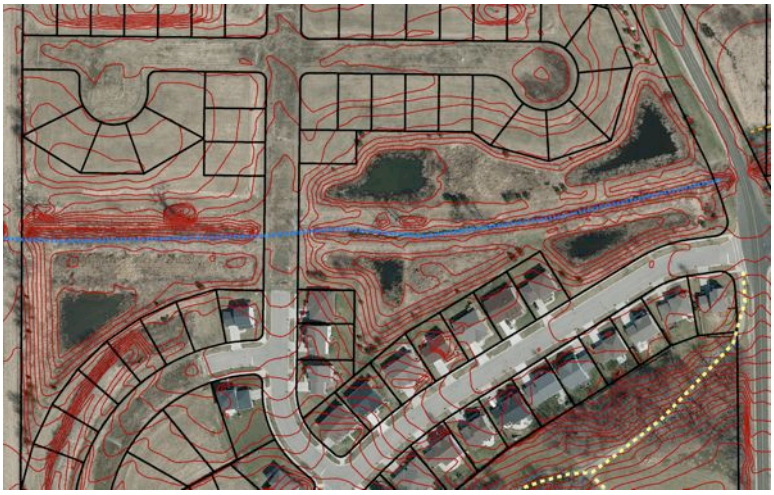
SWMA 5 was a dry detention basin with exceptionally steep side-slopes. The bottom of the basin was lined with rocks and did not support vegetation. Most of the side slopes consisted of mowed turf but the steepest parts supported un-mowed grasses and herbs. Small quantities of **crown vetch** were noted in the basin. In addition, black walnut saplings were colonizing the un-mowed areas.

SWMA 6 – Chapel Green to I-90



SWMA 6 was an exceptionally deep (roughly 20-30 feet) drainage ditch that collects runoff from an agricultural watershed stretching west from the village. Since the ditch side-slopes were steep and dangerous, and the adjoining lands were privately owned, the investigator did not inspect the entire ditch. However it was clear that, in addition to common grasses and wildflowers, the ditch supported large numbers of young trees, particularly of cottonwood.

SWMA 7 – Chapel Green



SWMA 7 was a group of pond-marsh basins and a drainage ditch (an extension of SWMA 6). Marsh vegetation was dominated by cattails but native wool-grass was also noted. The uplands surrounding the basins and ditch had been rough-mowed recently. It appeared there had been many small, woody seedlings in the mowed area. The pond margins supported numerous saplings of cottonwood, box elder and willow. There was also a small number of mature trees of black cherry, hackberry and cottonwood on the uplands. Some of the cherries and hackberries appeared vulnerable to wind-throw. Native plants, including cup-plant, indian grass and big bluestem, were scattered around the uplands, suggesting native seed was planted following construction of the basins. No aggressive invasive exotic plants were noted in this SWMA however they could still be present.

SWMA 8 – Chase Pond



SWMA 8 was a pond with moderately steep side slopes that are rough-mowed periodically. No aggressive invasive exotic plants were noted. No woody seedlings or saplings were present on the basin side slopes. Mature box elder trees were present in the wooded areas surrounding the pond. Seed from these box elders could give rise to seedlings and saplings on the pond margins. A paddleboat was placed next to the shoreline on the east side of the pond, suggesting recreational use of the pond by the neighbors.

SWMA 9 – Dahl Park



SWMA 9 was a string of pond-marsh basins. The surrounding terrain was flat; it supported a large expanse of mowed turf. The pond side-slopes were short and moderately steep. In most areas they were mowed regularly to within 5-8 feet of the pond. Small amounts of **white sweet clover** were observed in the un-mowed pond margins, but otherwise no aggressive invasive exotic plants were noted. No encroachment of woody vegetation on the pond margins was noted either.

SWMA 10 – Highfield Terrace & Heritage Gardens Swales & Dry Basins



SWMA 10 was a series swales and dry basins. This area supported grasses mostly and had been rough-mowed recently. No tree seedlings or shrubs were noted except a small patch of willows in a low, wet area. No aggressive exotic species were noted although they could have been present but not visible due to recent mowing. At least small amounts of **wild parsnip** are probably present in this area.

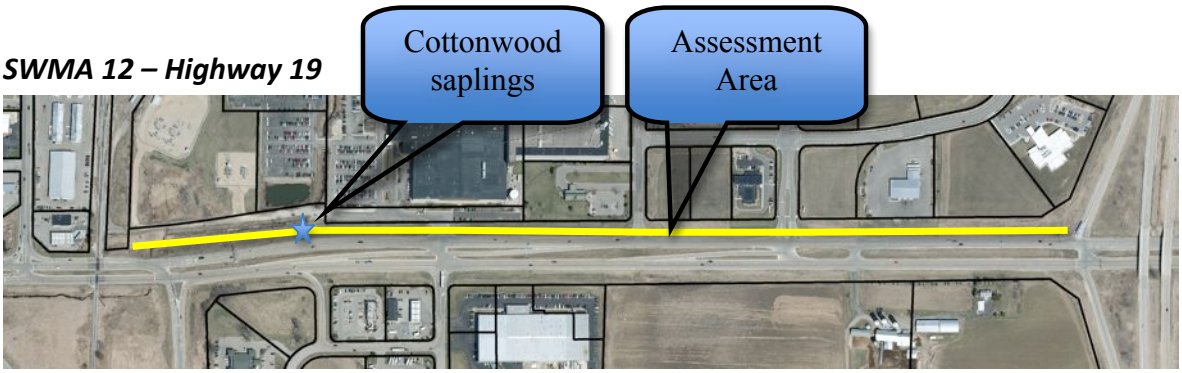
SWMA 11 – Highfield Terrace & Heritage Gardens Pond



SWMA 11 was a pond. The surrounding grassy uplands had been rough-mowed recently. The basin side slopes were moderately steep and mowed to within 5-10 feet of the pond. No aggressive exotic species were noted however small patches of willow seedlings were

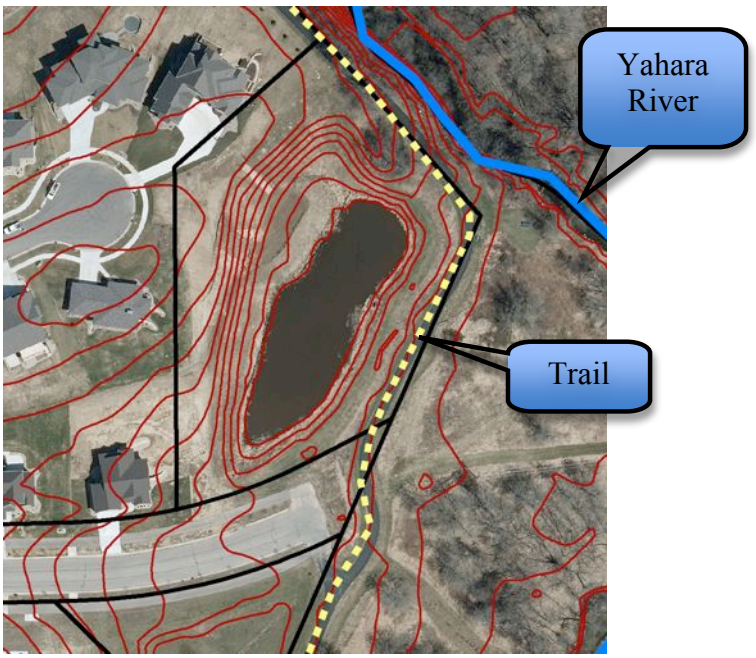
scattered around the un-mowed shorelines. They probably seeded in from a large willow colony in a nearby ditch to the west.

SWMA 12 – Highway 19



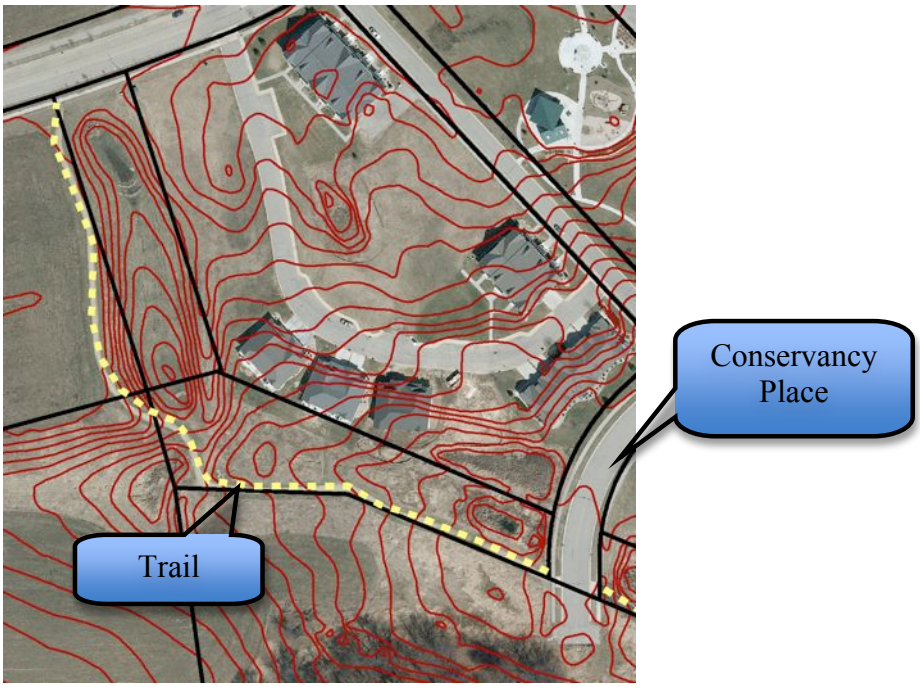
SWMA 12 was a roadside swale following the north edge of Highway 19. The swale possessed gentle side slopes and a low gradient. This area was regularly mowed, except for the west end, which was comprised of um-mowed cool season grasses. A small patch of cottonwood saplings was noted on the west end.

SWMA 13 – Innovation Drive Pond



SWMA 13 was a pond. Pond side-slopes were moderately steep. They had been recently rough-mowed to within 5 feet of the pond. In spite of mowing, large quantities of **wild parsnip** and **Canada thistle** were evident. No woody seedlings were noted in this area. This SWMA is next to a heavily used public trail.

SWMA 14 – Innovation Drive to Conservancy Place Drainage-way & Basins



SWMA 14 was a string of swales and dry detention basins. Overall the gradient of this system was steep. There were two small cattail-dominated basins. The lower cattail basin, adjacent to Conservancy Place, possessed steep side-slopes that could not be mowed. The slope contained moderate amounts of **wild parsnip** and **Canada thistle.** Apart from the cattail basins, the SWMA supported grassy vegetation that had been rough-mowed recently. A public trail follows the edge of the drainage-way.

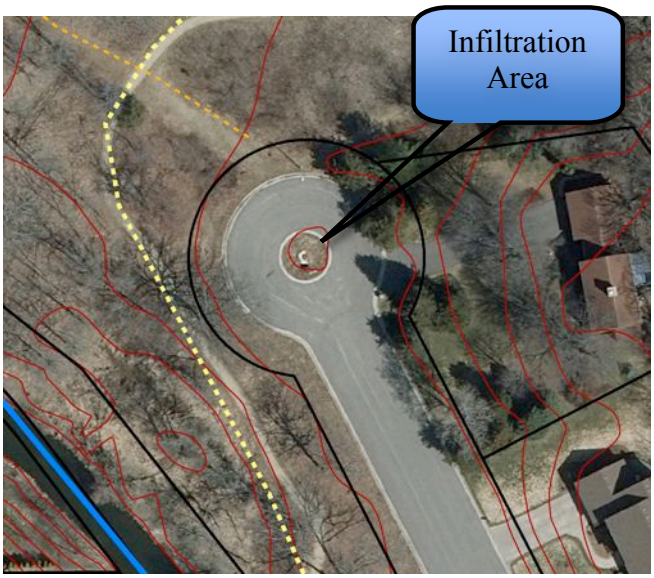
SWMA 15 – Liberty Land Park



SWMA 15 is a drainage-way. It is lined with concrete in the south segment and un-lined in the north segment. The banks of the un-lined segment are too steep to mow; they support tall grasses and wildflowers. The bed of the un-lined segment is scoured by heavy storm water

flows and therefore consists of bare soil. The bare soil has enabled willow seedlings to establish along most of the channel. No aggressive exotic plant species were noted in this SWMA.

SWMA 16 – Mayapple Court



SWMA 16 was a small infiltration area in a cul de sac. It was planted to native plant species, including sedges, wool-grass and dark green bulrush. The planted natives are thriving and for the most part suppressing weeds. Although small numbers of weeds, including common ragweed and queen anne's lace, were noted.

SWMA 17 – Meadowview Park



SWMA 17 consisted of two ponds. The surrounding terrain was flat and supported a large expanse of mowed turf. The pond side-slopes were short and steep. In most areas the pond margins were mowed regularly to within 5-8 feet of the pond. No aggressive invasive exotic

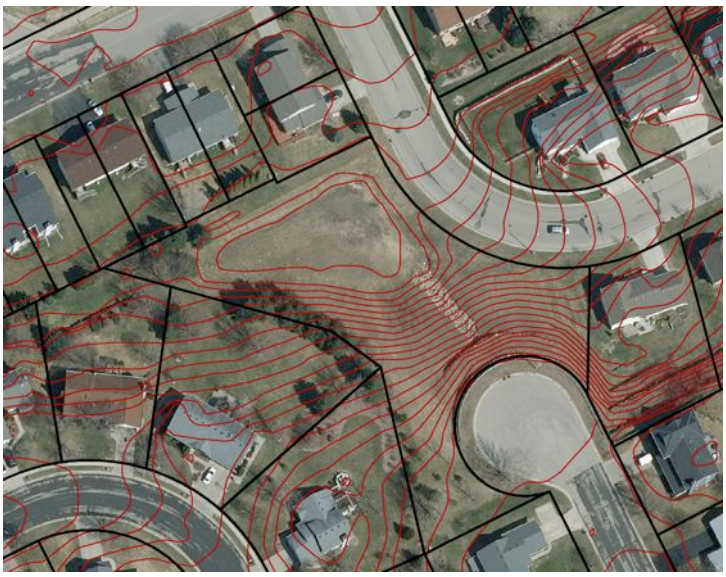
plants were noted. No encroachment of woody vegetation on the pond margins was observed either.

SWMA 18 – North Industrial Park



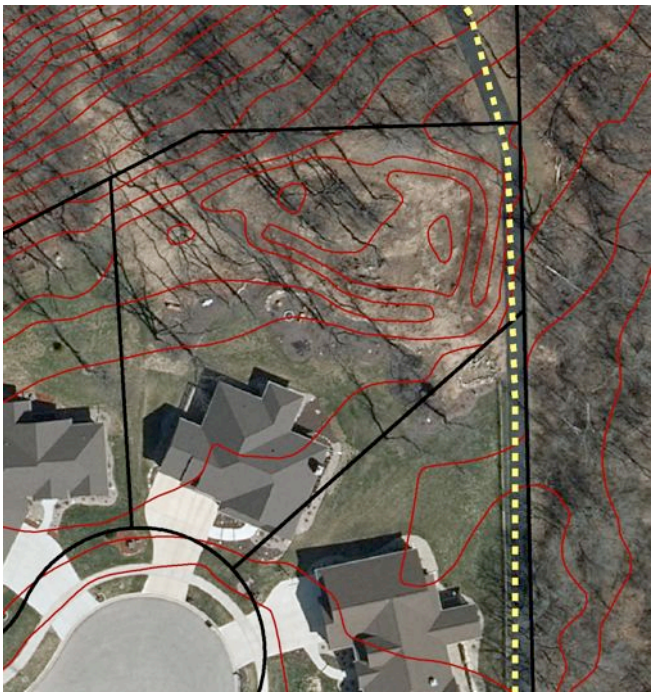
SWMA 18 was a dry detention basin. It supported grassy vegetation that had been rough-mowed recently. The entire basin was mowed. No aggressive invasive exotic plants or encroachment of woody vegetation were noted.

SWMA 19 – Old Indian Trail



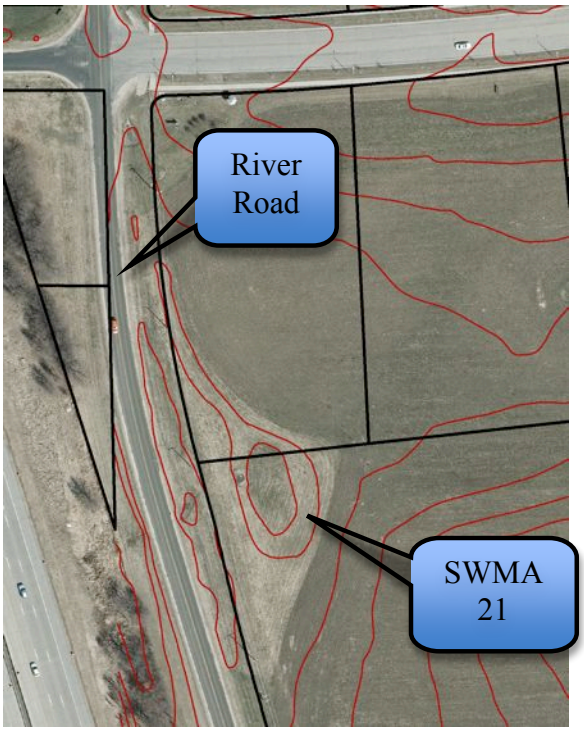
SWMA 19 was a dry detention basin. The entire basin was regularly mowed. A small colony of **crown vetch** was observed near the basin outlet. There could be more crown vetch elsewhere in the basin that was not visible due to mowing.

SWMA 20 – Prairie Fire Court Basin



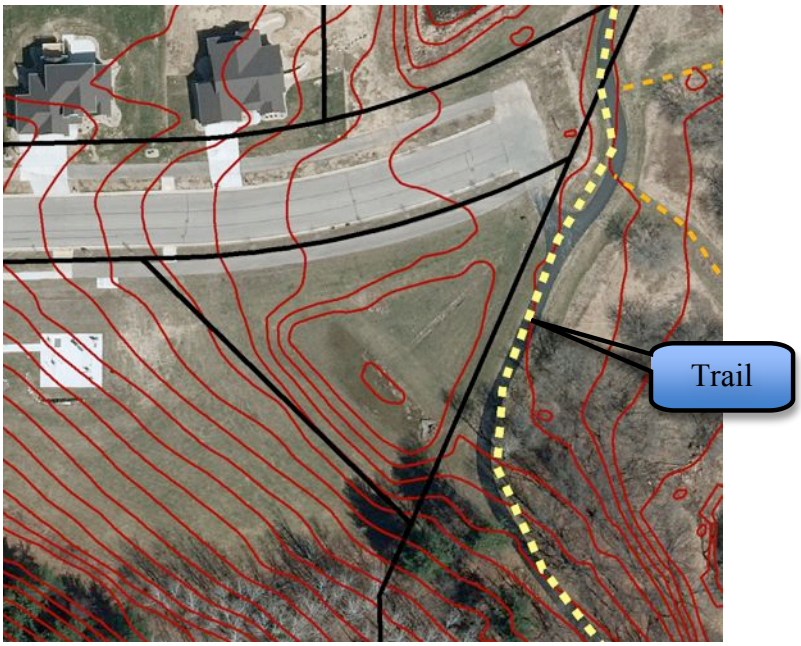
SWMA 20 was a dry detention basin. It is un-managed and supports tall grasses and wildflowers. Woody vegetation, including invasive exotic shrubs like **buckthorn, honeysuckle, autumn olive** and **multiflora rose,** is encroaching. In addition there were numerous box elder saplings on the basin side slopes. Box elder is a fast-growing tree; the saplings will develop into mature trees rapidly.

SWMA 21 – River Road & Innovation Drive Basin



SWMA 21 was a dry detention basin with gentle side slopes. The entire basin had been rough-mowed recently. No aggressive exotic species or woody seedlings were noted. However, there were box elder trees on the opposite side of River Road that could give rise to saplings in the basin if mowing were neglected for long periods.

SWMA 22 – River's Turn Park



SWMA 22 was a dry detention basin with gentle side slopes. It is mowed regularly. No invasive exotic species were observed. There is a public trail next to this site. The woods on the opposite side of the trail contained mature box elders. They would probably seed into this site if mowing were neglected.

SWMA 23 – Sunnybrook Park



SWMA 23 was a pond. It was surrounded by regularly mowed turf grass. Although, there was a 5-8 foot-wide strip of un-mowed vegetation along the pond margins, no exotic invasive species or woody vegetation were observed. However, there was a grove of mature box elders overlooking the pond from the south. These could give rise to seedlings and saplings in the un-mowed sections of the basin.

SWMA 24 – Veteran's Park



SWMA 24 was a wet area created by discharging storm water into an abandoned channel of the Yahara River. A storm pipe empties into the basin from the south. An outlet structure (gabion basket) on the north end holds water in the basin. The basin supports wet meadow vegetation, primarily reed canary grass. The basin floor was littered with fallen trees.

SWMA 25 – Vinburn Road North



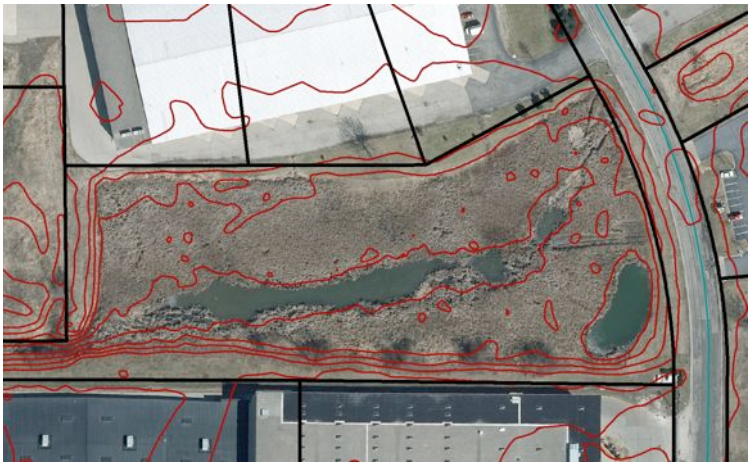
SWMA 25 was a pond. The surrounding uplands were mowed regularly to within approximately 4 feet of the shoreline. No invasive exotic plants or woody seedlings were noted in the basin. However, there were two small cottonwood trees in the northwest corner of the site. These trees could produce seed and give rise to woody seedling on the pond margins.

SWMA 26 – Vinburn Road South



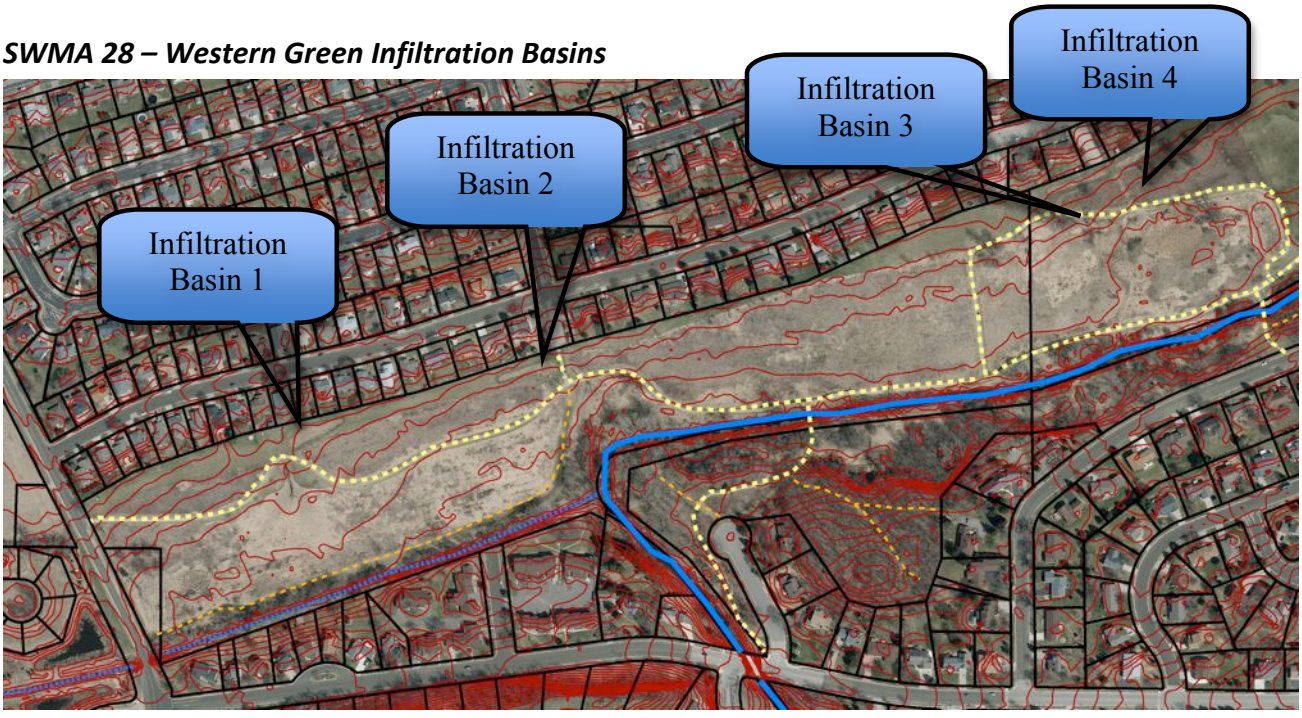
SWMA 26 was a grassy swale. It had been rough-mowed recently. It receives water from a storm water pond, SWMA 25, on the opposite side of Vinburn Road. Heavy storm water flows have scoured the swale, creating rills and gullies. These bare areas have been colonized by willow seedlings, which were probably seeded by the dense willow thickets on the south end of the swale. No aggressive exotic plants species were observed but they could still be present.

SWMA 27 – Walgreens



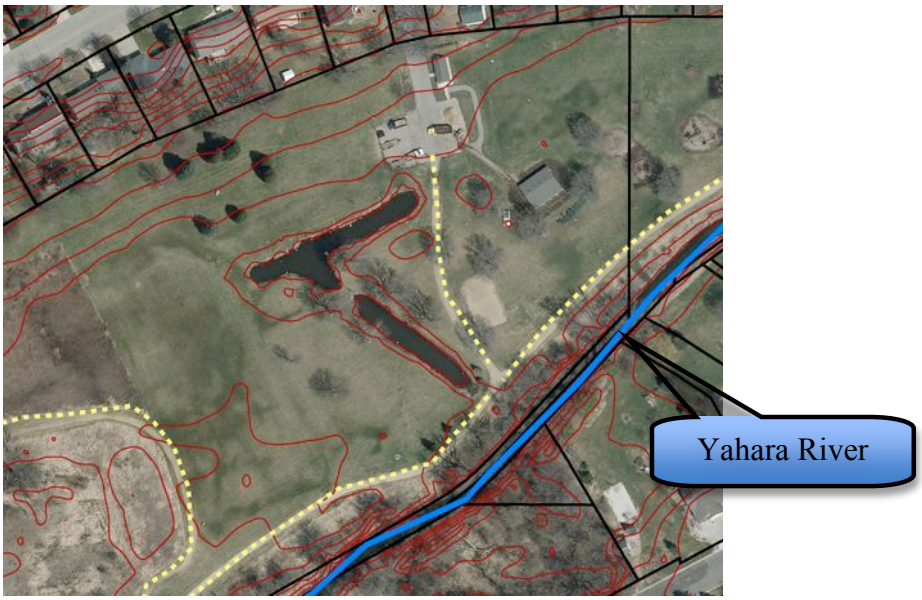
SWMA 27 was a cattail marsh with small open water areas. The basin side-slopes were rough-mowed to within 5-15 feet of the marsh in most areas. There were numerous shrubs and small trees of willow and cottonwood on the lower side slopes on the south side of the basin. Large populations of **Canada thistle** and **crown vetch** were observed on the south basin side slopes as well.

SWMA 28 – Western Green Infiltration Basins



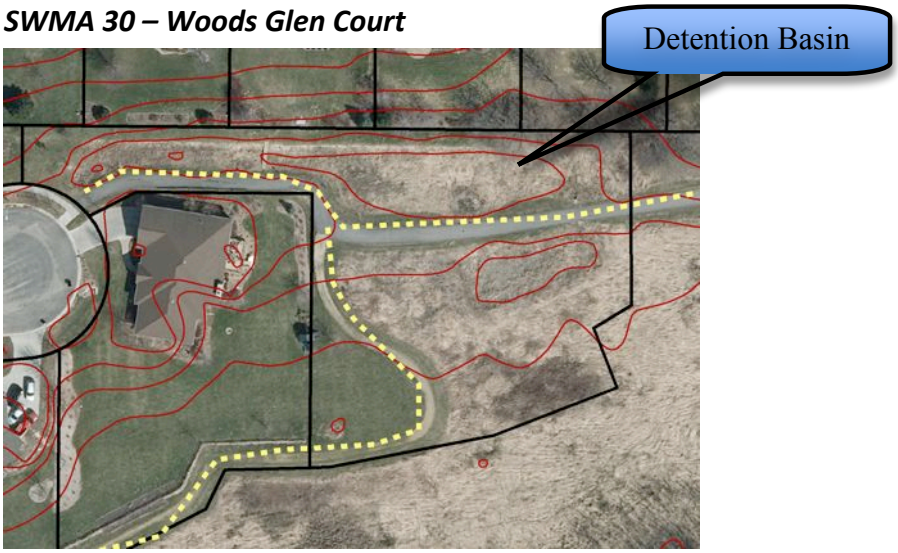
SWMA 28 consisted of four small (<1/4 acre) infiltration basins in Western Green Park. The uplands surrounding the basins are regularly mowed. The basins were planted to native vegetation, including cord grass, sedges, switch grass, New England aster and bergamont, among others. However, cottonwood seedlings and **Canada thistle** have become established. Basin 3 has suffered especially heavy infestation by Canada thistle.

SWMA 29 – Western Green Ponds



SWMA 29 consisted of two ponds in Western Green Park. The surrounding uplands are regularly mowed to within 2-5 feet of the ponds. The investigator did not find a pipe connecting the ponds to the nearby Yahara River. However, the ponds could overtop their banks and spill into the river following heavy rains. **Crown vetch** has been observed, and treated with herbicide, by the investigator on the south end of the south pond in recent years. No woody seedlings were noted in the un-mowed pond margins.

SWMA 30 – Woods Glen Court



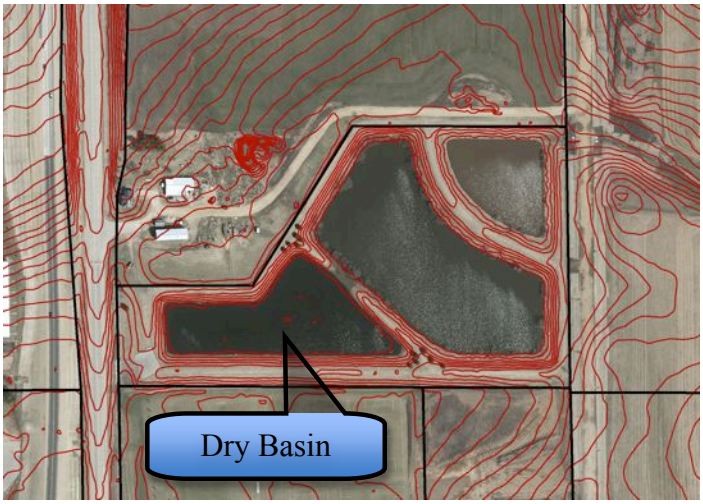
SWMA 30 consisted of a dry detention basin and a swale that feeds it. Most of the basin side-slopes were mowed but the basin floor was un-mowed and supported tall grasses and wildflowers. **Canada thistle,** but no other aggressive exotic plants, was observed in the basin. No woody seedlings were noted in spite of the presence of mature box elders immediately north of the basin, which could shed seed into the basin and give rise to young box elders.

SWMA 31 – Yahara Park



SWMA 31 was a pond. The uplands surrounding the pond were mowed regularly but there was a strip of un-mowed vegetation 5-15 feet wide on the pond margins. Small patches of **Canada thistle** and scattered willow shrubs were noted in the un-mowed areas. The pond discharges to a ditch on the opposite (north) side of County Highway V. The ditch is a tributary of the Yahara River.

SWMA 32 – Yankee Conservancy



SWMA 32 was a group of two ponds and one dry detention basin. The uplands surrounding the basins supported grassy vegetation that had been rough-mowed recently. The floor of the dry basin had also been rough-mowed. The lower side-slopes were un-mowed and supported numerous willows, some relatively large (> 4 inches in diameter). Heavy populations of **Canada thistle** were scattered across the site.

III. Management Plan

Introduction

The management plan recommends actions focused on control of invasive exotic species and restoration of native plant communities. More than one goal is proposed for most of the communities. Goals are presented in order of decreasing priority and increasing complexity. In some cases two goals can be pursued concurrently. For example, in an upland forest management unit you may pursue a goal dedicated to controlling Japanese hedgeparsley while also restoring oak woodland.

The Village is legally liable for impacts to State-listed threatened and endangered plant and animal species that may be present in the parks (State Statute 29.604). Small white ladyslipper, a threatened species, could be present in the sedge meadows. In general, avoid harming this or other rare, protected species by (1) only spraying herbicide during the dormant season, (2) hand-pulling invasives rather than spraying during summer (taking caution to avoid excessive soil disturbance), (3) only burning part of a site at one time (this protects invertebrates), and (4) only burning in early spring and fall when most natives are dormant. Contact the DNR Bureau of Natural Heritage Conservation to learn more about how to mitigate the impact of management activities on rare or protected species.

Invasive Plant Control

Many species of invasive exotic plants were observed in the parks in the 2014 summer field evaluation. Some were so widespread that control is impractical. Examples are reed canary grass and box elder (a native invasive) trees, which have become the dominant species over large areas. Others are common but control, or even eradication, within segments of the parks is possible. These include the shrubs, buckthorn and honeysuckle, or the wild flowers, wild parsnip and Canada thistle, all of which were noted in numerous management units throughout the park. Wild parsnip, whose sap causes inflammation of the skin, is a safety hazard to park users. Therefore eradication of wild parsnip alongside trails should be a priority.

Still other invasive exotic plants are narrowly distributed and sparse in the parks (Figures 10-14). These plant species include Japanese hedgeparsley, spotted knapweed and crown vetch. The village may yet be able to eradicate these plants, or maintain their populations at low levels, with relatively little effort.

Garlic mustard was noted in numerous natural communities and management units. Its abundance ranged form sparse to heavy. The investigator was contracted by the village to control garlic mustard in a forest unit (WG-UF2) of Western Green Park on an annual basis since 2008. In spite of this effort, garlic mustard is still present in the unit. It appears that garlic mustard is difficult to eradicate. Moreover, the degree of harm garlic mustard does to the natural communities is not clear. Therefore, the investigator does not recommend the village dedicate significant effort to control and eradication of garlic mustard.

Appendix 1 contains invasive plant management and control guidelines.

Timber Management

Timber management recommendations are made for the riparian forests and the upland forests. The recommendations are intended to help the village utilize wood that is generated by following recommended management actions. The goals of management are to enhance the ecological functions of natural communities, *not* to generate wood for commercial use. However the sustainability of park management is increased when waste wood is utilized for higher purposes, like firewood for home heating or lumber.

In general, the commercial value of trees is decided by form, size and species. Tall, straight, large trees of commercially sought-after species command the highest prices. The most commercially valuable species are those utilized for furniture, cabinets and specialty wood products – black walnut, red oak, sugar maple and black cherry. However numerous other tree species are utilized for lumber as well, including black oak, white oak, basswood, elm, ash, and hickory. These species generally command lower prices than the high value hardwoods.

Some trees are too soft to be utilized for lumber. These include box elder, cottonwood, silver maple and willow. Unfortunately 28% of the village's parkland is dominated by these species. Nonetheless, wood of these species can be utilized for firewood. Since it is low-density wood, it is not as desirable for firewood as high-density species like oak, hickory and sugar maple. But firewood consumers, particularly owners of outdoor wood furnaces, are often willing to consume soft wood when it is readily available at no cost.

In summary, there are two classes of wood products derived from village forests: lumber and firewood. Large (>12 inches in diameter at breast height), straight trees of black cherry, white oak, red oak, shagbark hickory and basswood – the most common timber trees observed in the parks – can provide lumber. Small trees of any species and all trees of box elder, cottonwood, silver maple and willow can provide firewood.

Volunteer Involvement

Adult and youth volunteers can perform most of the recommended management actions in this plan. Basic plant identification skills are needed for controlling invasive species. Volunteers must be able to identify invasive species in different growth stages, e.g. garlic mustard as both 1st year and 2nd year plants, and buckthorn as both seedlings and shrubs. However, herbicide applications and prescribed burning should be done by trained professionals.

Adults and youth volunteers can do the following activities:

1. Hand-pull Japanese hedgeparsley or garlic mustard.
2. Torch 1st year garlic mustard plants.
3. Cut and pile brush (professional herbicide applicators will have to treat the cut stumps afterward).
4. Scout the parks for new colonies of invasive species — e.g. hedge parsley, spotted knapweed and crown vetch.
5. Shrub and tree planting, installing tree tubes and cages to protect seedlings from deer browse, mulching or cutting competing vegetation around seedlings.
6. Hand-scattering native seed.
7. Monitoring survival of planted shrubs and trees.

Most herbicide labels specify that workers are not allowed to re-enter an herbicide application site until 4 to 12 hours have passed. Nonetheless, adults and children participating in management activities may want to allow more time than this to minimize the chance of exposure to herbicides.

Management Priorities

There may be more management actions recommended than the village will have resources to complete in the near future. Consequently priority actions are enumerated below. Both the ecological impact of the action and the presence of trails were weighed in assigning priorities:

High Priority Actions		
Action	**Management Units**	**Rational**
Search for and eradicate Japanese hedgeparsley colonies.	MM-UF, UY-UF2, UY-UF4, UY-RF6, UY-RF4, UY-WM9	Japanese hedgeparsley is still sparse in the parks. It may be possible to eradicate it.
Continue to eradicate crown vetch colony.	WG-RF2	Crown vetch is still sparse in the parks. It may be possible to eradicate it. Moreover, it might spread into the nearby native prairies if it is not eradicated.
Continue maintenance of native planting in oak woodland.	WG-UF3	Much work was already invested in this site. The work must be continued for the native planting to succeed.
Continue to foliar-treat willow re-sprouts and seedlings with herbicide.	MM-WM1	The willow thicket was recently mowed. It will rebound quickly if the re-sprouts are not killed.
Eradicate white sweet clover from recently planted prairie.	MM-NP1, 2, 3, 4	The sweet clover is poised to spread rapidly in the young prairie and outcompete planted native grasses and wildflowers.
Foliar-treat seedlings & re-sprouts from recently forestry-mowed areas.	CG-UF, UY-UF4, UY-UF7	The buckthorn and honeysuckle thickets were recently mowed. They will rebound quickly if the re-sprouts are not killed.
Eradicate cottonwood		The basins were planted to native vegetation and the invasive plants could

seedlings & Canada thistle in the infiltration basins.	SWMA 28 – Western Green Infiltration Basins.	outcompete it. Moreover, public visibility is high.
Eradicate wild parsnip and Canada thistle.	SWMA 13 – Innovation Drive Ponds.	This storm water pond is next to a heavily used trail.
Plant native vegetation in the wildlife scrapes.	MM-M&AB 1, 2	If natives are not planted soon, reed canary grass and cattails will quickly colonize the wildlife scrapes and diminish the plant species diversity and wildlife habitat value.

Priority Actions		
Action	**Management Units**	**Rational**
Search for and eradicate spotted knapweed colonies.	MM-UF, UY-WM12	Spotted knapweed is still sparse in the parks. It may be possible to eradicate it.
Continue garlic mustard control.	WG-UF2	Much work has been invested in controlling garlic mustard in this unit. Therefore the village might want to continue to keep it in check even if eradication is not possible.
Monitor, and mow if necessary, Canada goldenrod in recently planted prairies.	MM-NP1, 2, 3, 4	Goldenrod could become dominant in the young prairie if it is not controlled. Eradication is not possible but spot-mowing goldenrod at this stage will keep it from dominating the prairie.
Conduct prescribed burns in recently planted prairies once there is enough fuel.	MM-NP1, 2, 3, 4	Prescribed burning will encourage the native plants and discourage cool-season exotic plants and trees and shrubs.
Continue prescribed burning in native prairies.	WG-NP, V-NP	Prescribed burning will encourage the native plants and discourage cool-season exotic plants and trees and shrubs.

Remove trees and shrubs from pond margins.	SWMA 32 – Yankee Conservancy	Tree and shrubs have grown large. Removal will be increasingly expensive as they continue to grow.

Low Priority (but important) Actions		
Action	**Management Units**	**Rational**
Clear trailside buckthorn & honeysuckle thickets.	See Figures 11-13 for thicket locations.	This will free up much growing space to native plants as well as open views of trailside habitats.
Assess water lily planting & continue if conditions are suitable.	UY-M&AB (Sunfish Pond)	Populations of floating-leaved plants are scarce in Sunfish Pond. Increasing them will enhance fish habitat.
Release large oaks at trailhead on Riverwood Bend St.	WG-UF1	Clearing trees and brush around these large oak trees will increase their visibility and attractiveness.
Plant native shrubs and oaks.	UY-Gr, CG-Gr, WG-Gr1 B-Gr1	The grasslands are ideal planting sites. Young oaks are scarce in the parks, planting them will ensure the presence of mature oaks, and the habitat values they provide, for future generations.

Natural Community 1: Riparian Forests

(80 Acres – 16 Management Units)

Management Overview

Dominated by "weedy", aggressive species, the riparian forests have only moderate restoration potential. Nonetheless, the invasive exotic species that are still sparse in this community — crown vetch and Japanese hedgeparsley — should be eliminated before they spread further. Moreover, the exotic shrubs, honeysuckle and buckthorn should also be controlled.

The village may want to first focus on clearing dense honeysuckle and buckthorn thickets that line many of the trails (Figure 11-13). This will free up growing space to native plants in addition to opening views of trailside habitats. Alternatively, the village could attempt complete eradication of exotic brush, which means focusing on the low buckthorn/ honeysuckle density units *first* and then progressing toward high-density units. This is an ambitious strategy that will require several years and a significant budget to complete.

In addition to controlling invasive exotics, the riparian forests can be enhanced significantly by planting flood-tolerant, native trees and shrubs, which will be both attractive and valuable to wildlife. Plantings can be done in the scattered openings within the riparian forest canopy, or existing trees, which are mostly box elders, can be removed to create space. Red maple, swamp white oak, hackberry and river birch are suitable trees for wet to moist soils. Red osier dogwood, nannyberry, elderberry and silky dogwood are suitable shrubs. See Appendix 1 for planting guidelines.

Timber Management Opportunities

Basswood and black walnut were the only tree species that occurred in significant numbers and also had commercial value. High quality (i.e. large and straight) walnuts can be especially valuable but no high quality walnuts were observed in the parks.

In the process of removing trees to make way for new plantings, following Goal 2, the village will generate a large quantity of box elder, willow and cottonwood logs. The village could dispose of the logs by advertising their availability to local residents with outdoor wood furnaces.

Goal 1: Attempt to eradicate crown vetch and Japanese hedgeparsley; control dense honeysuckle and buckthorn thickets along trails.

Objectives:

- Crown vetch and Japanese hedgeparsley are completely absent.
- Dense trailside thickets of buckthorn and honeysuckle are absent.

Actions:

1. Eradicate the crown vetch colonies and scattered Japanese hedgeparsley plants (see map, Figures 10-14) using the procedure outlined in Appendix 1.
2. Cut dense buckthorn and honeysuckle thickets using the techniques outlined in Appendix 1. See map on Figures 11-13 for locations of exotic shrub thickets alongside trails and streets.
3. Place boot brushes at trailheads to limit spread of seed of invasives, particularly garlic mustard, into or outside of the parks.

Monitoring:

- Conduct "walk through" inventories annually in spring or early summer to find new plants and colonies of crown vetch and Japanese hedgeparsley.
- Conduct “walk through” inventories annually to search for surviving buckthorn and honeysuckle shrubs and seedlings.

Goal 2: Establish native trees and shrubs; encourage existing native trees.

Objectives:

- >80% of planted tree and shrub seedlings survive to the sapling stage (>3 feet tall).

Actions:

1. Establish trees and shrubs in a natural-looking pattern using the guidelines under "Tree & Shrub Establishment" in Appendix 1. Select sunny, well-drained areas near trails or create new openings by clearing existing trees and shrubs. Be sure to stump-treat cut trees and shrubs with appropriate herbicide to prevent re-sprouting.
2. Encourage young, healthy native trees – e.g. basswoods, walnuts or oaks – that are already established by cutting their nearest competitors so they have more room to grow.

Monitoring:

- Conduct survival checks on planted seedlings annually.

Natural Community 2: Wet Meadows

(60 Acres – 22 Management Units)

Management Overview

There are relatively few management opportunities in the wet meadows. The dominant grass, reed canary grass, is a stubborn invasive. Attempts to eradicate it and establish native vegetation in its place would be costly and run the risk of failure. Unfortunately reed canary grass offers few benefits to wildlife.

Unit MM-WM1 was a willow thicket until it was mowed in the fall of 2013, converting it to a wet meadow. Since mowing, the village has foliar-sprayed willow re-sprouts with herbicide. The willows are likely to continue re-sprouting for several years. The village should continue treating the re-sprouts until the population is eradicated.

Establishing native, flood-tolerant trees and shrubs following the recommendations for the riparian forest could enhance wet meadow habitat significantly. Planting widely spaced trees and scattered clumps of shrubs would preserve the open character of the meadows. Trees and shrubs would provide food sources – acorns and berries – and perching and nesting sites for songbirds that do no currently exist in the wet meadows.

Goal 1: Establish native trees and shrubs; encourage existing native trees.

Objectives:

- >80% of planted tree and shrub seedlings survive to the sapling stage (>3 feet tall).

Action:

Establish trees and shrubs in a natural-looking pattern using the guidelines under "Tree & Shrub Establishment" in Appendix 1. Select sunny, well-drained areas near trails or create new openings by clearing existing trees and shrubs. Be sure to stump-treat cut trees and shrubs with appropriate herbicide to prevent re-sprouting.

Monitoring:

- Conduct survival checks on planted seedlings annually until they reach sapling stage.

Goal 2: Control willow re-sprouts in Marvin & Marie Schweers Natural Area.

Objectives:

- Willows seedlings and re-sprouts are absent from Unit MM-WM1.

Action:

Foliar-spray willow re-sprouts with appropriate herbicide when they are actively growing. Be sure to use an herbicide with an aquatic label when saturated soil or

standing water is present.

Monitoring:

- Conduct "walk through" surveys annually to assess success of herbicide treatment and identify new willow re-sprouts or seedlings.

Natural Community 3: Sedge Meadows

(45 Acres – 8 Management Units)

Management Overview

As noted in the natural community description, the sedge meadow community is the highest quality remnant native plant community in the park. It contained little reed canary grass, which often dominates wet sites, or any other type of invasive exotic species. Red osier dogwood and willow shrubs were scattered across the sedge meadows in small numbers. They were confined to high spots and are therefore unlikely to spread.

Two units labeled "Riparian forest/Sedge meadow" (see map, Figure 7) were sedge meadows with sparse tree canopies of cottonwoods, willows, aspens and box elders. Although the tree canopies were light, they are probably suppressing sun-loving native wildflowers to some degree. However, because the sedge meadows are saturated for much of the year, it may be difficult to remove the trees without damaging the fragile soil and vegetation.

Rather than removing trees from these management units, the village could kill them by girdling them or felling and leaving them lay. However numerous standing dead and/or fallen trees might be considered unsightly to the public, which can view these areas from nearby trails.

As a relatively undisturbed native community, this is a likely setting for rare species, in particular the small white lady's-slipper and glade mallow**,** both mentioned in the "Natural Heritage Inventory & State Natural Areas" section. The best time to locate these plants is from spring to mid-summer, when they are flowering. Be sure to search for them before using herbicide in the sedge meadows.

Overall, there is little the village can do to improve the sedge meadows. They are kept intact naturally by steady ground water inflow. The village should encourage storm water best management practices in the neighborhoods, and future neighborhoods, that drain into the sedge meadows. In particular, rainwater infiltration practices at gutter downspouts like rain gardens should help sustain the flow of ground water.

Goal: Reduce tree cover.

Objective:

- ❖ Tree canopy cover is significantly reduced in the "Riparian Forest/Sedge Meadow" management units.

Actions:

1. Kill trees by "phloem-girdling". Strip the bark in a 12-inch wide band around the entire circumference of the tree. Apply appropriate herbicide (e.g. glyphosate or triclopyr) to the exposed inner bark. Be sure to use herbicide that is labeled for aquatic areas when the soil is saturated or standing water is present.
2. Alternatively, kill trees by felling them and applying herbicide to the cut stumps. Be sure to use herbicide that is labeled for aquatic areas when the soil is saturated

or standing water is present. Section tree tops into short lengths so they lay close to the ground and are therefore less conspicuous to trail users.

Monitoring:

- Check girdled and/or cut trees annually for 3 years after treatment to ensure they are dead.

Natural Community 4: Upland Forests

(41 Acres – 15 Management Units)

Management Overview

Apart from dense infestations of exotic brush (buckthorn & honeysuckle) in some areas, the upland forests are relatively intact natural communities requiring little help to maintain ecological functions. Nonetheless, Japanese hedge parsley was observed in very low abundance in some upland forest management units. It should be eliminated before it spreads further. The exotic shrubs, honeysuckle and buckthorn, should also be controlled to the best of the village's ability.

Garlic mustard is present in many of the upland forest units. A recent attempt to control garlic mustard in village parks was only moderately successful. It is possible that garlic mustard populations are too entrenched to eradicate. Hence the investigator does not recommend significant effort to control garlic mustard.

The village may first focus on clearing dense honeysuckle and buckthorn thickets in high public visibility areas (Figures 11-13). This will free up growing space to native plants in addition to opening views of trailside habitats. However, if it desires to, the village could attempt complete eradication of exotic brush, which means focusing on the low buckthorn/honeysuckle density units *first* and then progressing toward high-density units. This is an ambitious strategy that will require several years and a significant budget to accomplish.

Canopy thinning, outlined under Goal 2, is a strategy to enhance the beauty and ecological integrity of the upland forests by identifying healthy, long-lived trees and encouraging them by cutting their nearest competitors. In most cases this approach will be applied to white oaks, which offer many benefits to wildlife and have lifespans well beyond 100 years. This approach can also be applied to red oaks, basswoods and hickories.

Oak woodland restoration, outlined under Goal 3, involves removal of the majority of heavy shade casting, non-oak trees, e.g. black cherries, basswoods and box elders. This will increase sunlight on the forest floor and potentially increase abundance of sun-loving native wildflowers. The oak woodland can then be maintained by prescribed burning on a 2-5 year rotation. Since this option involves heavy tree removal, it may be frowned upon by the public. Nonetheless, an oak woodland restoration is already in progress in Unit WG-UF3, next to Mayapple Ct.

Exotic brush, primarily buckthorn, was recently cleared from three upland forest management units – Units CG-UF, UY-UF4, UY-UF7 – with a forestry mower. The village must now foliar-treat seedlings and re-sprouts to kill the shrubs. Completely killing shrubs will probably require several herbicide treatments over two or more years.

Timber Management Opportunities

Tree cutting under Goals 1 and 2 could generate logs for lumber utilization. Smaller white oaks, as well as black cherries and basswoods, among other timber species, will be cut to encourage large, healthy white oaks and bur oaks. Many of these cut trees will be large and straight enough to mill into lumber.

Black cherry is a fast-growing, shallow-rooted tree prone to tipping in high winds. There are large (>16 inches in diameter at breast height), tall black cherries scattered across most of the upland forests. Some of these could be cut and utilized for lumber before they succumb to high winds.

Tree cutting could generate significant quantities of firewood. Unlike the riparian forests, most of the timber species in the upland forests – particularly oaks and hickories – produce high-density wood prized for home heating.

Goal 1: Attempt to eradicate Japanese hedgeparsley; control dense honeysuckle and buckthorn infestations.

Objectives:

- Japanese hedgeparsley are completely absent.
- Dense infestations of buckthorn and honeysuckle are absent.

Actions:

1. Eradicate the scattered Japanese hedgeparsley plants (see map, Figures 10, 12 & 13) using the procedure outlined in Appendix 1.
2. Cut dense buckthorn and honeysuckle thickets using the techniques outlined in Appendix 1. See map on Figures 11-13 for locations of exotic shrub thickets alongside trails and streets.
3. Post signs at trailheads explaining control of invasives and discouraging off-trail walking so seeds of invasives have less chance being spread by shoes. Place boot brushes at trailheads to limit spread of seed of invasives, particularly garlic mustard, into or outside of the Park.

Monitoring:

- Conduct “walk through” inventories annually in spring or early summer to find new plants and colonies of crown vetch and Japanese Hedgeparsley.
- Conduct “walk through” inventories annually to search for surviving buckthorn and honeysuckle shrubs and seedlings.

Goal 2: Identify healthy, long-lived trees and cut their closest competitors.

Objectives:

- A significant number of target trees, mostly white oaks and bur oaks, are identified and “released”.

Action:

- Identify healthy trees of a desirable species and cut or girdle all, or most, neighboring trees whose crowns are crowding the target tree. Also cut most understory trees, sapling and shrubs directly beneath the target tree.

Monitoring:

- Recheck the cut or girdled trees annually for 3 years to ensure they are dead.

Goal 3: Create an oak woodland community by removing most non-oak trees and conducting prescribed burns.

Objectives:

- Approximately 90% of non-oak trees are cut or girdled and light levels to the forest floor are significantly increased.

Action:

1. Open-up the forest canopy by killing all non-oak hardwoods larger than 2 inches in diameter by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps. This should leave a canopy dominated by large oaks. If oaks are not the majority of the canopy, leave some shagbark hickories and black cherries as well. Also cut and treat all honeysuckle and buckthorn with herbicide. Native shrubs can be retained but should not cover more than 10% of the site.
2. Conduct annual prescribed burns for three years to control small woody stems (<2 inches in diameter). Thereafter, conduct burns on 2-5 year intervals.
3. If native plant species diversity is poor, hand-broadcast seed of native oak woodland grasses and forbs in the late fall. Late fall broadcast seedings, or "frost seedings", are effective since the action of rainfall, melting snow and frost work the seed into the soil.

Monitoring:

- Recheck the cut or girdled trees annually for 3 years to ensure they are dead.
- Conduct "walk through" inventories annually to evaluate success of native seeding and check for reinvasion of woody seedlings.

Natural Community 5: Native Prairie

(29 Acres – 6 Management Units)

The native prairies have been well cared for to date. In the Western Green Park prairie, native plant cover is nearly 100%. Invasive species are few and scattered – prescribed burning is apparently holding them in check.

Planted in 2014, the native prairies in Marvin & Marie Schweers Natural Area are just getting established. It is essential that the village burn these young prairies annually, provided there is enough fuel in the form of grass to carry fire, until they are fully established, a process that generally takes 3 to 6 years. Small populations of the invasive exotic plant, white sweet clover, were noted in these prairies. The sweet clover should be controlled immediately before it spreads.

Established native prairies should be burned on a 1-3 year cycle to maintain the dominance of native grasses and wildflowers over exotic plants, like reed canary grass, brome grass and Kentucky blue grass, which may invade the prairies. Late spring burns, i.e. past mid-April, are best to discourage cool-season exotic grasses and wildflowers, which are green and vulnerable to fire at this time.

Invertebrate populations, e.g. butterflies, flies, wasps, beetles and spiders, can suffer under annual prescribed burning as eggs or overwintering larvae and adults are destroyed by fire. To address this concern, divide the prairies into multiple burn units and burn one per season. This way some invertebrates are preserved to re-colonize burned areas. Alternate burning between units from year to year.

Goals: Attempt to eradicate sweet clover; continue annual burn management; control Canada thistle and wild parsnip.

Objectives:

- >90% of grass and forb relative cover is of native species typical of a mesic prairie.

Actions:

1. Attempt to eradicate sweet clover from the newly planted prairie in Marvin & Marie Schweers Natural Area following guidelines in Appendix 1.
2. Divide the prairies into burn units and continue burning annually or biennially, alternating among units.
3. Scout annually and control or eradicate populations of Canada thistle or wild parsnip that are found.

Monitoring:

- Conduct "walk through" inventories annually in the newly planted prairie in Marvin & Marie Schweers to find new or surviving colonies of sweet clover.
- Conduct “walk through” inventories annually, or as often as feasible, in all prairies to search for colonies of Canada thistle or wild parsnip.

Natural Community 6: Grassland

(7 Acres – 7 Management Units)

Dominated by exotic grasses, the grasslands are inferior to native prairies as wildlife habitat. However the benefits gained by replacing them with native grasses and forbs would probably not justify the expense of doing so. Therefore a practical approach is simply to control the most aggressive exotic plants – e.g. spotted knapweed, wild parsnip and honeysuckle – and to establish nut and fruit-bearing trees and shrubs for the benefit of wildlife.

Since young oaks are scarce in the parks, the grasslands present an ideal opportunity to establish them and thereby ensure their existence for future generations. Moreover, young oaks thrive in full sun and are therefore well suited to grassland planting sites.

Goal 1: Attempt to eradicate spotted knapweed; control wild parsnip and honeysuckle.

Objectives:

- Spotted knapweed is completely absent.
- Wild parsnip and honeysuckle are very minor components of the natural community.

Actions:

1. Eradicate the spotted knapweed plants (see map, Figures 10 & 12) using the procedures outlined in Appendix 1.
2. Control wild parsnip and honeysuckle using the techniques outlined in Appendix 1.

Monitoring:

- Conduct "walk through" inventories annually to find new or surviving colonies of spotted knapweed and wild parsnip, and new or surviving seedlings and shrubs of honeysuckle.

Goal 2: Establish native trees and shrubs; encourage existing native trees.

Objectives:

- >80% of planted tree and shrub seedlings survive to the sapling stage (>3 feet tall).

Action:

Establish trees and shrubs in a natural-looking pattern using the guidelines under "Tree & Shrub Establishment" in Appendix 1. Cut existing tree saplings and shrubs as necessary to create space for new plantings. Be sure to stump-treat cut trees and shrubs with appropriate herbicide to prevent re-sprouting.

Monitoring:

- Conduct survival checks on planted seedlings annually until they reach sapling stage.

Natural Community 7: Degraded Native Prairie

(4 Acres – 2 Management Units)

The degraded native prairie unit containing heavy reed canary grass cover (Unit WG-DNP2, Figure 6) should simply continue to be burned in the hope of gradually increasing native plant cover. However the unit containing heavy Canada goldenrod (Unit WG-DNP1) cover will probably not respond to fire since burning does not typically diminish Canada goldenrod. The only practical means to reduce Canada goldenrod is herbicide treatment. This is probably not worth the effort, especially considering Canada goldenrod is an important nectar and pollen source for insects, and therefore does provide ecological benefits.

"Interseeding" by hand-scattering prairie seed collected from the nearby prairies in late fall or winter could increase native cover in both degraded native prairie units.

Goal: Increase the abundance of native grasses and wildflowers and diminish abundances of reed canary grass (in Unit WG-DNP2).

Objectives:

- >75% of grass and forb relative cover is of native species typical of a mesic prairie.

Actions:

1. Conduct annual or biennial prescribed burns. When possible burn in late spring (i.e. past mid-April) to obtain better control of reed canary grass.
2. Collect seed from native grasses and wildflowers in the nearby prairie when the seed ripens and hand-scatter between November and late March. Frost action and snowmelt will work the seed into the soil during winter.

Monitoring:

- Following at least 3 years of prescribed burns, sample for native plant cover vs. reed canary grass cover using fixed-area plots. Declare success when the average native relative cover in the plots is more than 75%.

Natural Community 8: Marshes & Aquatic Beds

(5 Acres – 6 Management Units)

The marshes and aquatic beds provide many ecological benefits in their current state, however supplemental planting of aquatic species can enhance their value. The wildlife scrapes in Marvin & Marie Schweers Natural Area must be examined separately since they were recently dug and are currently empty of vegetation.

Pond margins (Sunfish Pond and storm water ponds of Western Green and Bakke) can be enhanced be planting floating-leaved aquatic plants, e.g. white water lily, in the deeper water beyond the emergent plant zone (emergent plants grow in shallow water – less than 18 inches; they include cattails and bulrushes). Floating-leaved plants are best planted in clear water less than 3 feet deep. Early summer, before surface algae mats develop, is a good planting time provided water is not too deep. White water lilies were planted on the northwest shoreline of Sunfish pond in 2014. The success of this planting should be assessed and the planting should be continued if there are water depths less than 3 feet in early summer.

The wildlife scrapes in Marvin & Marie Schweers Natural Area could be planted to emergent species, like bulrushes, bur reeds and arrowheads, on the basin side slopes, and submergent species, like wild celery and sago pondweed, in the basin bottoms where there is permanent standing water. If the scrapes are not planted soon, they will probably be colonized by reed canary grass and cattails.

Establishing emergent plants will consist of inserting plugs or live plants into the ground with a digging implement. Establishing floating-leaved and emergent plants will consist of anchoring tubers – large, fleshy belowground organs – to basin or pond bottoms.

A water control structure was installed at the outlet of the wildlife scrapes. It will enable raising and lowering of water levels in the scrapes. Water levels could be lowered to enable mowing or burning in the wet meadows surrounding the scrapes. They could also be lowered to create an exposed mud surface in late summer to attract migrating shorebirds. Subsequently they could be raised to create waterfowl habitat in fall and spring.

The bottom of the outlet pipe in the water control structure is roughly one foot higher than the bottoms of the wildlife scrapes (Kurt Waterstradt, U.S. Fish & Wildlife Service, personal communication). Therefore it will not be possible to drain the scrapes completely.

Goal: Increase the diversity and abundance of aquatic plants.

Objectives:

- The emergent/floating-leaved zone of the ponds is wider and possesses greater diversity of native plants.

Actions:

1. Plant plugs (i.e. container-grown plants) of emergent plants where average water depths are shallower than one foot. Plant rootstalks (i.e. bare-root plants) of submergent plants where average water depths are deeper than one foot. Secure the rootstalks to the bottom of the pond by wrapping a section of 13-gauge around them once and then inserting the ends of the wire into the soil. Rootstalks should only be half-buried. Plant in the spring or early summer to allow the plants time to develop before winter and to take advantage of relatively clear water.
2. Create wide, unmowed buffers – at least 20 feet – surrounding ponds. In Western Green Park, leave the swales that channels surface runoff into the ponds unmowed. This should reduce the quantity of nutrients entering the pond via surface runoff.

Monitoring:

- ❖ Conduct "walk through" inventories to check the survival and spread of the plants.

Storm Water Management Areas

(32 Units)

Unlike the conservancy parks, the SWMAs primary purpose is to influence the quantity and quality of storm water the village discharges to receiving water bodies – the Yahara River and its tributaries. Therefore management recommendations are focused on maintaining those functions, primarily by controlling encroachment of woody vegetation in the un-mowed segments of the SWMAs. Dense growth of shrubs and trees will impede the flow of water and potentially contribute woody debris that will clog basin outlets and pipes.

Invasive exotic plants, primarily Canada thistle, crown vetch and wild parsnip, were noted in many SWMAs. These plants will not impede the primary function of the SWMAs but they should still be controlled since they could spread outside the SWMAs and threaten nearby natural areas and domestic landscapes.

The sap of wild parsnip causes inflammation of the skin. Therefore, SWMAs near public trails that contain wild parsnip, e.g. SWMA 13 – Innovation Drive Pond and SWMA 14 – Innovation Drive to Conservancy Place, will require attention.

Biennial invasives, i.e. those with two-year life cycles that produce seed in the second year, can be partially controlled by well-timed mowing. The plants must be mowed when they are tall and have just developed flower buds. At this stage the plant has already expended most of its energy. Therefore, after being cut, the plant's roots are not able to regenerate another vigorous plant capable of setting viable seed. If biennial invasive plants are cut *after* setting seed, the mowers could spread the seed and thereby introduce the invasive plant into new areas.

Goal 1: Control, or eradicate, Canada thistle, crown vetch and wild parsnip.

Objectives:

- Canada thistle, crown vetch and wild parsnip are very minor components of the SWMAs.

Actions:

1. Control or eradicate Canada thistle, crown vetch and wild parsnip following the guidelines in Appendix 1.
2. To control wild parsnip (and other aggressive exotic biennials like queen anne's lace and white sweet clover), mow SWMAs in early June when the plants are tall but have not yet set seed.

Monitoring:

- Conduct "walk through" inventories in spring to evaluate invasive populations and establish mowing schedules.

Goal 2: Eradicate woody vegetation from SWMAs.

Objectives:

- Un-wanted shrubs and trees are absent from the SWMAs, particularly from the un-mowed pond margins.

Actions:

1. Kill woody vegetation following the guidelines in Appendix 1.
2. Alternatively, destroy woody vegetation using prescribed fire in the un-mowed areas, where there is sufficient fuel. Unlike herbicide treatment, fire will not completely kill woody plants, it will only top-kill them and thereby keep them in check temporarily.
3. Kill seed-bearing (female) box elders in the wooded areas close to SWMAs 8, 23 and 30 so they do not shed seed into the sites.

Monitoring:

- Conduct "walk through" inventories in spring or early summer to evaluate success of herbicide treatments on woody vegetation and to search for new seedlings.

Storm Water Management Area	Woody Encroach-ment	Nearby Seed Trees	Crown Vetch	Canada Thistle	Wild Parsnip	Other
SWMA 1 – Alliant	X		X			White sweet clover
SWMA 2 – Autumn Blaze I	X			X	X	
SWMA 3 – Autumn Blaze II				X		burdock
SWMA 4 – Bakke Pond						Purple loosetrife
SWMA 5 – Campbell Hill	X		X			
SWMA 6 – Chapel Green to I-90	X					
SWMA 7 – Chapel Green	X					
SWMA 8 – Chase Pond		X				
SWMA 9 – Dahl Park						White sweet clover
SWMA 10 – Highfield Terrace & Heritage Gardens Swales & Dry Basins					X	
SWMA 11 – Highfield Terrace & Heritage Gardens Pond	X					
SWMA 12 – Highway 19	X					
SWMA 13 – Innovation Drive Pond				X	X	

Storm Water Management Area	Woody Encroach-ment	Nearby Seed Trees	Crown Vetch	Canada Thistle	Wild Parsnip	Other
SWMA 14 – Innovation Drive to Conservancy Place Drainage-way & Basins				X	X	
SWMA 15 – Liberty Land Park	X					
SWMA 16 – Mayapple Court						
SWMA 17 – Meadowview Park						
SWMA 18 – North Industrial Park						
SWMA 19 – Old Indian Trail			X			
SWMA 20 – Prairie Fire Court Basin	X					Buckthorn, honey-suckle, autumn olive, multiflora rose
SWMA 21 – River Road & Innovation Drive Basin						
SWMA 22 – River's Turn Park						
SWMA 23 – Sunnybrook Park		X				
SWMA 24 – Veteran's Park						
SWMA 25 – Vinburn Road North		X				
SWMA 26 – Vinburn Road South	X					
SWMA 27 – Walgreens			X	X		
SWMA 28 – Western Green Infiltration Basins	X			X		
SWMA 29 – Western Green Ponds			X			
SWMA 30 – Woods Glen Court		X		X		
SWMA 31 – Yahara Park	X			X		
SWMA 32 – Yankee Conservancy	X			X		

Figures

Management Unit Label Key:



Park.
MM= Marvin & Marie Schweers Natural Area
B=Bakke
V=Veteran's Park
WG=Western Green Park
CG=Chapel Green
WdGn=Woods Glen
UY=Upper Yahara River Corridor
R=Reigstad Park

Natural Community & Unit Number.
RF=Riparian Forest
WM=Wet Meadow
SM=Sedge Meadow
UF=Upland Forest
Gr=Grassland
NP=Native Prairie
DNP=Degraded Native Prairie
M&AB=Marsh & Aquatic Beds

References

Curtis, J.T. 1959. The Vegetation of Wisconsin. University of Wisconsin Press, Madison, WI.

Ehrlich, P.R., Dobkin, D.S., Wheye, D. 1988. The Birder's Handbook. A Field Guide to the Natural History of North American Birds. Simon & Schuster, New York, NY.

Hole, F.D. 1976. Soils of Wisconsin. University of Wisconsin Press, Madison, WI.

Hunt, R .J., et al. 2006. Evaluating the Effects of Nearshore Development on Wisconsin Lakes. United States Geoligical Survey.

Finley, R.W. 1951. Original Vegetation Cover of Wisconsin. Ph.D. thesis. University of Wisconsin, Madison.

Glocker, C.L. and Patzer, R.A. 1978. Soil Survey of Dane County. USDA, Soil Conservaton Service.

Johnson, P.S. 1993. Perspectives on the Ecology and Silviculture of Oak-Dominated Forests in the Central and Eastern States. USDA Forest Service. North Central Forest Experiment Station. St. Paul, MN.

Kopiztke, D.A. and Sweeney, J.M. 2000. Threatened and Endangered Species in Forests of Wisconsin. International Paper Co.

Mickelson, D.M. and McCartney M.C. 1979. Glacial Geology of Dane County, Wisconsin. University of Wisconsin-Extension Geological and Natural History Survey.

Palmquist, R. 1965. Geomorphic development of part of the Driftless Area, southwest Wisconsin. Ph.D. thesis, University of Wisconsin, Madison.

Sample, D.W. and Mossman, M.J. 1997.Managing Habitat for Grassland Birds: A Guide for Wisconsin. WI. Department of Natural Resources. Madison, WI.

Schmidt, K. and Whelen, C. 1999. "Effects of exotic Lonicera and Bhamnus on exotic songbird nest predation". *Conservation Biology* 6: 1502.

Schultz, Gwen M. 1986. Wisconsin's Foundations: A Review of the State's Geology and Its Human Influence on Geography and Human Activity. University of Wisconsin Press, Madison, WI.

Society for Ecological Restoration (SER) International Science & Policy Working Group. 2004. The SER International Primer on Ecological Restoration. *www.ser.org* & Tucson: Society for Ecological Restoration International.

WI. Department of Natural Resources (DNR). 1995. Wisconsin's Biodiversity as a Management Issue.

WI. Department of Natural Resources (DNR). 1999. DNR Ecological Landscapes of Wisconsin.

WI. Department of Natural Resources (DNR). 2001. Lower Rock River Water Quality Management Plan.

Appendix 1: Management Techniques

Garlic Mustard Control

1. Spray the plants with herbicide in late fall, winter (when warmer than 38 degrees), or early spring before seeds have formed (March or April). Alternatively hand-pull the plants in spring before seeds have formed. If any hand-pulled plants have flowers or seed, they must be bagged and removed from the site.
2. Kill the small first-year garlic mustard seedlings in late spring or early summer (May or June) by burning them with a hand-held torch, conducting a prescribed burn over the entire site or spraying with herbicide. Continue steps 1 and 2 annually until garlic mustard is completely eradicated.
3. Scout annually, in fall or early spring, for new colonies. Especially search along deer or human trails.

Japanese Hedgeparsley Control

1. Foliar-spray first year plants, or second year plants before they have flowered (flowering time is July to August), with herbicide (only spray when warmer than 38 degrees).
2. Second-year plants can be hand-pulled. If flower buds or seeds are present on the plants, the plants must be bagged and removed from the site.

Buckthorn & Honeysuckle Control

1. Kill buckthorn and honeysuckle by cutting and treating cut stumps with a triclopyr (for buckthorn) or glyphosate-based (for buckthorn or honeysuckle) herbicide. Buckthorn (but not honeysuckle) can also be killed by basal bark-treating it triclopyr-based herbicide with bark-penetrating properties.
2. Foliar-treat buckthorn seedlings and re-sprouts with triclopyr-based herbicide (e.g. Garlon 4 or Element 4) when they are actively growing, i.e. from May to September. Alternatively, hand-pull the seedlings. Foliar-treat honeysuckle seedlings & re-sprouts with metsulfuron methyl (e.g. Escort XP).
3. Return to the site annually to search for new colonies of seedlings or surviving re-sprouts and re-treat them.

Crown Vetch, Spotted Knapweed, Burdock & Canada Thistle

1. Foliar-spray with herbicide during the early flower bud stage (early summer). Choose an aminopyralid-based herbicide (e.g. Milestone) formulation or glyphosate-based herbicide formulation for any of the species. Spotted knapweed can also be hand-pulled.
2. Spray surviving plants again in late summer or fall.
3. Repeat steps 1 and 2 for as many years as necessary to achieve control of these species.

Wild Parsnip & Sweet Clover Control

1. Hand-pull or mow 2nd year plants in the early flower bud stage (usually mid to

late June). Alternatively cut the roots of 2nd year plants 1 inch below ground with a spade.
2. Repeat these steps annually.
3. Late spring prescribed burns will in some cases kill, or set back, 2nd year plants.

Note: Wild parsnip sap is "phototoxic", meaning that if it contacts your skin when exposed to sunlight, it causes burns and blisters. Always wear long pants, long-sleeved shirts and gloves when working near wild parsnip.

Oak Savanna/Woodland Restoration

1. Open-up the forest canopy by killing all non-oak hardwoods that are larger than 2 inches in diameter by girdling, basal bark treatment with appropriate herbicide, or cutting and herbiciding cut stumps. This should leave a canopy dominated by oaks. If oaks comprise less than 50% of the canopy, leave some shagbark hickories as well. Also cut and treat all honeysuckle and buckthorn with herbicide. Native shrubs can be retained but should not cover more than 10% of the site. Woody debris can be piled and burned when snow cover is present.
2. Conduct annual prescribed burns for three years to control small woody stems (<2 inches in diameter). Thereafter, conduct burns on 2-4 year intervals.
3. If characteristic oak woodland grasses and wildflowers are not increasing in abundance after three years of prescribed burning, hand-broadcast seed of native oak savanna grasses and forbs in the late fall. Late fall broadcast seedings, or "frost seedings", are effective since the action of rainfall, melting snow and frost work the seed into the soil.

Prairie Establishment

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

1. Kill existing grasses and herbs by foliar-spraying with a broad-spectrum (glyphosate-based) herbicide. Kill existing trees and shrubs by cutting and stump treating with glyphosate or triclopyr-based herbicides. Broadcast spraying of grasses and herbs should begin in spring and be done at least 3 times during the growing season. Establish a cover crop of oats or annual rye in September on erosion-prone sites. Annual weeds will probably serve as a cover crop on non-erosion-prone sites. If necessary due to persistence of weeds, repeat herbicide treatments for a second growing season. If you are planting a field that has been in row-crops like corn or soybean, this step is not necessary since weed control has already been done.
2. Broadcast or drill seed of native grasses and wildflowers, preferably of local genotypes, in October or November. Or drill 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 frost work the seed into the soil.

3. Mow weeds to a height of 6-12 inches every 4-6 weeks during the *first* post-planting growing season to prevent them from smothering young prairie plants. Mowing lower than 6 inches may result in harm to young, developing prairie plants. Spot-spray herbicide as needed to control aggressive perennials, like Canada goldenrod or Canada thistle.
4. If there is enough fine fuel in the form or grasses, during the *second* post-planting season, burn the site in spring. If not, just mow it to a height of 4 inches once in the spring. Then halt mowing and continue spot spraying as needed.
5. Begin burning annually starting the *third* post-planting growing season, if there is enough fuel. Late spring burns (late April to mid-May) will achieve better control of undesirable exotic species than early spring or fall burns. Once the prairie is established, divide it into sections and rotate burns every 1-3 years among sections.

Tree & Shrub Establishment

1. Mark planting sites with orange pin flags. For tree planting sites, space flags at least 8 feet apart. For shrub sites, space flags at least 6 feet. Hand-plant tree and shrub seedlings in spring (April is best, when conditions are cool and moist) using a shovel or planting bar. Immediately following planting, kill all ground-layer vegetation with foliar herbicide in a 4-foot radius surrounding each seedling (ideally the seedling is still dormant but if necessary protect it from overspray with a shield of some sort) to eliminate competition for moisture and nutrients. Return in mid-summer to treat weeds that germinate and grow through the dead sod.
2. Mow weeds and grasses in fall to reduce small mammal habitat — small mammals might girdle seedlings during winter by feeding on their stems.
3. Protect seedlings from deer herbivory by erecting 5-foot tall welded wire cages surrounding each seedling. Alternatively, plastic tree tubes or vinyl diamond mesh protectors, secured with wood or bamboo stakes, can be installed.
4. Continue mowing and spraying around seedlings every 4-6 weeks for as many growing seasons as it takes for >80% of seedlings to become saplings (>3 feet tall).
5. Replant in spring where tree seedlings died.

Appendix 2: Glade Mallow & Small White Lady's-slipper

Glade Mallow: Special Concern

(Napaea dioica)



Prefers Wet Meadows; blooms from early June to mid-August.

Small White Lady's-slipper: Threatened

(Cypripedium candidum)



Prefers wet prairies and fens; blooms from mid-May to mid-June.

Appendix 3: Plant Species List

Note: "Coefficient of Conservatism" is a measure of a plant species' sensitivity to disturbance and tendency to occur in relatively undisturbed remnant native plant communities. Plants with higher numbers are more sensitive to disturbance and are generally not as common on the landscape. **"Wetland Indicator Status"** indicates the likelihood of a species' occurring inside of a wetland, as follows:

Obligate Wetland (OBL). Occur almost always (estimated probability >99%) under natural conditions in wetlands.
Facultative Wetland (FACW). Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.
Facultative (FAC). Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).
Facultative Upland (FACU). Usually occur in non-wetlands (estimated probability 67%-99%), but occasionally found in wetlands (estimated probability 1%-33%).
Obligate Upland (UPL). Occur in wetlands in another region, but occur almost always (estimated probability >99%) under natural conditions in non-wetlands in the region specified.

Species	Life Form	Native or Alien	Coefficient of Conservatism	Wetland Indicator Status
American elm (Ulmus americana)	Tree	Native	3	FacW-
Angelica (Angelica atropurpurea)	Perrenial Forb	Native	6	Obl
Arrowhead (Sagittaria latifolia)	Semi-aquatic Forb	Native	None	Obl
Basswood (Tilia americana)	Tree	Native	5	FacU
Beggar-ticks (Bidens frondosa)	Annual Forb	Native	1	FacW
Bergamont (Monarda fistulosa)	Perrenial Forb	Native	3	FacU
Big bluestem (Andropogon gerardii)	Perrenial Grass	Native	4	Fac-
Bittersweet nightshade (Solanum dulcamara)	Herbaceous Vine	Alien	None	Fac
Black cherry (Prunus serotina)	Tree	Native	3	FacU
Black oak (Quercus velutina)	Tree	Native	5	Upl
Black raspberry (Rubus occidentalis)	Shrub	Native	2	Upl
Black walnut (Juglans nigra)	Tree	Native	3	FacU

Black wild currant (Ribes americanum)	Shrub	Native	4	FacW
Black willow (Salix nigra)	Tree	Native	4	Obl
Blackberry (Rubus allegheniensis)	Shrub	Native	2	FacU+
Black-eyed susan (Rudbeckia hirta)	Biennial Forb	Native	4	FacU
Blue-joint grass (Calamagrostis canadensis)	Perrenial Grass	Native	5	Obl
Blue vervain (Verbena hastata)	Perrenial Forb	Native	3	FacW+
Bluegrass (Poa pratensis)	Perrenial Grass	Alien	None	Fac-
Blunt spike-rush (Eleocharis obtusa)	Annual/Perrenial Sedge	Native	3	Obl
Boneset (Eupatorium perfoliatum)	Perrenial Forb	Native	6	FacW+
Box elder (Acer negundo)	Tree	Native	0	FacW-
Broadleaved cattail (Typha latifolia)	Perrenial Semi-aquatic	Native	1	Obl
Brome-grass (Bromus inermis)	Perrenial Grass	Alien	None	Upl
Buckthorn (Rhamnus cathartica)	Shrub	Alien	None	Fac-
Bugleweed (Lycopus americanus)	Perrenial Forb	Native	4	Obl
Bull-thistle (Cirsium vulgare)	Biennial Forb	Alien	None	FacU-
Bur oak (Quercus macrocarpa)	Tree	Native	None	Fac-
Burdock (Arctium minus)	Biennial Forb	Alien	None	Upl
Burreed (Sparganium americanum)	Perrenial Aquatic	Native	8	Obl
Canada anemone (Anemone canadensis)	Perrenial Forb	Native	4	FacW
Canada goldenrod (Solidago canadense)	Perrenial Forb	Native	1	FacU

Canada moonseed (Menispermum canadense)	Woody Vine	Native	5	Fac
Canada thistle (Cirsium arvense)	Perrenial Forb	Alien	None	FacU
Canada tick trefoil (Desmodium canadense)	Perrenial Forb	Native	4	Fac-
Chokecherry (Prunus virginiana)	Shrub	Native	3	Fac-
Cinquefoil (Potentilla simplex)	Perrenial Forb	Native	2	FacU-
Clearweed (Pilea pumila)	Annual Forb	Native	3	FacW
Common milkweed (Asclepias syriaca)	Perrenial Forb	Native	1	Upl
Compass plant (Silphium laciniatum)	Perrenial Forb	Native	8	FacW-
Cottonwood (Populus deltoides)	Tree	Native	2	Fac+
Cranberry viburnum (Viburnum opulus)	Shrub	Alien	None	FacW
Creeping charlie (Glechoma hederacea)	Perrenial Forb	Alien	None	FacU
Crown Vetch (Coronilla varia)	Perrenial Forb	Alien	None	Upl
Culver's root (Veronicastrum virginicum)	Perrenial Forb	Native	6	Fac
Cupplant (Silphium perfoliatum)	Perrenial Forb	Native	4	FacW-
Curly dock (Rumex crispus)	Perrenial Forb	Alien	None	Fac+
Daisy fleabane (Erigeron annuus)	Annual Forb	Native	0	Fac-
Dame's rocket (Hesperis matronalis)	Biennial Forb	Alien	None	Upl
Dark-green bulrush (Scirpus atrovirens)	Perrenial Sedge	Native	3	Obl

Elderberry (Sambucus canadensis)	Shrub	Native	3	FacW-
Enchanter's nightshade (Circaea lutetiana)	Perrenial Forb	Native	2	FacU
False sunflower (Heliopsis helianthoides)	Perrenial Forb	Native	5	Upl
Floating pondweed (Potamogeton natans)	Perrenial Aquatic	Native	5	Obl
Fox sedge (Carex stipata)	Perrenial Sedge	Native	2	Obl
Frost aster (Aster pilosus)	Perrenial Forb	Native	1	FacU+
Garlic mustard (Alliaria petiolata)	Biennial Forb	Alien		Fac
Giant goldenrod (Solidago gigantea)	Perrenial Forb	Native	3	FacW
Giant ragweed (Ambrosia trifida)	Annual Forb	Native	0	Fac+
Gooseberry (Ribes missouriense)	Shrub	Native	4	Upl
Grey dogwood (Cornus racemosa)	Shrub	Native	2	FacW-
Hackberry (Celtis occidentalis)	Tree	Native	4	Fac-
Hawkweed (Hieracium aurantiacum)	Perrenial Forb	Alien	None	Upl
Heal-all (Prunella vulgaris)	Perrenial Forb	Alien	None	Fac
Hedge parsnip (Torilis japonica)	Annual Forb	Alien	None	Nl
Hog-peanut (Amphicarpaea bracteata)	Herbaceous vine	Native	5	Fac
Honeysuckle (Lonicera X bella)	Shrub	Alien	None	Upl
Horsetail (Equisetum arvense)	Perrenial Fern Ally	Native	1	Fac

Hybrid cattail (Typha X glauca)	Perrenial Semi-aquatic	Alien	None	Obl
Indian grass (Sorghastrum nutans)	Perrenial Grass	Native	5	FacU+
Ironweed (Vernonia Fasciculata)	Perrenial Forb	Native	5	FacW
Jerusalem artichoke (Helianthus tuberosus)	Perrenial Forb	Native	2	Fac
Jewelweed (Impatiens capensis)	Annual Forb	Native	2	FacW
Joe-pye weed (Eupatorium maculatum)	Perrenial Forb	Native	4	Obl
Lake sedge (Carex lacustris)	Perrenial Sedge	Native	6	Obl
Marsh aster (Aster lanceolatus)	Perrenial Forb	Native	4	NI
Marsh milkweed (Asclepias incarnata)	Perrenial Forb	Native	5	Obl
May-apple (Podophyllum peltatum)	Perrenial Forb	Native	4	FacU
Monkey flower (Mimulus ringens)	Perrenial Forb	Native	6	Obl
Motherwort (Leonurus cardiaca)	Perrenial Forb	Alien	None	Upl
Mountain mint (Pycnanthemum virginianum)	Perrenial Forb	Native	6	FacW+
Narrow-leaved cattail (Typha angustifolia)	Perrenial Semi-aquatic	Alien	None	Obl
Narrow-leaved hedge nettle (Stachys tenuifolia)	Perrenial Forb	Native	6	FacW+
Narrow-leaved loostrife (Lysimachia quadriflora)	Perrenial Forb	Native	9	Obl
New england aster (Aster novae-angliae)	Perrenial Forb	Native	3	FacW
Nodding bur marigold (Bidens	Annual Forb	Native	4	Obl

cernuus)				
Nodding thistle (Carduus nutans)	Biennial Forb	Alien	None	Upl
Ox-eye daisy (Leucanthemum vulgare)	Perrenial Forb	Alien	None	Upl
Path rush (Juncus tenuis)	Perrenial Rush	Native	1	Fac
Prairie dock (Silphium terebinthinaceu m)	Perrenial Forb	Native	7	FacU
Purple loosetrife (Lythrum salicaria)	Perrenial Forb	Alien	None	Obl
Purple prairie clover (Dalea purpureum)	Perrenial Forb	Native	7	Upl
Purple-stem aster (Aster puniceous)	Perrenial Forb	Native	5	Obl
Pussy willow (Salix discolor)	Shrub	Native	2	FacW
Quackgrass (Elytrigia repens)	Perrenial Forb	Alien	None	FacU
Queen anne's lace (Daucus carota)	Biennial Forb	Alien	None	Upl
Rattlesnake master (Eryngium yuccifolium)	Perrenial Forb	Native	8	Fac+
Red baneberry (Actaea rubra)	Perrenial Forb	Native	7	Upl
Red osier dogwood (Cornus stolonifera)	Shrub	Native	3	FacW
Red-top grass (Agrostis gigantea)	Perrenial Grass	Alien	None	NI
Reed canary grass (Phalaris arundinacea)	Alien Grass	Alien	None	FacW+
Rice cutgrass (Leersia oryzoides)	Perrenial Grass	Native	3	Obl
River-bank grape (Vitis riparia)	Woody Vine	Native	2	FacW-
Rosinweed (Silphium integrifolium)	Perrenial Forb	Native	6	Upl
Sandbar willow (Salix exigua)	Shrub	Native	2	Obl

Sawtooth sunflower (Helianthis grosseseratus)	Perrenial Forb	Native	2	FacW-
Side-flowering aster (Aster lateriflorus)	Perrenial Forb	Native	None	FacW-
Silver maple (Acer saccharinum)	Tree	Native	2	FacW
Soft-stem bulrush (Schoenoplectus tabernaemontani)	Perrenial Sedge	Native	4	Obl
Solomon's plume (Maianthemum racemosum)	Perrenial Forb	Native	None	FacU
Solomon's seal (Polygonatum biflorum)	Perrenial Forb	Native	4	FacU
Sow-thistle (Sonchus arvensis)	Perrenial Forb	Alien	None	Fac-
Spiderwort (Tradescantia ohiensis)	Perrenial Forb	Native	5	FacU+
Spotted knapweed (Centaurea biebersteinii)	Biennial Forb	Alien	None	Upl
Staghorn sumac (Rhus hirta)	Shrub	Native	2	Upl
Stickseed (Hackelia virginiana)	Biennial Forb	Native	3	Fac-
Stiff goldenrod (Solidago rigida)	Perrenial Forb	Native	5	FacU-
Stinging nettles (Urtica dioica)	Perrenial Forb	Native	1	Fac+
Swamp aster (Aster firmus)	Perrenial Forb	Native	6	FacW+
Sweet cicely (Osmorhiza claytonii)	Perrenial Forb	Native	5	FacU-
Sweet-scented bedstraw (Galium triflorum)	Perrenial Forb	Native	5	FacU+
Tall meadowrue (Thalictrum daycarpum)	Perrenial Forb	Native	4	FacW-
Turk's cap lily (Lilium michiganense)	Perrenial Forb	Native	6	Fac+

Tussock sedge (Carex stricta)	Perrenial Sedge	Native	7	Obl
Violet species (Viola sp.)	Perrenial Forbs	?	?	?
Virginia waterleaf (Hydrophyllum virginianum)	Perrenial Forb	Native	4	FacW-
Virgin's bower (Clematis virginiana)	Woody Vine	Native	4	Fac
Water plantain (Alisma subcordatum)	Perrenial Semi-aquatic	Native	3	Obl
Water smartweed (Polygonum amphibian)	Perrenial Semi-aquatic Forb	Native	4	Obl
White ash (Fraxinus americana)	Tree	Native	5	FacU
White avens (Geum canadense)	Perrenial Forb	Native	2	Fac
White muberry (Morus alba)	Tree	Alien	None	Fac
White oak (Quercus alba)	Tree	Native	7	FacU
White snakeroot (Eupatorium rugosum)	Perrenial Forb	Native	1	FacU
White sweet clover (Melitotus alba)	Biennial Forb	Alien	None	FacU
White vervain (Verbena urticifolia)	Perrenial Forb	Native	2	Fac+
White water lily (Nymphaea odorata)	Perrenial Aquatic	Native	6	Obl
White wild indigo (Baptisia alba)	Perrenial Forb	Native	8	FacU
Wild cucumber (Echinocystus lobata)	Heraceous Vine	Native	2	FacW-
Wild Geranium (Geranium maculatum)	Perrenial Forb	Native	4	FacU
Wild parsnip (Pastinaca sativa)	Biennial Forb	Alien	None	Upl
Wild quinine (Parthenium integrifolium)	**Threatened** Perrenial Forb	Native	8	Upl
Woodbine (Parthenocissus	Woody Vine	Native	5	Fac-

quinquefolia)				
Woodland sunflower (Helianthus strumosus)	Perrenial Forb	Native	4	Upl
Yarrow (Achillea millefolium)	Perrenial Forb	Native	1	FacU
Yellow avens (Geum aleppicum)	Perrenial Forb	Native	3	Fac+
Yellow coneflower (Ratibida pinatta)	Perrenial Forb	Native	4	Upl
Yellow sweet clover (Melitotus officinalis)	Biennial Forb	Alien	None	FacU
Yellow wood sorrel (Oxalis corniculata)	Perrenial Forb	Alien	None	FacU