

2361 Dewes Street
Glenview, IL 60025
February 18 2016

Larry Suffredin, Commissioner
Forest Preserve District of Cook County
Suite 192
820 Davis Street
Evanston, IL 60201

Dear Larry,

Our annual reports on restoration activities in Miami and ST Paul Woods and on ecological conditions in Miami Woods and Prairie are attached for your information. The restoration report focuses on activities while the report on ecological conditions focuses on the six aspects of habitat and ecological health.

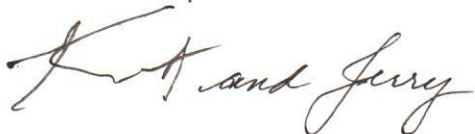
Restoration activities in Miami Woods and Prairie involved 19 workdays and 1,745 volunteer hours bringing the total since 2001 to 382 days and 30,554 hours. During 2015 there was a major initiative to begin returning native shrubs to the Miami side of the river with the Audubon project planting and caging 570 shrubs of 17 species. An additional 90 native shrubs grown in the Oakton College greenhouse were planted in a large deer enclosure

In the north half of St Paul Woods, restoration activities involved 15 workdays and 822 hours, bringing the total since 2011 to 72 days and 4,521 hours.

In both preserves, conditions remain dominated by the excess number of white tailed deer. No woody seedlings survived winter browsing on either side of the river except within deer enclosures as has been the case for more than 10 years.

On the Miami side of the river brush removal neared completion and grasses and sedges continue to thrive along with broad-leafed species not eaten by deer. But most broad-leafed species declined including prairie dock which was not seen during 2015.

On the St Paul side of the river brush removal continued in the northern half of the Preserve, but recovery was prevented by deer browsing.

A handwritten signature in cursive script that reads "Kent and Jerry".

Kent and Jerry Fuller
Stewards

MIAMI WOODS & PRAIRE &

ST PAUL WOODS

2015 RESTORATION UPDATE



Kent & Jerry Fuller,
Volunteer Stewards

North Branch Restoration Project

1/1/2016



2015 MIAMI WOODS and ST PAUL WOODS RESTORATION ACTIVITIES

History and Geography

Miami Woods and St Paul Woods Preserves bracket the North Branch of the Chicago River for a mile between Dempster and Oakton Streets in the Village of Morton Grove. They contain approximately 265 acres and are part of the system of preserves that provides a corridor stretching along the river from within the City of Chicago northward to its headwaters in Lake County. All of the land in Miami and St Paul was used for agriculture for almost 100 years, either cultivated for crops or used for pasture. Additionally, a portion of St Paul was used as Klem's commercial picnic grove for many years before reverting to agriculture by the time of the first aerial photo in 1925. A remnant of Klem's grove can still be seen in the row of old catalpa trees lining the large open field in the north end of the preserve. The trees once lined the entrance drive from the Morton Grove train station used by visitors arriving by rail.

The watershed of the North Branch is part of the Lake Border Morainic system consisting of five north-south moraines formed primarily of clayey glacial till that form the shallow valleys of the Des Plaines River and the tributaries to the Chicago River. At their southern end, the moraines merge with the older Chicago Lake Plain formed by ancient Lake Chicago. Miami and St Paul are within the lake plain where it meets the Park Ridge moraine.

At the time of the original public land survey in 1839 the river wandered through shallow sloughs without a well defined channel and probably stopped flowing in dry seasons. Since then, much of it was dredged and straightened to provide drainage for farming and to accelerate storm drainage from urban areas. Runoff patterns have changed from absorption by natural vegetation to "flashy" peak flows from roofs and pavement. Dry weather flows are now augmented by a steady supply of used Lake Michigan water released from sewage treatment plants. Between Dempster and Oakton the river was straightened near the two streets leaving a dry oxbow near Dempster and a wet oxbow near Oakton. The middle portion does not appear to have been straightened although either dredging or increased flows have created a well defined channel which has eroding banks on the cutting side of the meanders. Restoration of floodplain areas remains an unsolved ecological puzzle. The 1925 aerial photo shows much of floodplain and surrounding area to be farm fields with some of the area in open woods with space between tree canopies.

The landscape is similar on both sides of the river having been shaped by the receding Wisconsin glacier a bit more than 100 centuries ago. Topography divides the site into three zones. The normal level of the river is at about 610 feet above sea level. The flood plain rises from about 610 to a bit less than 615 feet; relatively narrow transition slopes rise from about 615 to 620 feet; and the gently sloping uplands rise from about 620 to 625 feet. There is a riffle area approximately one third of the way south of Dempster which is currently used by middle and high school students for river studies. During the existence of Klem's picnic grove a low dam was constructed there to support boating on the river. It is thought that the riffle with its large glacial rocks was the site of a Native American fishing weir in earlier times.

Restoration Overview

Full restoration is well underway in Miami following the restoration strategy of the North Branch Restoration Project. In general the strategy is to: rescue and protect remnant populations of native



species; control invasive species; return controlled fire to the landscape; thin young trees to return sunlight to the ground layer; and reintroduce seed of native plants gathered from within the North Branch watershed. Unfortunately recovery is limited to species not eaten by deer due to the excessive unmanaged deer herd.

Restoration activities in St Paul are limited to control of invasive species and thinning of excess fire sensitive trees. Recovery of the area is severely limited by both the deer herd and a ban on reintroduction of seed.

Restoration in Miami began in 1977 primarily in the Prairie. Restoration was stopped by an ill-advised moratorium on all restoration imposed in 1996 and continuing for five years. Late in 2001 work resumed with a major effort to restore woodlands, including work by school groups that had been conducting river studies in the riffle area and become interested in restoration. When buckthorn was eliminated from areas near the riffle area on the Miami Side of the river, work was expanded into St Paul in 2011.

Miami Woods Restoration

Miami Woods contains about 112 acres, nearly all of which is covered with natural vegetation and is being actively managed to restore it to full health. A few acres between the parking lot and the intersection of Caldwell Avenue and Oakton Street are being left as non-native brush to retain a visual and sound buffer. Additionally there are about three acres of turf grass area associated with the picnic shelter. Except for the Caldwell/Oakton buffer and a short stretch of brush northward along Oakton, invasive woody species have been removed from all of Miami Woods as of the close of 2015.

During 2015, the native plant communities continued to recover from decades of invasion by brush and other invasive species. However, recovery has been limited to species not eaten by deer. This has resulted in continuing recovery of grass and sedges and a few species of broad-leafed plants, but not most broad-leafed species.

Miami Workday Summary

Year	Workdays	Volunteer Visits	Cut Brush	Pull Garlic Mustard	Gather Seeds	Education	Total Hours
2015	19	555	915	221	210	399	1745
2001-15	382	9224	19189	3785	2397	5183	30554

Since resumption of restoration in 2001 there have been 382 workdays involving 9,224 volunteer visits. Volunteers have contributed 25,371 hours of stewardship work. 76% of the effort has been in cutting brush, 15% pulling garlic mustard, and 9% gathering seed. There have also been 30,554 hours of organized educational activity during the period, primarily devoted to river studies.

Workdays during 2015 were devoted to pulling garlic mustard, gathering seed and removing brush. Most of the brush removal was concentrated in the badly degraded area along Caldwell Avenue from the parking lot north to the prairie, and along Dempster Street. Elsewhere thinning of fire-sensitive trees is being continued to maintain the amount of sunlight reaching the herbaceous layer.

During 2015 there were 19 workdays where 555 volunteer visits contributed a total of 1,346 hours of work. Brush cutting accounted for 68% of the hours, garlic mustard removal for 16%, and seed gathering for 16%. The North Branch Wednesday Seed Team also gathered seed in Miami on two days involving 24 volunteer visits and 54 hours of work.

Groups working in Miami Woods during 2015 included: the Chicago City Day School on 4 days, Wright College on 6 days, and Carl Shurz High School 2 days, the North Branch Wednesday Woodchoppers 4 days. The remaining days were North Branch Restoration Project events which included North Branch volunteers plus students from a variety of schools.

Herbaceous invasive species and seedlings of woody invasives are being controlled using herbicide applied by the site stewards. One exception is garlic mustard which is pulled by hand. The invasive celandine buttercup, *ranunculus ficaria*, is continuing to emerge as a major threat to the riparian wetland, and is not fully controlled. Herbicide was applied by the stewards on seven days, primarily to control celandine buttercup and thistles, but also small populations of reed canary grass, the common reed, crown vetch, and bird's foot trefoil. The Audubon interns also assisted by applying herbicide to buckthorn seedlings on four days with a total of 106 hours of work. Garlic mustard was pulled during six workdays and the stewards pulled on two additional days.

Fire was reintroduced to the open areas beginning in 2008 after a hiatus of more than 10 years. The main prairie has been burned six times since 2008, most recently in November of 2014. The extent and intensity of prairie burns has varied greatly depending on weather conditions.

During 2015, controlled burning was conducted in the spring by a Forest Preserve contractor which resulted in the burning of 8 wooded units. The eastern tip of the prairie (PR01) was burned in the fall of this year, but the adjacent wooded areas did not burn.

DEER and the YEAR of the SHRUB

The the near absence of native shrubs in Miami Woods, due to its agricultural history and the unmanaged deer herd, resulted in very limited nesting habitat for shrub-land birds. To address the problem, Audubon Chicago Region obtained a grant to reintroduce native shrubs to provide habitat for migratory and nesting birds. As a result, 2015 has been the Year of the Shrub in Miami Woods. Shrubs grown as nursery seedlings in 2014 were planted in Miami during 2015. 570 shrubs of 17 species were planted in deer-proof wire cages throughout the Preserve. Additionally the District provided materials for a large deer enclosure just north of the Caldwell Avenue parking lot which has been planted with 90 other shrubs grown by volunteer Ken Schaffer in the Oakton Community College greenhouse.

The District's Audubon interns assisted with the planting and placement of cages, and also erected the main Caldwell enclosure. They worked on four days contributing 269 hours of effort. Students from Wight College planted the shrubs from the Oakton greenhouse into the Caldwell enclosure.

As part of the shrub project, bird monitors are being recruited by Audubon to track the use of the new shrubs by birds as the plants mature in coming years.

The need for deer enclosures continued unabated during 2015 as the deer problem continued to have severe impact on uncaged woody plants and most other broad-leafed species. No woody seedlings

survived winter browsing as has been the case since the deer population erupted more than 10 years ago.



This early photo of Miami prairie shows a robust population of prairie doc. By summer of 2015 none could be found.

The three long term exclosures continued to protect species lost from unprotected areas. However, the woodland exclosure was impacted by deer on two occasions when trees fell, knocking down the fence. In both cases some browsing occurred before discovery and repair, but it is not clear whether it will have lasting effect.

The effects of excessive deer browsing are illustrated by conditions within, and outside of, the long term prairie and woodland exclosures. As discussed in our separated 2012 report on deer impacts, many species have been lost since the inventory reported in Susanne Masi's 1991 Mater of science thesis. And many more are threatened. The 2015 pictures below show the last remaining white trillium to be found within Miami Woods together with wild germanium which was formerly common but survives only within the woodland exclosure.





There are now many small exclosures scattered throughout the preserves as a result of the shrub initiative.

Work performed by the Audubon interns spraying invasive and planting shrubs added up to 8 days and 375 hours.

The Ecological State of Miami Woods is described in further detail in the separate *Miami Woods Ecological Health 2015 Edition*.

ST PAUL WOODS ACTIVITIES 2015

Year	Workdays	Volunteer Visits	Cut Brush	Education	Total Hours
2015	15	355	631	191	822
2011-15	72	1457	2819	1702	4521

St Paul is on the east side of the river and is similar to Miami with respect to topography, but does not contain prairie openings. The open areas visible in the 1925 aerial photo have been converted into turf grass playing fields or allowed to grow into dense areas of brush and fire sensitive trees.

St Paul contains about the same acreage of natural area as Miami, contains four shelter structures and large areas of turf grass. It is classified as a level IV grove which can be reserved for use by very large groups. A forest preserve drive extends north from Oakton Street through the Preserve to Lincoln Street to the north which provides a connection to Dempster Street.

Current ecological conditions are quite degraded, partly because of the history of land use with its physical disruption and prevention of fires; and partly due to the eruption of the deer population during the past 20 years. As in Miami Woods, the only surviving broad-leaved herbaceous species are those not eaten by deer, and native shrubs are virtually absent. There are some pre-agriculture oaks and hickories present, but the woodlands have been heavily invaded by buckthorn and fire sensitive trees that would



have been kept out by pre-settlement fires. The resulting dense shade has severely impacted the natural communities.

Restoration work in St Paul is occurring in three zones.

North: north of the Main Street right of way (not developed). The north half is being restored by stewards Kent and Jerry Fuller of the North Branch Restoration Project working with a variety of groups and is reported here.

Southeast: South end, east of the preserve drive. The southeast zone is being restored by steward Chris Parson of the North Branch Restoration Project and students from the Chicago Public School's Hawthorn School. Restoration began in 2004 and consists of brush removal and thinning of small trees, primarily buckthorn. Good progress is being made throughout management units UW02 and WO03 east of the drive.

Southwest: South end, west of the preserve drive. The southwest is being managed as a research project by the FPD where ground level sunlight has been substantially increased by tree removal.

NORTH ZONE

The north zone includes Groves #1 and #2 and is about 56 acres in size.

The Grove #1 management unit is on the east side, and contains about 33 acres of woodland and 6 acres of playfield. Grove #1 still contains many widely spaced large old oaks, one of which fell and was cut up by a District crew which left a stump with 175 rings. An unusual feature is the presence of some very large black locusts which are about 75 years old. They are native further south in Illinois, but may have been planted to produce fence posts. The majority of the trees throughout the north half of St Paul are fire sensitive species less than 50 years old, primarily sugar maples. Grove #1 contains two management units. Unit # WO01 is north of the drive and the shelter. It contains about 8 acres of woodland and about 1,000 feet of streambank. It is separated from the drive by about 5 acres of playfield. Unit WO02 is south of the drive and contains about 19 acres of woodland.



One of the unusual features in St Paul is a legacy of old catalpa trees lining the drive that once served as the entry to Klem's picnic grove which once brought visitors from the Morton Grove rail station to the

river

The Grove #2 management area is to the west and contains about 11 acres of woods and an acre of turf grass adjacent to shelter #2. It provides access to the riffle area used by schools for river studies and contains about 1,400 feet of streambank. It forms approximately the northern one fourth of management unit #FO01.

In north St Paul restoration activities began in 2011 when permits were obtained to begin clearing brush in Grove #2 between the shelter and the river. Since then considerable progress has been made in removing brush and thinning fire sensitive trees to restore the availability of sunlight to the ground layer of herbaceous plants.

Limited restoration is occurring in the St Paul North because restoration is limited to removal and control of invasive species and thinning of excess fire sensitive trees. Introduction of seed is banned by the District. Work has been conducted by schools, The Veridian Energy Group, and the North Branch Woodchoppers. Because introduction of seed is banned by the District, no regularly scheduled North Branch workdays occur in the northern zone.

During 2015, 15 workdays were held involving 355 volunteer visits and 631 hours of work. The 2011-2015 totals are 72 workdays, 1,457 visits, and 2,819 hours of work.

In grove 1 the Wednesday Woodchoppers continued to thin the crowded invading fire-sensitive trees from under the very old oaks between the shelter and the river. Because of the dense shade there was virtually no herbaceous vegetation. The increased sunlight is stimulating growth of the few herbaceous species surviving in the area. The area also contains an old concrete dance floor and unusually large black locust trees. The locusts are nearly two feet in diameter, but at 75 years, they are far younger than the ancient oaks which are twice as old. The invading fire-sensitive trees are mostly younger than 50 years. A photo from within Grove #1 is shown on the cover of this report

In grove 2 in April the Veridian Energy group completed removal of buckthorn from the peninsula of brush dividing Groves 1 and 2. In November students from the Chicago City Day School removed buckthorn from a dense patch near the Shelter #1 and from the river bank north of the shelter. Relatively little buckthorn remains in either grove.



The Veridian Energy Group Removed buckthorn from the wooded peninsula between groves 1 and 2.

In addition to scheduled workdays, stewards applied herbicide on several days to control reed canary grass, the common red, Canada thistle, lily of the valley, and celandine buttercup. Of these five invasive species, the buttercup remains the greatest threat. It has massively invaded the floodplain in the southern half of the Preserve and is moving into the northern portion.

Current Conditions

In the Grove #1 north of the drive (unit WO01) nearly all buckthorn has been removed except for a buffer at the eastern end of the large playfield and along Lincoln Avenue. Initial thinning to restore herbaceous vegetation (wildflowers and grasses) and oak reproduction has been completed throughout the woodland north of the big field to the river. A wide un-thinned buffer is being left near Lincoln Street and the RR tracks, in part because there are few oaks or valued plants in the area. A large un-restored natural area of about 20 acres is located in management unit WO02 south of the drive.

Grove #2, (north and west of the drive) contains 11 acres of natural area where brush removal and initial tree thinning is nearing completion.

Current conditions are limited by the excessive unmanaged population of deer and the current prohibition on reintroduction of native seed. The result during the past four years has been the spread of a few early succession native species and large quantities of non-invasive, non-native weeds.

There is no record of controlled burning having been conducted in St Paul Woods, nor is any scheduled.

Miami and the northern portion of St Paul share many characteristics in terms of geography and original plant communities. But the state of restoration and ecological health is very different. On the Miami side of the river restoration has been underway since 1977 including controlled burning and reintroduction of local origin seed. In St Paul North, restoration began in 2011 and has been limited to controlling invasive species and thinning fire sensitive trees to return sunlight to the ground. Both areas have been substantially freed from invasive species, but portions of Miami have been free of invasives for a far longer period of time and have had the advantage of the reintroduction of diverse seed. The earlier control of invasive species in Miami also prevented some of the loss of native species that were rescued in Miami, but lost from St Paul.

Miami is far more diverse than St Paul and contains more conservative species, but both are suffering from the effects of the excessive and unmanaged population of white-tailed deer.

Workdays in Miami & St Paul 1001 - 2015

Year	Days		Volunteers		Stewardship Hours		Educational Activity	
	Mi	St P	Mi	St P	Mi	St P	Mi	StP
2015	<u>19</u>	<u>15</u>	<u>555</u>	<u>355</u>	<u>1,346</u>	<u>631</u>	<u>399</u>	<u>191</u>
2001-2015	382	72	9,224	1,457	35,371	2,819	5,183	1,702



2015 GROUPS WORKG IN IN MIAMI & ST PAUL (days)

	Miami	St Paul	Total
Wright College*	6	0	6
CCDS 4-8 grades**	4	3	7
Carl Shurz HS	2	0	2
NB Choppers***	4	11	15
North Branch	3*	0	3
Veridian Energy	0	1	1
N B Seed Pickers****	2	0	2
Total	21	15	36

*Two Wright days were also regular North Branch Days, but are shown here as Wright days.

** CCDS is the Chicago City Day School.

*** NB Woodchoppers are a group of experienced and highly proficient North Branch volunteers who work on Wednesday mornings cutting brush and thinning trees.

**** NB Seed Pickers are a group of North Branch volunteers who gather seed from various North Branch sites every Wednesday morning from May through November.

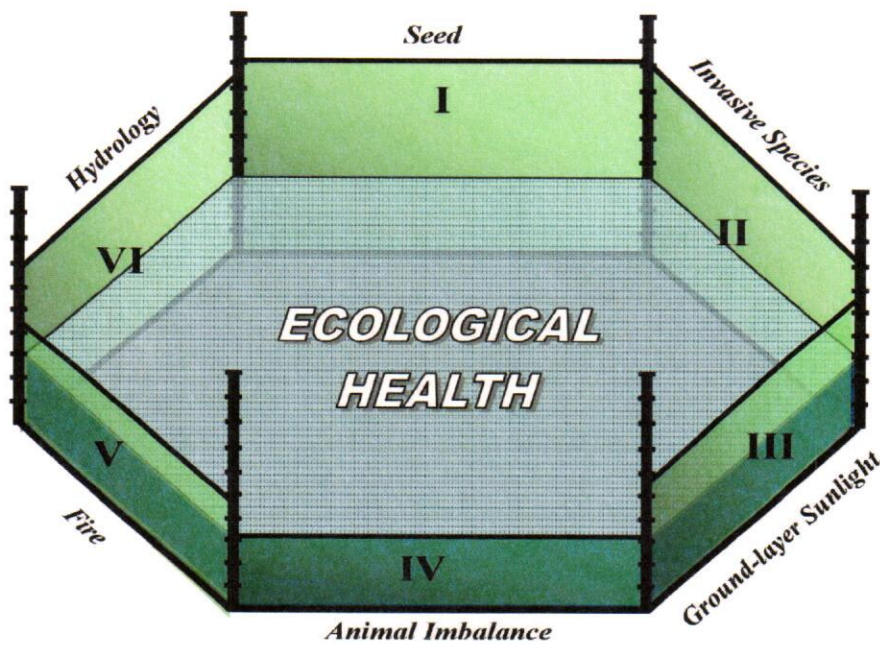
Workdays in Miami & St Paul 1001 - 2015

Year	Days		Volunteers		Stewardship		Educational Activity	
	Mi	St P	Mi	St P	Mi	St P	Mi	StP
2001	1		40		120			
2002	16		373		976			
2003	17		497		1,078		450	
2004	22		736		1,927		560	
2005	24		776		1,984		542	
2006	32		1,013		2,563		637	
2007	31		909		2,803		712	
2008	33		850		2,739		471	
2009	29		844		2,067		368	
2010	42		879		2,625		488	
2011	46	6	642	186	1,878	297	165	313
2012	27	14	497	344	1,433	644	90	306
2013	18	22	281	477	724	1,095	153	533
2014	25	15	330	332	1,108	602	148	359
2015	<u>19</u>	<u>15</u>	<u>555</u>	<u>355</u>	<u>1,346</u>	<u>631</u>	<u>399</u>	<u>191</u>
	382	72	9,224	1,457	35,371	2,819	5,183	1,702
Combined								
	454 Days		10,681 Volunteers		38,190 Hours		6,885 Hours	

MIAMI WOODS

ECOLOGICAL HEALTH

2015 Edition



**Ecological Quality Container &
Limiting Habitat Factors**

(The most deficient factor limits the level of ecological quality)



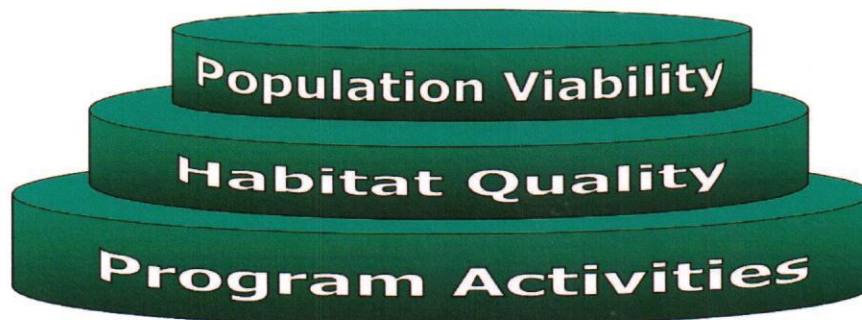
MIAMI WOODS ECOLOGICAL HEALTH 2015 Edition

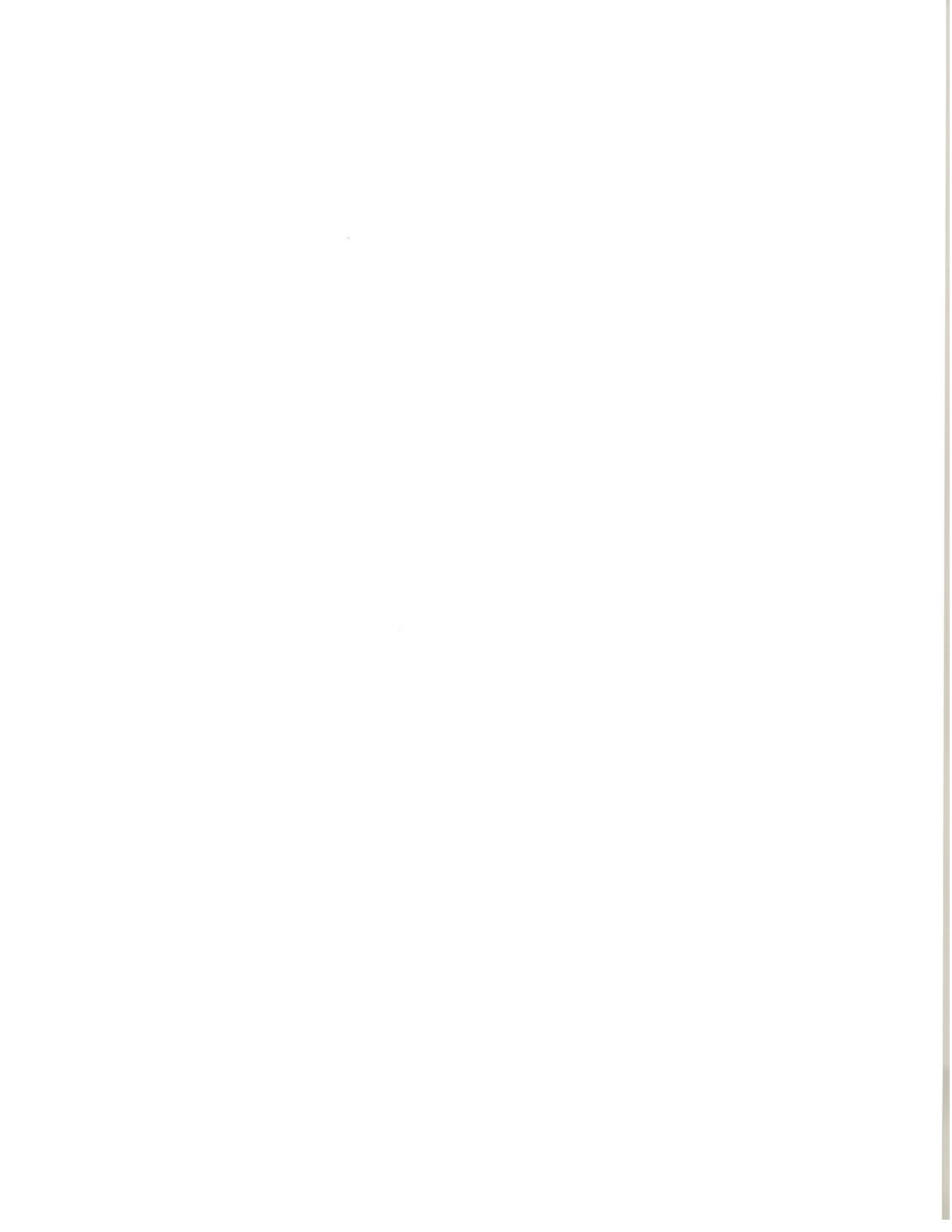
The land that was to become Miami Woods was formed by glaciers and 100 centuries of prairie vegetation, together with groves of trees that probably came and went under the influence of drought and fire. (A thorough discussion of the geology and soils of Miami Woods can be found in Susanne Masi's 1991 master of science thesis.) It was farmed for about a century and then acquired to be a forest preserve and left unmanaged for decades in the belief that it would recover. In the absence of natural processes such as fire, and impacted by the new force of invasive species, the scattered old oaks became surrounded by young fire-sensitive trees, together with thickets of buckthorn and Tartarian honeysuckle. During the past 30 years volunteers have invested more than 25,000 hours of stewardship work controlling the invasive species, thinning fire sensitive trees, and reintroducing native seed. Also, the Forest Preserve District is in the process of returning the natural force of fire to the land.

I INTRODUCTION

Ecological communities: As described in the *Chicago Wilderness Atlas of Biodiversity* and the *Chicago Wilderness Biodiversity Recovery Plan*, plants, animals and other living organisms naturally self-assemble into identifiable kinds of ecological communities based on where conditions are best suited for their growth and reproduction. Communities are identified based on their habitat and populations. Individual species may occur in more than one type of community, but they are most abundant where they are most competitive. In general, ecological communities within Miami Woods consist of woodland, savanna, and prairie; ranging from mesic (moderately moist) to wet, including wetland. The aquatic community consists primarily of the river together with its bed and benthic organisms.

A framework: The ecology of natural areas and their state of health can be viewed as a three layered system. The top layer consists of populations of plants and animals including invertebrates, reptiles, amphibians, birds, and mammals. The sustainability of those populations is the ultimate measure of ecological health. The middle layer consists of physical, chemical and biological habitats that provide food, shelter, and conditions needed for reproduction. The bottom layer consists of human activity which includes both activities that harm habitat and activities that protect and restore it. Each layer rests on the one below.





Ecological health / Ecological Quality of natural areas includes both populations and habitat, but it is the state of the top layer that is the ultimate measure. The ecological quality of habitats depends on many factors, but there are six that are key to restoration: seed, invasive species, sunlight, fire, animal management, and hydrology. These six major factors can be envisioned as the sides of a storage bin (section V). Deficiencies in any factor can be seen as lowering one of the six sides, spilling out biodiversity and reducing ecological health. Restoring each of these factors is essential to restoring ecological quality. (For a discussion of ecological health and its six factors in Miami Woods see section V.)

II CURRENT STATUS OF ECOLOGICAL COMMUNITIES

The best available map for discussing ecological conditions is the FPCC map of management units superimposed on an aerial photograph (Attached). The management unit boundaries were drawn without regard for topography and before restoration began, apparently based largely upon degree of canopy closure including buckthorn and fire sensitive trees. As the boundaries of the woodland and savanna communities become clearer it will probably be useful to modify and perhaps combine some units. The emerging ecological communities within Miami Woods cover portions, or all, of multiple management units. In this review, the communities are discussed primarily in terms of existing management units.

Prairie: In terms used in the *Biodiversity Recovery Plan*, Miami Prairie is a fine-textured-soil prairie that ranges from mesic to wet-mesic. The prairie community covers the northern 80% of PR01 and all of PR02 & 03. Its condition varies depending on the length of time since invasive species have been controlled. The oldest areas are in the northern one third of PR01 and western 60% of PR02 and PR03

Savanna: In terms used in the *Biodiversity Recovery Plan* it is a fine-textured-soil savanna that ranges from mesic to wet mesic and is found in management units SA01 and SA02. The area between the two units is a woodland that is rapidly thinning due to the death of ash trees to the extent that the two savannas will soon become connected by a very open woodland or savanna. Management units SA03 and SA04 have extensive tree cover and lack savanna species; and thus appear to be better identified as woodlands.

Wooded Communities: Historically there was very little woodland in Miami Woods except near the river. Public land survey records from 1840 are discussed in the Masi thesis and show that trees on the west side of the river were predominantly scattered oaks. Most of the soil in the preserve is deep black prairie "corn-belt" soil suggesting that throughout most of its history the area was covered with prairie vegetation. Oaks and hickories probably moved back and forth in response to wet and dry periods and to the impact of fire. Fire sensitive trees may have been present, but would have been limited to wetter areas. An aerial photograph from 1925 shows very limited presence of trees with most of the land being farmed. There were scattered trees along the edge of the river, and while there were some wooded areas, they appear to be lightly wooded pastures with treetops that did not meet. The only area with woods that had a closed canopy at that time was in portions of WO03 and WO04. The remaining old oaks show that they grew to large size with wide spread lateral branches which have since been shade-pruned as the fire sensitive species moved in. At present it is the younger fire sensitive species that make the



Preserve appear to be so densely wooded. Reproduction of trees and shrubs has not been successful for more than 10 years due to excessive deer browsing.

At present all of the floodplain and much of the uplands are covered with wooded communities ranging from very open to small areas with closed forest formed by reproduction probably dating from the 1920s or '30s. The upland woods are mesic to wet-mesic and support a mixture of very large oaks more than 100 years old (fallen branches have shown more than 120 growth rings) and fire sensitive species that are less than 60 years old. Woodland flora is present to some extent throughout the present woodlands, but it is more diverse in areas that supported trees in 1925.

Very few native shrubs were present in the Preserve even before the deer population erupted, probably as the result of cultivation and grazing. The contrast between the diversity of native shrubs in nearby Harms Woods versus Miami Woods suggests that grazing was more intense in Miami.

Closed forest was rare, if present at all, within Miami Woods in earlier times. Herbaceous species associated with closed forests are not found at present. The closed canopy that appears in the northeast corner in the 1925 aerial photo was apparently an oak woodland where the crowns of widely spaced trees had reached each other, but forest flora had not become established. The management units shown on the map were apparently designated based on tree cover in the 1970s regardless of whether crown closure was the result of recent invasion by fire sensitive species or was associated with older communities. Since the goal is to restore Miami Woods to its earlier communities, it does not seem appropriate to encourage development of closed forest conditions.

Floodplain, River and Wetlands: The floodplain can be easily seen in the topo map as the area below the 620 contour line. It extends along the west side of the river from the north/south midpoint of the preserve in management unit FO03 northward almost to its northern border. It includes the eastern portions of management units FO03, SA03, PR02, WO11, WO09, WO07; all of FO02, FO01 and WO05; and the southeastern portion of WO03. There is also an area of floodplain at the southern end of the Preserve covering most of FO05. Canopy cover varies greatly throughout the floodplain, ranging from approximately 50 to 90%. Herbaceous cover varies greatly from place to place depending in elevation, in part due to drainage, but probably even more on the length of time vegetation is submerged following storm events. Duration of inundation varies greatly from year to year, and in wet years substantial areas support little or no herbaceous vegetation for extended periods. Invasive species have been virtually eliminated except for persistent small patches of reed canary grass which are spot sprayed; and celandine buttercup which is increasing in spite of regular spot spraying.

The floodplain has changed substantially during the past 200 years. There are no systematic records, but at the time of the public land survey the river was smaller and flows may have dried out during some seasons. Certainly a higher percentage of rainfall was absorbed throughout its undeveloped watershed, and Lake Michigan water was not being used and discarded into it. The aerial photograph from 1925 shows that there were few trees in the floodplain at that time and portions of it were being cultivated.

In the upland areas there are nine small ephemeral streams that are fed entirely from within the Preserve. They are recovering from the impact of invasive species and excess shade, and have good potential as sedge meadows. There are also wet pockets that are recovering and have potential for supporting wetland vegetation and forming ephemeral ponds during wet years.

The river channel and its waters support an aquatic community that is beyond the scope of this review.

Mini Sites: Mini sites can range from as small as a few hundred square feet to several acres. They are places where certain species have a competitive advantage and where mini communities can become established. They may be obvious at the beginning of restoration, or they may not be identifiable until recovery is well under way.

North Branch Restoration Project Strategy: The early stages of restoration are like a rescue mission. The central idea is to protect and salvage the existing living resources that survive in remnant patches. To do this, the main focus is on the remnants: gathering seed, controlling invasive species, and restoring the availability of sunlight by removing brush and thinning fire sensitive trees.

During early stages of restoration the North Branch approach is to broadly distribute seed mixes into cleared areas. These mixes contain a variety of species based on the amount of sunlight and moisture that they need. Individual species may be included in more than one mix if they can grow under a variety of conditions. This approach gives a variety of species the opportunity to self-select into places where they are best able to compete. Seed is introduced during multiple years because weather conditions vary from year to year and site conditions evolve as vegetation recovers. The purpose is to allow mini communities of plants to develop naturally in mini sites throughout each larger restoration site.

As restoration of a site progresses, mini sites develop as the result of many factors, but the result is diversification of the larger area. Stewards can help this process along by identifying and tracking likely mini sites and ensuring that they receive needed care, but for the most part they emerge spontaneously.

One set of likely mini sites within Miami Woods are the nine small watersheds that exist entirely within the preserve and are drained by small seasonal streams that flow to the river through culverts under the bike path.

III POPULATIONS

Plant Populations: The aerial photograph from 1925 shows that there were relatively few trees in Miami “woods”. Most of the area appeared to be in use as farm fields or pasture. At the time, trees were spread out with space between the crowns. Many of those old trees are still present. Most are oaks and hickories that are now crowded by younger fire-sensitive species. Much of the formerly treeless area is now covered with fire-sensitive trees. Herbaceous vegetation in the currently wooded areas is characteristic of savanna and open woodland conditions, and little or no forest vegetation is present. The main prairie and two smaller savanna openings currently support a diverse mix of prairie and savanna species which survived agricultural activity and have been strengthened by seed from local remnant natural areas.

Plant populations are unevenly distributed not just because of varied habitats, but because various places are at different stages of recovery following control of invasive species and application of various management practices. 162 species of prairie and savanna plants were found on site by North Branch volunteers when they began restoration in 1977. Since then more native prairie and savanna species have been reintroduced from nearby remnants. As work expanded into woodland areas, more native species were found and more woodland species were reintroduced. Unfortunately, since restoration began, the deer population erupted from less than one per 40 acres to more than ten per 40 acres. This has resulted in the loss of 35 plant species and 23 more have been greatly reduced in abundance and appear to be headed toward disappearance.

Animal populations: Reptiles and amphibians are basically absent from Miami Woods with the exception of two snake species, a few American toads; and turtles in the river. Bird species are monitored and show that shrub nesting species have declined. This has stimulated a project to restore native shrubs. Ground-nesting birds are absent, probably due to the large raccoon population together with pressure from other native predators and household cats. Native predators of grassland birds include great horned owls, hawks, coyotes and even deer. Invertebrate populations are mostly unknown although butterflies have been monitored in some years.

IV Habitats

The preserve contains 5 community types: Black Soil Prairie, Savanna, Woods, Wooded flood plain, and the river itself. It also has the potential for creating several small ephemeral ponds and/or sedge meadows. These communities exist because of complex interactions between species and the existence of physical, biological and chemical habitats. Restoration of the health and quality of those communities depend on six major habitat factors discussed in section V

Physical habitat in Miami Woods is largely determined by topography and human facilities. Topography divides the site into three zones. The normal level of the river is at about 610 feet above sea level. The flood plain rises from about 610 to a bit less than 615 feet; relatively narrow transition slopes rise from about 615 to 620 feet; and the gently sloping uplands rise from about 620 to 625 feet

There are three small eroding streams that carry water from off-site to the river. The storm flow in these streams is vastly greater than before development of the surrounding area and is resulting in severe stream bank erosion. Small sub-watersheds within the Preserve support small seasonal streams that flow to the river through culverts under the bike path. These are discussed in the hydrology section below.

Soils are predominantly deep black (corn-belt) silt loams that were created from glacial till by prairie plants. There are small areas on the transitional slopes with thinner lighter soils that may reflect a woodland history. The original soil within the floodplain appears to be overlain by substantial quantities of black prairie soil eroded and deposited during the agricultural period. There is a major physical legacy from historical agricultural use which existed for about 100 years until about 1925, and left continuing impacts due to cultivation and pasturing of livestock. Details of agricultural use are unknown, but it appears to have been intense judging from the reduced herbaceous vegetation and near absence of native shrubs. The main prairie is drained

by agricultural tiles as discussed below in the hydrology section. The main existing cultural feature is the picnic grove with its lawns, shelter, and parking lot. The other major cultural feature is the segment of the North Branch bike path which runs near the river between Oakton and Dempster Streets. In the 1925 aerial photograph most of the bike path appears as a narrow unpaved road. There is evidence of old farm roadways, and the presence of concrete bollards and anecdotes indicate that there was a FPDC access drive along the northern edge of the prairie to the depth of the existing condo development. The remains of an old farm house basement exist at the intersection of the bike path and the Main Street right-of-way.

Utility easements are another cultural feature. They exist along Caldwell Avenue and across the prairie from Caldwell Avenue to the bike path at the north-south midpoint of the preserve. The easement covers the land that would have been Main Street in Morton Grove if it had crossed the river. It provides access to the deep tunnel drop shaft near the bike path. The MWRD deep tunnel provides combined sewer overflow protection and runs from north to south deep underground through the preserve. It has no known impact on surface or groundwater within the preserve. Two water mains exist within that easement and extend to the east from Caldwell under the river and through St Paul Woods providing Morton Grove with major access to water supplied from the City of Chicago. During 2014 both mains were replaced using open cut construction from Caldwell to the bike path and tunneling under the river. The North Branch Restoration Project agreed to re-vegetate the disturbed area to ensure use of local origin seed.

Further south the Village of Niles has an easement from the intersection of Caldwell and Cleveland Street to the river north of the parking lot. A 72 inch storm sewer is planned for construction in that right of way during 2016 also using open cut construction.

Physical access to the preserve is primarily by way of the bike path, the picnic grove, and the unofficial "hole-in-the-fence" at the southeastern corner of the parking lot for the Prairie View Shopping Center at the north end.

Biological habitat is recovering as invasive species are being brought under control, sunlight is being returned to the ground layer, and seed is being reintroduced from other natural areas from nearby areas. But recovery has been held back by excessive deer populations as discussed below. The impacts of excessive raccoon populations are unquantified, but probably contribute to the absence of reptiles, amphibians, and ground-nesting birds. Plant diseases have killed most of the elms (*Ulmus* sp.) and are rapidly killing all ash trees (*Fraxinus* sp.). Disease has also killed all but one of the less abundant butternut trees (*Juglans cineria*). With the exception of gray dogwood in the prairie, native shrubs are few in number, probably due to use as pasture and more recently due to deer browsing. Currently browsing prevents reproduction of all trees and shrubs and is eroding the few remaining shrub clumps. The impact of excessive browsing by deer is clearly evident in three deer exclosures located in the main prairie, woodland unit W004, and adjacent to the Prairie View Shopping Center parking lot. A project is underway, sponsored by Audubon, to reintroduce native shrubs to provide improved bird habitat. Substantial planting was completed during 2015.

Chemical habitat and impacts within it are relatively unknown. Airborne deposition of nutrients and contaminants is similar to surrounding areas and is unquantified. Chemical concentrations in the river and loadings from upstream are unknown, but include effluent from a very large sewage treatment plant in Lake County and large quantities of urban non-point runoff. Warmth

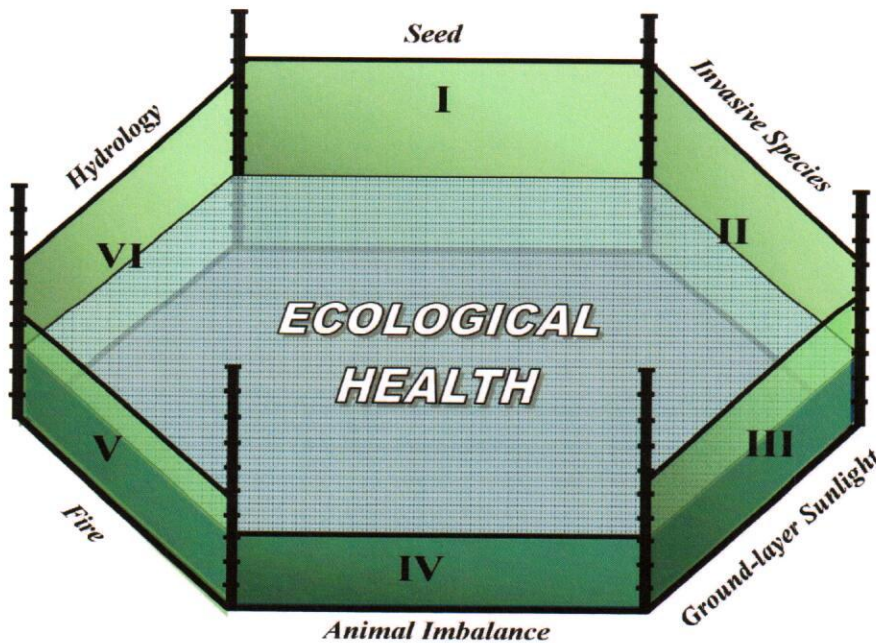
from wastewater and salt from streets limits ice formation on the river. Limited sampling data from the river is available from the Chicago City Day School whose students regularly sample the river. Within Miami Woods three small tributary streams bring flood water and chemical loading from off site as discussed in the hydrology section below. There have been problems with sanitary sewage entering the streams in the past, but none is known to exist at present.

Human Activity:

Historic human impact is present primarily in the form of past agricultural use which is discussed below in the hydrology section. Recreational use associated with the Bike path and picnic grove continues to have some impact. Maintenance of water and sewer mains under the Main Street and Caldwell Avenue rights of way also continue to have negative impacts, primarily in the form of excavation related to replacement and augmentation. Positive human activity is found in restoration activities discussed below.

V State of Restoration in Miami Woods Habitats & Six Major Factors

Habitat Factors: There are many habitat factors needed to support healthy ecological communities and they can be described and measured in many ways. But there are six major factors that determine the success of restoration which can be envisioned as the sides of a six sided reservoir that stores ecological quality as illustrated below. The most deficient (limiting) factor determines the level of quality that can be supported.



Ecological Quality Container & Limiting Habitat Factors
 (The most deficient factor limits the level of ecological quality)

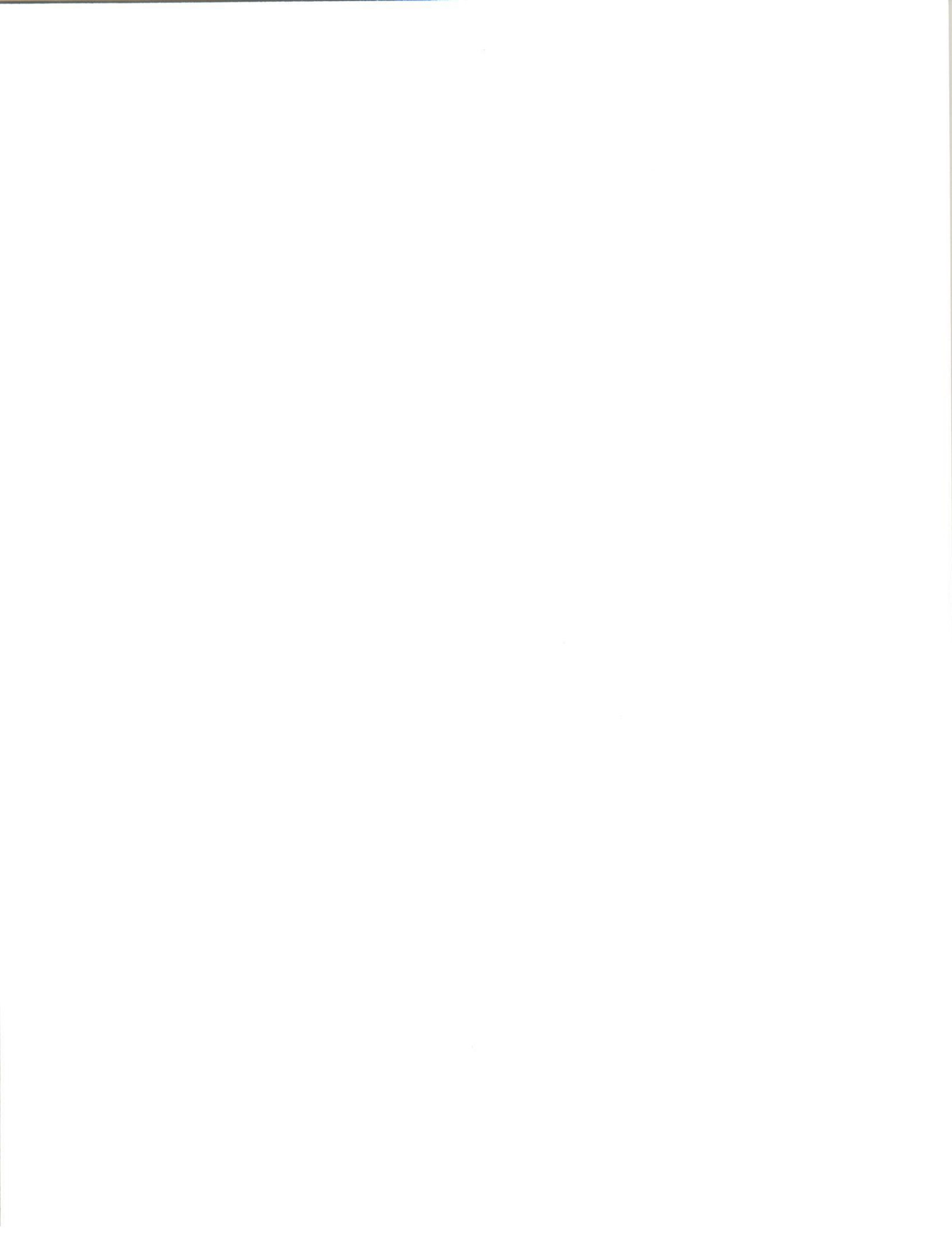
Seed collection and Dispersal: The reintroduction of native seed from local sources began at the start of restoration and has continued to the present. Seed is gathered by volunteers throughout the North Branch watershed during the growing season, then processed and combined into mixes according to the amount of sunlight and moisture needed by the plants. Some species that are difficult to gather from natural areas are grown by gardeners using wild seed from local areas. Seed from those plants are also added to the mixes. The mixes are then allocated among the restoration sites including Miami Woods. Seeding has been successful in Miami Woods, but deer have suppressed or prevented recovery of many forbs (broad-leafed species).

Invasive species: The control of invasive plant species has been a major component of the restoration project from its start in Miami prairie in 1977. The most time-consuming activity has been the removal of brush, primarily common buckthorn (*Rhamnus cathartica*) and Tartarian honeysuckle (*Lonicera tatarica*). Seedlings of these species continue to require control. Other woody species that were a problem, but are under control are multiflora rose (*Rosa multiflora*), privett (*Ligustrum vulgare*), and barberry (*Berberis thunbergii*). Since restoration resumed in 2001, 382 workdays and more than 25,000 hours of stewardship work have been devoted to restoration, primarily to brush control. At present brush removal has been completed throughout Miami Woods except where it has been left to provide perimeter buffers for sight and sound. The long term strategy is to replace all invasive brush with native shrubs.

Herbaceous invasives continue to pose challenges, but are held in check by spot application of herbicide. The two most persistent challenges are reed canary grass (*Phalaris arundinacea*) and Canada thistle (*Cirsium arvense*). Others requiring treatment are common reed (*Phragmites australis*), teasel (*Dipsacus laciniatus*), field parsnip (*Pastinaca sativa*), crown vetch (*Coronilla varia*), purple loosestrife (*Lythrum salicaria*), and bird's foot trefoil (*Lotus corniculatus*). By far the most threatening is celandine buttercup (*Ranunculus ficaria*) which is rapidly invading floodplains and is increasing with in Miami Woods in spite of aggressive spraying. Spot application of herbicide is conducted throughout the Preserve several times annually.

Sunlight: The availability of adequate sunlight determines the presence and abundance of many species. As described in the *Biodiversity Recovery Plan*, prairies can tolerate up to 10% tree cover, savannas from 10-50%, woodlands 50-80%, and forests 80-100%. Due to the absence of the natural force of fire, Miami Woods is far shadier than it would be in a natural condition. Removal of invasive brush helps to restore needed levels, but thinning of fire-sensitive tree species is also essential. Initial thinning of fire-sensitive trees has been conducted throughout the Preserve during the past 14 years and the rapid die-off of ash trees in some areas is greatly increasing the amount of sunlight reaching the ground. However, some areas still have too much shade, and continuous growth and closure of the tree canopy means that continued thinning is needed.

Fire: The natural force of fire has been absent from Miami Woods for most of the past 200 years. It is needed as a management tool to help control invasive species and to stimulate native species. During the past 10 years, the main prairie has been burned several times and the other two openings twice, but most of the woodland management areas have been burned only once. Burning on a two year cycle is needed for ecological reasons and would reduce the use of herbicide needed to control invasives.



Animal Imbalance: The absence of large predators and changes in habitat have greatly altered animal populations within the Preserve. The largest impact on the ecosystem is from the dense deer population. Records of observations by volunteers report the first sighting of a deer in 1978. The next year there were two. The eruption began from there. Videos made in 1995 showed continuous vegetation from the ground into the trees along edges of open areas. In recent years a hard browse line has been present with twigs and leaves present only above the reach of browsing deer. With the exception of Japanese honeysuckle, barberry, older canes of multiflora rose, and older stems of gray dogwood, all other twigs and leaves are consumed. Impacts on forbs (broad leafed plants) are almost as severe. Many species have been suppressed or completely eliminated as noted in section III. As a result, populations of the few forbs that are not eaten have become very abundant. Most grasses and sedges have not been noticeably impacted although sedges are grazed aggressively during the early spring until other plants become available.

Another animal species that appears to have exploded is raccoons. The impacts are unknown, but probably contribute to the absence of amphibians and reptiles as well as the absence of ground-nesting birds.

Hydrology and Wetlands: As briefly described above in the section on physical habitat, the topography of Miami Woods consists of relatively flat uplands, transitional slopes, and floodplains. Some of the transitional slopes are quite steep in areas where the river has been cutting into the uplands in relatively recent times, and less so elsewhere.

Surface hydrology consists of the river itself, the river floodplain, small tributaries, and small seasonal ponds and wetlands scattered in the prairie openings.

Sometime before 1925 the river channel was dredged and partially straightened, especially at the north and south ends near Dempster and Oakton Streets where portions of the old channel can be seen as oxbows. No restoration has taken place within the river itself. Unfortunately heavy woody materials are periodically removed by the Metropolitan Water Reclamation District. This reduces the flood retention function of the floodplain and destroys natural stream habitat.

The floodplain is heavily impacted by flooding that is more frequent and longer lasting than historic patterns because of upstream development. The 1925 aerial photograph shows that there were few trees in the floodplain and that portions were cultivated. Currently it is covered with fire-sensitive trees. Within the floodplain, invasive species are being controlled and some seeding is being done, but major restoration is unlikely due to flooding stresses. Lesser celandine buttercup is a major threat to surviving plants, especially spring ephemerals.

There are twelve small tributary streams of varying size that feed the river within Miami Woods. Three receive large surges of storm runoff from beyond the Preserve and are eroding unsightly gullies. They have small base flows, probably from footing drains and air conditioning condensate. They provide useful habitat, but, without control of the off-site flows, little can be done to control the erosion. One exception is a 2014 Eagle Scout project that resulted in two log dams in the lower portion of the Wayside Woods stream that drains portions of Dempster Street. The temporary impoundments behind the dams will reduce the erosive force of storm flows. The other nine streams are ephemeral and receive water only from within the Preserve. They

have good potential including the possibility of creating ephemeral ponds by controlling their flow where they run through culverts under the bike path.

Small wetland pockets occur in the prairie and woodlands and provide important habitat for wetland plants and animals.

Groundwater has not been mapped, but portions of the prairie are seasonally quite wet. There are three large drain tile outlets that appear to drain the prairie. They are 12 inch vitrified clay which is unusual for farm tiles, but they are dry except during spring or prolonged wet periods and show little or no response to individual rainfall events. Mapping and blocking the tiles could lead to restoring additional wetland areas or even ephemeral ponds.

VI MONITORING

Monitoring the condition of plant communities in Miami ranges from anecdotal observation by long term observers including stewards, to intense carefully quantified surveys. The occurrence and abundance of many species vary somewhat from year to year, but trends eventually emerge. As mentioned in the section on populations, monitoring began in the prairie in 1977 and showed an increasing number of species to be present in response to restoration efforts. Since the eruption of the deer population the number of broad-leafed species has declined. However, the number of sedges and grasses has increased.

The number and abundance of native species is one somewhat crude indication of ecological quality. The quality of those species based on their sensitivity to disturbance is an additional factor. The Floristic Quality Assessment system described in *Plants of the Chicago Region* by Swink and Wilhelm provides a robust methodology for evaluating quality based on values assigned to each native species occurring within the Chicago Region. Using that system it has been found that between 1981 and 2011 the weighted mean C value has progressed from 2.9 to 3.8 and the weighted native FQI from 9.5 to 14.1. This shows that floristic quality has improved even though numerous high quality native species have been lost to excessive deer browsing. Apparently the improvement in grasses and sedges has been enough to outweigh the loss in plants that deer prefer. The surveys have also shown that invasive species have declined since restoration began.

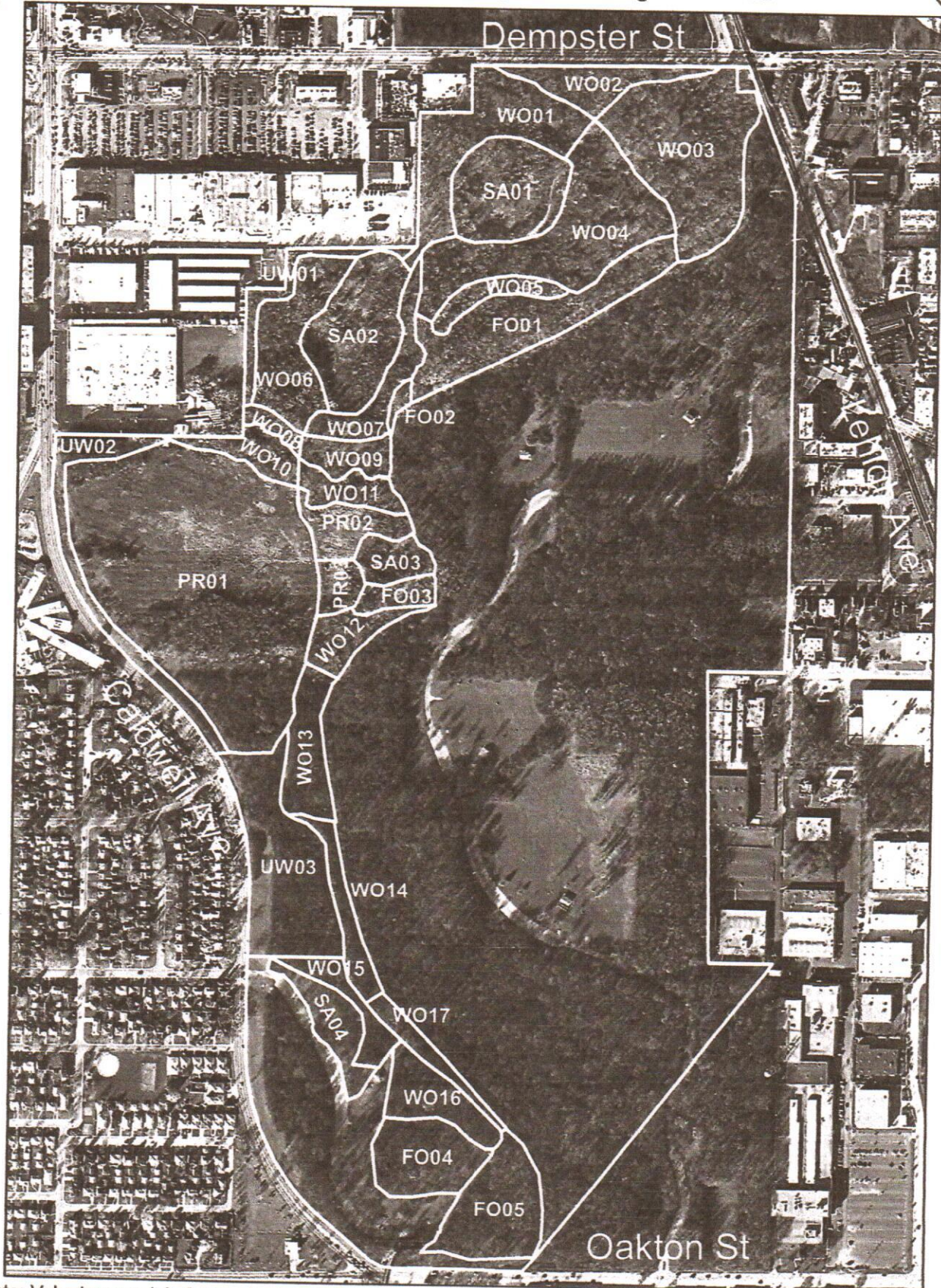
An earlier major review of conditions in Miami Prairie was conducted by Susanne Masi as a master of science thesis in 1991. A major conclusion of the thesis was that, "The hypothesis of the study has been supported, namely, that significant improvement of the prairie's natural quality has resulted from the interaction of management practices and natural succession. This improvement is measured in the quadrats and on the Prairie as a whole by (1) the increase of the number of native species and (2) the increase in abundance and quality of native species, and (3) the decrease in the abundance of alien and weedy native species. Chapter 4 showed that the Natural Area Rating Index (NARI) increased significantly from 1981 to 1990 for the transect and for the prairie as a whole."

Overall Miami Woods and Prairie remains a work in progress. Five of the six major habitat factors have improved significantly: invasive brush has been removed and invasive weeds are under control; fire sensitive trees have been thinned returning needed sunlight; periodic fire is being returned to the landscape; seed has been distributed; and hydrology is not posing major

Miami Woods

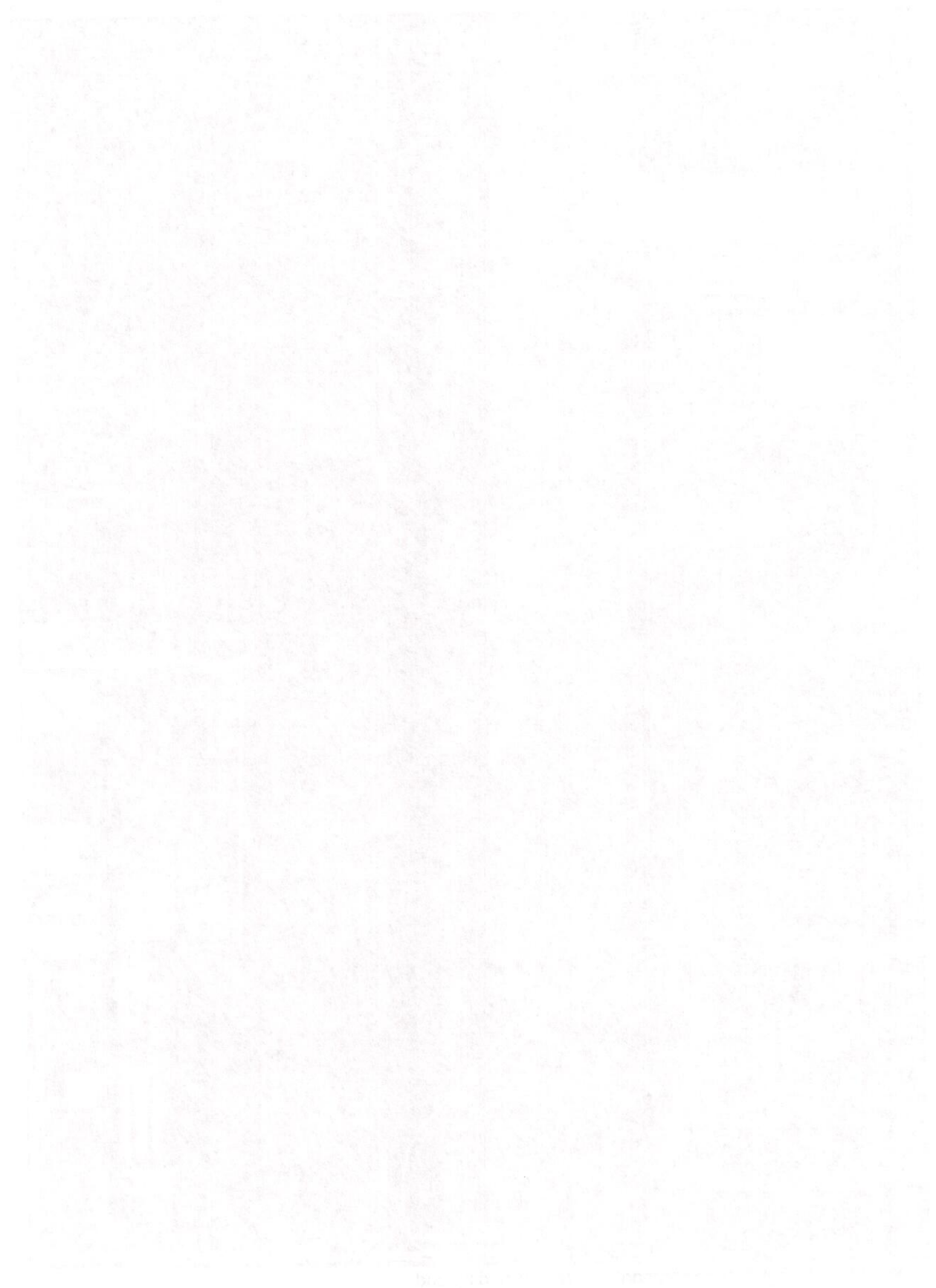
Land Management Site #1206

Site Extent: 106 Acres Designated Management Units



Note: Volunteer work is focused primarily in areas including and north of Prairie 01 (PR01). It is the mission of the Forest Preserve District to manage all of its remnant natural areas county-wide, including areas outside of volunteer work units.





problems. Although the sixth factor continues to destroy ecological health and quality, there has been some improvement in floristic quality and the stage is set for major recovery when the deer herd is brought under control.

