

**MIAMI WOODS & PRAIRIE:  
40 YEARS of VOLUNTEER RESTORATION  
1977 - 2017**



**MIAMI PAIRIE 1982**

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This report has been prepared by Kent Fuller, who together with Jeryl Fuller are the current volunteer stewards for Miami Woods. Information on phase one of the story is based largely on Stephen Packard's 1982 report titled *Stargrass Prairie* and Susanne Masi's 1991 Master of Science thesis.

# MIAMI WOODS & PRAIRIE: 40 YEARS of VOLUNTEER RESTORATION

## SUMMARY

Restoration of Miami Woods and Prairie has occurred in three phases during the past 40 years: Discovery and early restoration from 1977 to 1996; the moratorium period 1996 to 2000; and the current period from 2000 to 2017. Early work concentrated on the prairie during which 108 native species were found and 66 reintroduced from local remnant areas as documented in a 1991 Master of Science thesis. The thesis addresses the question “Can it be said that, “significant improvement of the natural quality of Miami Prairie has resulted from multiple restoration management activities combined with the course of natural succession”. The conclusion is that as of 1990 the answer was, yes.

A moratorium on restoration was imposed in 1995 resulting in a 5 year hiatus during which brush reinvaded portions of the restored area, but was quickly removed when restoration resumed.

During the current period as of June 2017 there have been 323 workdays, 9,874 volunteer work visits, and 27,039 hours of donated work.

Six habitat factors are evaluated and graded for success

- |  |                |
|--|----------------|
| 1. Availability of seed and other propagules | A              |
| 2. Control of invasive species               | A              |
| 3. Ground layer sunlight                     | A              |
| 4. Periodic fire                             | A              |
| 5. Hydrology                                 | Not Applicable |
| 6. Animal imbalance                          | F              |

Four vegetative groups are evaluated and graded for success

- |  |  |
|--|--|
| 1. Trees   | D (no reproduction due to deer)                  |
| 2. Shrubs  | D (no reproduction due to deer)                  |
| 3. Grass-like plants (grasses, sedges, & rushes) | A  |
| 4. Forbs (broad leafed herbaceous plants)        | D (continuing loss of species preferred by deer) |

Overall, restoration of Miami Woods is a success in terms of controlling invasive species, returning sunlight to the ground, reintroduction of native species, and the reintroduction of fire. Areas formerly choked with invasive brush have been cleared and fire sensitive trees have been thinned. This has allowed lush native vegetation to replace the mostly bare earth formerly present under the brush. It is also a success in terms of satisfaction felt by the many hundreds of volunteers who have enjoyed participating and seen the results of their work.

However, a closer look at ecological health shows that the unmanaged excessive population of deer has limited restoration to plants not eaten by deer, has resulted in the loss of many species of plants, and is preventing reproduction of all native trees and shrubs. A solid foundation has been built, but until deer are controlled, the ecological health of Miami Woods and Prairie will remain severely impaired.

## **40 YEARS of VOLUNTEER RESTORATION**

The discovery and recovery of Miami Prairie with its surrounding woods is a story of 40 years and thousands of donated hours. It is the story of people who share an interest, and of the ecology of a place and its health. It is best told in three phases. Early years from 1977 to 1996; the moratorium from 1996 to 2000; and current period 2000 to 2017.

Miami Woods stretches for a mile on the west side of the North Branch of the Chicago River in Morton Grove between Oakton and Dempster Streets. It includes about 111 acres of natural area consisting of prairie and wooded communities. The picnic grove adds about 7 acres of mowed lawn and parking.

### **I.) HISTORY: Three Phases**

#### **Phase 1: Discovery, Early Work & Susanne Masi's Thesis 1977-1995**

The restoration of Miami Woods began in 1977 when Stephen Packard discovered many native prairie plants growing in the mowed meadow between Caldwell Avenue the river. He contacted others who were interested in prairies, including local members of the Sierra Club. They asked the Forest Preserve District to stop mowing and began pulling weeds and gathering seeds. The results were spectacular as the cover photo illustrates. During the next few years, prairie dock and other native plants continued to respond as shown in the photo below.



The volunteers also began to work in several other remnant prairie patches along the North Branch and evolved into the North Branch Prairie Project. Later, as the group broadened its focus to include wooded areas, it became the North Branch Restoration Project.

In Miami, volunteers discovered a second smaller opening to the north of the main prairie which also contained many prairie plants, notably a vigorous population of white wild indigo. It became known as the Indigo Opening.

In the main prairie they attacked weeds and brush, gathered and spread seed, and grew and planted seedlings. Late in this period work began in the woods, primarily by clearing buckthorn from a few small areas.

In 1978 the group first observed the presence of one deer. In 1981 there was also a faun, and in 1982 the doe produced twins. The population grew slowly at first, and later became very large.

In 1988 Susanne Masi began studying the prairie and completed her Master of Science thesis in 1991. She tested the hypothesis that, "significant improvement of the natural quality of Miami Prairie has resulted from multiple restoration management activities combined with the course of natural succession". Conducting a thorough inventory and looking at more than 10 years of data she concluded that yes, significant improvement had occurred and that management had succeeded.

In evaluating "the natural quality of Miami Prairie" Susanne concentrated on the diversity and quality of plants as the measure of success. It is the diversity and quality within living communities that is the ultimate measure of ecological health, but it is also the case that those communities rest on many habitat factors. Some of those are also addressed in the thesis and will be further addressed here in the discussion of phase 3.

Here are some of the things reported in the thesis.

With respect to ecological health the original 93 species of native forbs (broad-leafed herbaceous plants) had increased by 33, to a total of 126. The 11 species of native grasses increased to 16 and had spread widely. The 16 species of native sedges and rushes had remained unchanged, but covered more space.

With respect to habitat, the invasive species situation had improved during the first stage as non-native invasive brush had been cleared from the prairie, and invasive native gray dogwood had been reduced. Also, herbaceous non-native invasive species were reduced in both abundance and impact. Sunlight was no longer blocked by trees invading the prairie. Fire had been returned in the form of controlled burns. Seed and seedling plants grown from local remnants were returning diversity. Hydrology was not a significant problem. And deer were not yet impacting ecological health.

Examining the response of native plants, the thesis hypothesis was confirmed, significant improvement of the natural quality of Miami Prairie had occurred.

The completion of Suzanne's thesis provided a clear picture of what had been accomplished during the first of the three phases of the story. From completion of Susanne's thesis in 1991 through 1995 modest improvements presumably continued, but monitoring data are scarce. The next phase came as a shock to all involved.

## **Phase 2: The Moratorium 1996-2000**

As volunteer restoration grew in Cook County and beyond, resistance emerged, primarily from the Edgebrook-Sauganash community within the city of Chicago. In that area many homes are in close proximity to forest preserve woods supporting a feeling possessiveness on the part of the residents. Various accusations were made, but focused on the idea that strangers were cutting down trees (mostly buckthorn) and the unfounded idea that they wanted to change the woods into prairie. Objections were also raised elsewhere in the County with the result that the Chairman of the Cook County Board declared a moratorium on restoration across all Forest Preserves within the County. The moratorium was imposed by a politician with no scientific background and based on hearsay with no creditable scientific facts. However, he had the power and the effect was drastic.

Although the Forest Preserve District of Cook County is a separate unit of government, somewhat like a park district, the State constitution provides that the members of its governing board are those who are elected as Commissioners of the general purpose government of the County. At the time the board members had little familiarity with conservation or ecology. At the time of the moratorium, the FPD board functioned with little public visibility and the District was treated much like a department of the general purpose government.

It took years before the FPD Board accepted the idea that volunteers were in fact, implementing the District's principal mission of protecting and restoring the natural flora and fauna of its lands. The result was that the moratorium was only gradually lifted from various areas, and finally fully revoked in 2006. In Miami Woods it was in effect for 5 years until December 2000.

Because the moratorium prohibited all restoration activity, brush and other invasive plants grew back into much of the area previously restored by volunteers. Needless to say, the quality of those areas declined significantly.

## **Phase 3: Current Period 2000-2016**

Kent and Jerry Fuller became apprentice site stewards for Miami just before imposition of the moratorium. When work resumed five years later they began keeping workday records including the number of volunteers and hours worked. During the current period, through June 2017, there have been 323 workdays, 9,874 volunteer work visits and 27,039 hours of donated work. Various other kinds of work hours have been contributed, but the workdays represent the main effort.

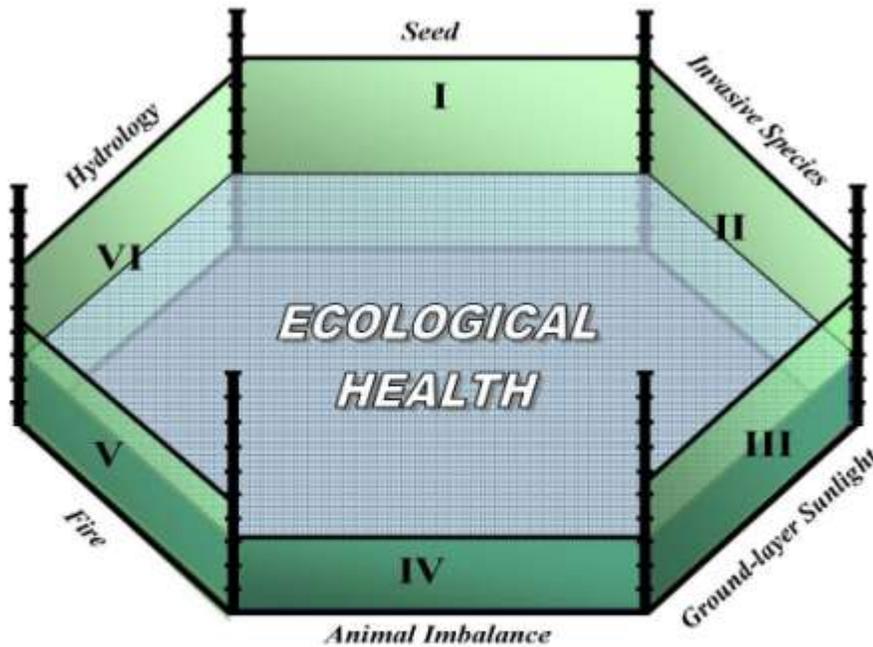
## **II.) ASSESSMENT FRAMEWORK 6+4**

Looking at the current situation in Miami Woods and Prairie after 40 years, it is useful to again pose Susanne Masi's hypothesis. Can it be said that, "significant improvement of the natural quality of Miami Prairie has resulted from multiple restoration management activities combined with the course of natural succession"? There are 10 parts to the answer.

The thesis focused on plant populations and floristic quality which are excellent measures of ecological health. It also addressed habitat factors and restoration work done to restore habitat. To fully answer the thesis question today, and to answer it for the entire Preserve including the woodlands, 10 things need to be addressed: 6 habitat factors and 4 vegetation categories.

Ecological health / quality in Miami Woods depends on six key habitat factors, all of which need to be addressed in restoring ecological health. One way to envision this situation is to picture a six sided storage bin that contains ecological health as illustrated in figure 1. The sides are formed by the six

primary habitat factors that determine the level of ecological health in Miami Woods. The most deficient factor limits the level of ecological quality.



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

A major point in the framework is that habitat factors determine the level of health in ecological communities, and it is the habitat factors that can be addressed through restoration activities.

This report will review available information on the state of each of the six primary habitat factors and ecological quality of vegetation in four major groups: 1 Trees, 2 Shrubs, 3 Grass-like plants (grasses, sedges & rushes), and 4 forbs (broad-leafed plants).

### HABITAT & ECOSYSTEM HEALTH

Because the plants depend on habitat factors for survival and sustainability it is important to look at the main habitat factors that support ecological health. In Miami Woods there are 6 primary habitat factors as shown above:

1. Availability of seed and other propagules
2. Control of invasive species
3. Ground layer sunlight
4. Periodic fire
5. Hydrology
6. Animal imbalance

#### Health of Vegetation Groups

1. Trees
2. Shrubs

3. Grass-like plants (grasses, sedges, & rushes)
4. Forbs (broad leafed herbaceous plants)

Because the data available for the Masi thesis was primarily from the prairie, the prairie and woodland areas will be discussed separately. Trees are not of major importance in the prairie, but will be addressed as part of the woodlands.

Another consideration in answering the question of improvement is whether degraded patches remain or whether the entire area has improved. At the outset of restoration, quality is typically very patchy with native plants surviving in some patches and other patches severely degraded by invasive species or other habitat factors. At the outset, Miami was typically patchy. The basic strategy was to rescue and stabilize the high quality patches, connect them, and then get them to spread to cover the entire area.

### **III.) THE PRAIRIE**

The Masi thesis concentrates on the prairie because early restoration and monitoring focused on the prairie. As a result most quantified information is limited to the prairie.

#### **PRAIRIE HABITAT FACTORS**

##### **1. Seed & Other Propagules:**

**Grade: A**

The North Branch Project developed a clear seed policy in its early years which focuses on gathering native seed from remnant populations within the North Branch watershed, creating mixes based on the moisture and sunlight needs of the plants, and allocating the supply among the various site stewards. Over the years, Miami has received a modest but steady supply of seed for distribution, primarily in newly prepared areas, especially following controlled burns. Although always limited in quantity, seed has been adequate and led to numerous species reintroductions. All seed has been gathered by volunteers from local populations existing in natural remnants or areas restored using local seed. All distribution has been by volunteers. Highest quality mixes are no longer allocated to Miami due to the consumption of high quality plants by the excess deer. (See also appendix 2 concerning shrubs.)

Other Propagules in the form of young native shrubs of local origin have been reintroduced in the last few years as part of a project sponsored by Audubon, the Chicago Region to enhance bird habitat. The project includes planting native shrubs grown from local stock in fenced deer exclosures and individual cages throughout the woodlands and the edges of the prairie.

##### **2. Invasive Species**

**Grade: A**

Control of woody invasive species, mostly consisting of common buckthorn and Eurasian honeysuckle, otherwise known as brush, has absorbed the greatest percentage of volunteer work effort. Woody invasives remaining within the prairie consist almost exclusively of native gray dogwood. It is a natural component of Illinois prairies, but can become invasive due to lack of natural fire, and drainage by farm tiles which change hydrology. During the post-agricultural decades without fire, dogwood in the Miami prairie built up extensive root systems which make control difficult. Spot application of herbicide will continue to be needed until burning can establish a balanced population.

Herbaceous (non-woody) invasive species (except celandine buttercup) have been reduced to nuisance levels that are not significantly impairing native vegetation. Continuing spot spraying will be necessary to ensure that species such as reed canary grass, phragmites, and Canada thistle do not reemerge as significant problems. In the case of celandine buttercup, aggressive spot spraying will be necessary until a biological control is found.

### **3. Ground Layer Sunlight:**

**Grade: A**

Ground layer Sunlight is not an issue in the prairie because invasive brush and trees have been removed and gray dogwood is being effectively managed. However, excessive shade remains a challenge in the wooded units as discussed below in the woodland section.

### **4. Fire : Prairie**

**Grade: A**

Fire stimulates native species and helps control invasive species. During Stage 1 until the moratorium, volunteers conducted controlled burns, mostly in the prairie. Following the moratorium, volunteers were no longer allowed to conduct controlled burns. However, burning was gradually returned to the Preserves as the FPD developed an effective burn program using staff, contractors, and volunteers. The prairie is receiving the fire it needs.

### **5. Hydrology B**

**Grade: B**

Hydrology is not known to be a constraint to restoration in Miami although farm tiles are present in the prairie, and a survey and analysis is needed. Modification of the tile system may be necessary in the long term.

### **6. Animal Imbalance:**

**Grade: F**

In the absence of large predators that formerly kept other animal populations in balance, those other native animals can become major problems. The abundance of raccoons is probably a major factor in the virtual absence of reptiles and amphibians within Miami prairie and woodlands, but work is needed to document the relationship and develop a management plan.

The major animal problem is the excessive number of white tailed deer. They are a normal component in the mid-western landscape and studies have shown that pre-settlement numbers of deer were typically about 15 per square mile or slightly less than 1 per 40 acres. Miami Woods has about 110 acres of natural area which would accommodate about 3 deer. Present numbers are about ten times larger.

During the first stage of restoration in Miami, deer began to return to the landscape. At the time of Susanne Masi's thesis in 1991 the population had grown, but was not yet recognized as having an adverse impact on ecological quality. Early photos do not show browse lines in the prairie or woodland edges. Reductions in populations of sensitive species had not yet been noted.

By 2000 the deer herd had expanded to the extent that it began to have substantial impacts on the plant population. Deer eat very little of grass or grass-like plants including sedges and rushes. So they were not impacted. However, three other groups began to be affected: forbs (broad-leafed plants), shrubs, and trees. Mature trees are not affected, but seedlings and twigs within 5 feet of the ground are eaten and small trees can be killed by loss of bark when bucks rub the velvet from their antlers. Also, acorns are eaten by the deer. Shrubs can be damaged when their twigs are eaten or bucks rub the bark. Since the Miami deer population erupted from the late 1990s, no trees or shrubs have successfully reproduced. No small trees less than 10 feet tall have survived, and shrub islands (clones) in the prairie have been reduced in size or destroyed.

When Kent & Jerry became apprentice stewards in 1996, traffic on Caldwell Avenue was not visible from the bike path. By the time work was again underway in 2001, browse lines were becoming visible as deer were eating more and more buckthorn twigs. Traffic on Caldwell soon became visible from the bike path. In 2011 Kent undertook an inventory of deer impact which included assessment of browse line development, absence of seedlings, and the extent of browsing on various herbaceous species. He also noted areas that were dominated by species not eaten by deer.

Deer have clear food preferences. There is some variation among individual deer, but in general they follow the same preferences. 2011 was a very dry year which apparently reduced the availability of food for deer and intensified browsing pressure. By the end of that summer deer were eating plants that they had not previously eaten.

In the prairie, impacts were most obvious in the formation of clearly defined browse lines in the brush at the edges of the open areas as can be seen in the photo of the Miami Woods entrance sign from about 2012. Browse lines also appeared within the prairie in the form of the loss of lower twigs of the shrub clones such as nanny berry and wild plums. New growth on gray dogwood was browsed heavily and new growth of native roses was all consumed. Even new growth of invasive multiflora rose and tartarian honeysuckle was consumed. Only thorny Japanese barberry was spared.

Many forbs disappeared from the prairie, notably both species of wild indigo. They also disappeared from the indigo opening and survive only within the fenced deer enclosure in the main prairie. Loss of species is continuing with prairie dock disappearing by 2016. The other side of the coin is the advantage some species have by not being eaten by deer. Many of them are weedy species, but some are quite conservative and easily lost due to other disturbance. An example in the prairie is Great St John's Wort which ranks as a 10 in the floristic quality index, but is never eaten by deer. Some other attractive and relatively high ranking species that are spared include bergamot/monarda and the blazing stars. An example of a good quality native species that has become hyper abundant in Miami is mountain mint. However, for the most part, deer prefer the high quality plants that volunteers are trying to restore.



Browse Line 2012

## PRAIRIE ECOSYSTEM HEALTH

As shown in the Masi thesis, there was a “significant improvement of the natural quality of Miami Prairie” between 1977 and 1990. Has there been a significant improvement since then? Is there still a “significant improvement of the natural quality of Miami Prairie since 1977? Has there been improvement since 1990? There are four parts to the answer with respect to ecosystem health which involve: trees; shrubs, grass-like plants; and forbs.

### 1. Trees

#### Grade A

Trees in the prairie are a minor factor as long as long as they are not too abundant. After initial tree removal from the open prairie, the woodland edge has been pushed back as time passed. So trees are not a factor in answering the question.

### 2. Shrubs

#### Grade D

Non-native shrubs were removed from the open prairie during the first stage and further removed from the edges as time passed. The native shrub clones were stable by the end of the first stage. By the start of the third stage the native shrub clumps became increasingly valued as habitat for shrub-land birds. Unfortunately the eruption of the deer population has resulted in reduction of the needed bird habitat and American hazel has been eliminated entirely. Further, native shrubs are not reproducing or expanding into to cleared areas because seedlings and shoots are consumed by deer. The only new shrubs are in deer exclosures resulting from the shrub project described in Appendix 2. So with respect to native shrubs, conditions are not better than 1990 or 1977.

**Herbaceous plant populations** are a major component in the health of prairie ecosystems. In the case of Miami Prairie, it is useful to look at two separate groups of plants; the forbs with their broad leaves, and the grass-like plants with narrow leaves. Most of the broad leaved plants are eaten by deer and grass like plants area seldom eaten by deer.

### 3. Grass-like herbaceous plants

#### Grade A

Grass-like herbaceous plants include grasses, sedges, and rushes. Eleven native grasses were present in 1977. Sixteen were present by 1990 and a total of 20 grasses were reported by 2016. Eleven native sedges were found by 1981 and 20 by 2016. Many of the recently identified sedges are probably the result of improved identification rather than reintroduction. Seven rushes were reported by 2016, an increase of one in recent years.

Grasses-like plants have all showed modest gains in the number species present over time and they have also showed substantial increases in the area they occupy as they have spread into restored areas. So for the grass like plants, the answer is yes, conditions are better for both 1981 and the present.

### 4. Forbs

#### Grade Forbs not eaten by deer A Forbs eaten by deer F

Forbs present a much more complex situation. As discussed in the above habitat section, during the growing season, forbs constitute a major portion of deer diet. Deer have a range of dietary preferences for forbs ranging from favorites, to plants seldom eaten, to some plants which are never eaten. Deer browsing throughout Miami Prairie and woods is intense during all seasons. Of the 95 native forb species present in 1977, 11 have been eliminated. Additionally 8 forb species restored by 1990 have been lost.

On the positive side, the forb species not eaten by deer have expanded into areas in the prairie formerly occupied by invasive species. However, some of those few species, notably mountain mint, have almost become invasive.

From 1977 to 1990 the number of forb species increased and expanded as invasive species were controlled and missing species were reintroduced. However, from 1990 to the present, substantial losses have occurred both in the number of species; and in the abundance of other forb species that deer prefer and have reduced in abundance, but not yet eliminated.

### **Prairie conclusions**

Looking at the quality of the plant community in Miami Prairie, it is clear that as documented in the Masi thesis, significant improvement in quality occurred between 1977 and 1990. But from 1990-2016 only part of the community improved. Grass-like plants improved, primarily with respect to the area they occupy and some forbs expanded.

On the other hand, shrubs stopped reproducing and were reduced in area. And, while some forbs not eaten by deer increased, far more suffered from excessive browsing. Viewed as a whole, it is clear that the plant community did not significantly improve in quality since 1990. In fact in the forb community, substantial losses have occurred since 1990 due to the eruption of the deer population. Considering the gains within the grass-like community together with losses by shrubs and forbs, the answer is that for ecological quality, there has been significant loss.

Looking at habitat factors, there have been significant gains in seed, control of invasive species, ground layer sunlight, and presence of fire. Hydrology remained unchanged, but damage by animal imbalance has been extreme.

## **IV.) WOODLAND INCLUDING SAVANNA**

### **WOODLAND HABITAT FACTORS**

Most woodland restoration was not undertaken until stage 3. Relatively few woodland species had been reintroduced before the moratorium; and monitoring was not as thorough as it was in the prairie. The result is that the impact of deer is not as thoroughly documented. However, the disappearance of species preferred by deer clearly illustrate their impact. Also the disappearance of seedling trees and shrubs also illustrate the situation. Conditions in the woodlands and savannas parallel those in the prairie.

#### **1. Seed & Propagules**

**Grade: Herbaceous Plants A; Shrubs B**

As in the prairie, volunteers have gathered seed of local native plants from natural remnants and from successful restorations. Seed gathering begins in spring as the seed from spring ephemerals ripen, into November. Seeding continues, but success is limited by excessive browsing by deer especially in the case of forbs.

In the case of shrubs, most plants are started as seedlings and then transplanted into protective cages, as described in the section on shrubs

#### **2. Invasive Species**

**Grade A %**

In the wooded areas of Miami, invasive species are best discussed in three categories: brush, garlic mustard, (In the prairie garlic mustard cannot compete with prairie plants) and herbaceous species. Brush is the most time consuming because it must be cut and burned, followed by application of herbicide to control re-sprouts and seedlings. After brush removal, when enough fuel has been grown to support controlled burns, use of herbicides can be reduced. Garlic mustard is treated separately by pulling, primarily by students in the spring season. Other invasive herbaceous species are controlled by spraying



burned only once or twice, but the prospect for regular and effective burning is looking good. The current program is adequate, but there is a lag in recovery due to the long absence of fire.

The woodland and savanna portions of Miami Woods have been heavily impacted by invasion of fire sensitive trees following the end of agriculture together with continuing fire suppression. There are no herbaceous plants that are characteristic of a closed forest to be found in Miami Woods, probably reflecting the absence of closed forest conditions in its history. Fire is needed throughout the wooded areas to assist in controlling invasive species and stimulating native species.

**5. Hydrology: Upland and transitional slopes A Floodplain C**

Hydrology is not a major factor in the wooded portions of Miami with the exception of the flood plain. Topography and drainage has not undergone major long term change within the wooded portions of Miami Woods with one exception. The river itself and the floodplain have changed due to channelization of the river near Dempster and Oakton Streets; and massive changes in river flow due to upstream changes consisting at first of agriculture and later urbanization. Restoration of the floodplain remains problematic due to the magnitude of changes and uncertainty as to what is possible.

The banks of three of the small tributary streams fed from off-site are eroding badly, but the area is small and flows are extreme due to off-site development. Restoration is highly unlikely unless upstream flows are modified. The hydrology of the river is complex and beyond the scope of volunteer restoration.

**6. Animal Imbalance Grade F**

As in the case with the prairie, throughout the woods all twigs within the reach of deer at about five feet have been consumed. (As seen in the photo on page 10.) The result is that there are no trees or shrubs less than about 10 or 15 years of age and no current reproduction. The consequence is that as the existing trees and shrubs complete their life spans there will eventually be no trees or shrubs present in Miami "Woods" unless the deer problem is brought under control.

**WOODLAND ECOLOGICAL HEALTH**

Although most woodland habitat factors have improved, ecological health in the wooded portions of Miami has clearly deteriorated since 1990 and since 1977.

**1. Trees Grade F**

The fundamental problem for trees is that they are no longer able to reproduce in Miami Woods. Additionally two tree diseases have significantly changed sunlight conditions. Beginning in the 1950s Dutch elm disease began killing the American and slippery elms and continued until very few elms are left. Whether the survivors have natural residence is uncertain, but the fact that they are continuing to die off is not encouraging. In recent years emerald ash borers have rapidly killed all of the white, black, and American ash trees, leaving only seedlings which are unlikely to survive. Loss of these species has caused massive change in the woodlands. Another disease is having a less dramatic, but important effect. Butternut trees were never abundant, but are steadily dying due to a non-native disease. At present only two survive in Miami Woods.

**2. Shrubs Grade F**

Native shrubs are no longer able to reproduce and existing plants are being damaged by excessive browsing bark loss due to antler rubbing. Shrubs are being reintroduced by the initiative described in appendix 2, but survive only within deer exclosures.

**3. Grass-like plants Grade A**

Grass-like plants have diversified and spread into areas where invasive species have been cleared.

#### 4. Forbs

#### Forbs not eaten by deer A Eaten by deer F

Forbs not eaten by deer have expanded into cleared areas, but those eaten by deer have been reduced or eliminated. Woodland forb species such as lilies, wild hyacinth, woodland phlox, smooth bank cress, green dragon, white trillium and native honeysuckles have been eliminated. Species such as white snakeroot which are not eaten by deer have become dominant in large areas.

Woodlands as a whole have benefitted by improvement in habitat factors such as control of woody and herbaceous invasive species, improved ground layer sunlight, burning, and seeding, but their ecological condition as measured in the vegetative community has deteriorated since 1990. In some respect it has deteriorated from conditions which existed in 1977.

#### V.) ANSWERS

##### Total picture:

There are two benchmarks involved; 1977 and 1990. The question is whether conditions have improved between 1977 and the present and 1990 and the present.

The limiting habitat factors within Miami woods have significantly improved between 1990 and the present; except for animal imbalance, primarily deer. Ecological quality for grass-like species has improved. But the excessive number of deer are destroying ecological quality with respect trees, shrubs, and most forbs throughout the Woods and Prairie.

Answers to the 10 questions on improvement

##### Habitat

Seed and propagules:

Yes, improved since 1977 and 1990

Invasive species control:

Yes, improved since 1977 and 1990

Ground layer sunlight:

Yes, improved since 1977 and 1990

Fire:

Yes, improved since 1977 and 1990

Hydrology:

Unchanged since 1977 and 1990, but not a major problem

Animal imbalance:

Unchanged from 1977 to 1990, (but not a problem)

No; a major disaster from 1990 to present

##### Ecological Health

Trees:

No; currently worse than 1977 and 1990

Shrubs:

No; worse than 1977 and 1990

Grass-like species:

Yes; steady improvement from 1977 to 1990 and from 1990 to present

Forbs:

No; for most forbs worse than 1977 and 1990

Unchanged for the few species not eaten by deer

Have Conditions Improved Since 1990?

	Yes Improved	Unchanged	No, Worse
1. Seed and Propagules	Yes		
2 Invasive Species	Yes		
3 Ground-layer Sunlight	Yes		
4 Periodic Fire	Yes		
5 Hydrology		Unchanged	
6 Animal Imbalance			No
7 Grass-like Plants	Yes		
8 Forbs			No
9 Shrubs			No
10 Trees			No

**VI.) CONCLUSIONS**

After 40 years of volunteer effort involving hundreds of workdays, thousands of individuals, and tens of thousands of contributed hours, restoration in Miami Woods and Prairie is in many respects a major success in preserving and protecting the native flora and fauna of the North Branch Watershed. However, success has been severely limited by the excess population of deer. A solid foundation has been created for a complete and lasting restoration once deer are effectively managed.

**What Next?**

By far the largest problem is the excessively large deer population. Until it is effectively managed, ecological health will continue to deteriorate.

The second largest and most immediate problem is the resurgence of Eurasian honeysuckle re-sprouts and seedlings in the woodland units. The primary answer to the problem is the FPD controlled burn program. It remains to be seen whether it can meet the challenge. In the near term, aggressive spot application of herbicide is necessary.

Various herbaceous invasive plant species exist at a nuisance level which do not impair ecological quality, but which will do so if not managed. Continuing spot spraying of invasives and pulling of garlic mustard is essential.

Long term, several initiatives are needed:

1. A monitoring and public information program is needed to document the deer problem and educate the public and decision makers.
2. A deer management program is needed if the ecological quality of Miami Woods and Prairie is to be saved from further decline, protected, and enhanced.
3. A survey and analysis of agricultural tiles under the prairie is needed together with remediation if substantial benefits are identified.
4. A survey of reptiles and amphibians is needed together with a survey and analysis of the very large raccoon population and their impact on the near absence of reptiles and amphibians from the Preserve.
5. The potential for improving ephemeral ponds should be examined and an action plan developed.

## **APPENDIX 1**

### **Topography, Hydrology & Soils**

Topographically, Miami Woods consists of three zones: upland that varies in elevation by only about 5 feet and slopes gently toward the river; transitional slopes that drops 5 to 10 feet over a relatively brief distance (10 to 200 feet) to the floodplain. The floodplain is relatively flat and varies in width from a few feet to more than a hundred yards. The river falls only a foot or two between Dempster and Oakton Streets and its channel is slightly below 610 feet in elevation.

The river and floodplain are the main hydrological features in Miami Woods and form its eastern edge. Three small streams emerge from storm drains at the edge of the preserve. They appear to have been ephemeral before development, but now carry small base flows and transport very large flash flows from upstream impervious areas during and after storm events. These flows are causing severe bank erosion, but affect relatively small areas. There are also nine upland drainage areas from within the preserve that form wet swales of varying size that produce seasonal flow and have outlets passing through culverts under the bike path.

The land slopes generally from the west toward the river and from north to south. Elevations range from about 635 feet at the northwestern edge of the prairie to a bit less than 610 feet along the river's edge. The river descends only a few feet from north to south as it runs from Dempster past Oakton Street. At normal flow, the river runs through a channel with relatively steep banks of about two feet below the edge of the flood plain. The 610 foot contour line runs along the river channel through the entire preserve. At the north end it has been straightened for a distance of about 1,300 feet and apparently deepened since there is a dry oxbow which appears on the map as management unit WO05. At the south end near Caldwell Avenue the channel has also been moved, leaving a wet oxbow on the St Paul side of the river. Both changes were made before the earliest aerial photo taken in 1925. It is not known whether lowering of the stream bed occurred at the time of the straightening or as the result of erosion.

The frequently inundated portion of the floodplain lies between 610 and 615 in elevation. The less frequently inundated portion lies between 615 and 620. Most of the transition from floodplain to upland is narrow and lies between the 620 and 625 contour lines which run close together. The upland varies only slightly in elevation.

Before settlement, in both the prairie and woodlands, most precipitation was absorbed into soil and became groundwater which gradually made its way into streams. This was facilitated by porous soils containing large amounts of organic matter within the soil, and decaying duff materials on the surface. It was also facilitated by "macropores" created by the growth and decay of roots, and also by larval insects such as cicadas, and invertebrates such as crayfish.

Plowing soil for agriculture exposed the fine textured soil to the impact of raindrops which suspended fine particles which tended to travel with water moving unimpeded by dead plant materials into tributary streams. Plowing also changes soil structure compacting it and closing pores, reducing movement into groundwater. Then, as land use shifted from agriculture to urban uses, a significant portion of the landscape became impervious as the result of paving and building structures.



Currently flow in the North Branch has become very “flashy” with flows increasing sharply following rain events because of the impervious surfaces. Also, base flow has increased as the result of flow from sewage treatment plants releasing used water from Lake Michigan. A notable example is the Clavey Road plant which has the capacity to treat up to and more gallons and more of sewage per day.

The result of all this is that the floodplain has deep layers of sediment eroded from upstream farm fields during the agricultural periods and has flooding patterns far different in timing and severity than in the past.

Tributaries to the river within Miami Woods include three small streams fed from off-site sources. These have small base flows, but are quite flashy with large storm flows due to off-site impervious surfaces which are causing unsightly channel and bank erosion. However, the area is comparatively small and restoration is unlikely until off-site conditions change.

In addition to the three small streams, there are nine small ephemeral streams that arise entirely within the Preserve and flow through culverts under the bike path as they flow to the river. With the exception of two small ephemeral ponds, the ephemeral streams provide surface drainage to the river. In most years the ponds dry out too early to support much aquatic life, but could be enhanced. They are located in the northwest corner of the prairie and in management unit FO04.

## **APPENDIX 2**

### **Shrubs**

Native shrubs in Miami woods and prairie are limited in diversity and abundance due to past agricultural grazing and continued pressure from the very large deer population. With respect to bird habitat, the removal of Eurasian honeysuckle has further reduced structural habitat available for shrub-land birds. To address the problem, restoration of native shrubs is underway supported by Audubon Chicago Region, Oakton Community College, The Forest Preserve District and North Branch Volunteers including students from Wright College.

Audubon is providing the largest part of the effort including propagation of shrubs, planting and fencing funded by a grant from the National Fish and Wildlife Foundation. Oakton has provided use of their greenhouse for propagation of shrubs by volunteer Ken Schaefer, while the FPD has provided fencing for deer exclosures constructed by North Branch. Audubon volunteers are conducting long term monitoring to record use of the shrubs by birds.

During 2014 and 2015 a total of 570 shrubs and understory trees of 27 species were propagated for Audubon by Possibility Place Nursery from locally collected seed. All were planted by Audubon in Miami Woods and Prairie, and nearly all were protected by fencing which ranged from individual cages to large deer exclosures. Audubon constructed one exclosure near the Caldwell Avenue Parking lot and North Branch constructed 5 others near Caldwell to provide a buffer between the street and the bike path as well as to provide habitat. Fencing materials for the North Branch exclosures were provided by the District. Audubon interns assisted in construction. Plant materials came from the Oakton greenhouse and volunteer Rob Sulski. Planting was by North Branch volunteers including students from Wright College.

# Miami Woods

