

# The State of the Land Today

Much attention has been focused in the last eighteen months on the District's fiscal state. But longtime supporters of the District remind us that we should be even more concerned about the state of its most important and valuable assets, the forest preserves themselves. Last summer, Friends of the Forest Preserves, the Sierra Club, and the National Audubon Society jointly conducted a study of the quality and health of the District's natural lands.

By wise and longstanding policy, the District has determined to keep approximately 80% of its holdings in "a natural state." The remaining 20% constitute the developed areas of the District—picnic groves, golf courses, parking lots and bike trails, and education centers.

The District's core mission is to provide safekeeping for these natural lands. Its mission, as defined by its founding charter and confirmed many times since, is to acquire, restore, and preserve its lands "in their natural state and condition, as near as may be." The District's woods and prairies, marshes and ponds provide vital ecosystem services by helping to clean the air, control flooding, and reduce soil erosion. The plants they support provide essential habitat for thousands of species of animals, from foxes to birds to butterflies to frogs. They also provide a chance for urban people to escape the concrete of the city for a walk in nature. They are truly the natural wonders of our region—and irreplaceable assets.

But, how is this nature doing? More specifically, how well is the District fulfilling its mission of preserving, protecting, restoring and restocking these lands?

The three conservation groups conducted a land audit of the health of the District's lands. This is the first of its kind ever done in Cook County. This "natural audit" describes the condition of the District's preserves. It did not look at every tree. Instead, it used scientific sampling to draw conclusions about this vast sweep of precious natural land.

## Methods

Wayne Lampa, former ecologist for the Forest Preserve District of DuPage County and currently senior scientist at the Conservation Research Institute in Elmhurst, designed the study. Last summer the study's organizers recruited 89 monitors (most of them professionals working for Cook County and other conservation agencies, or highly knowledgeable volunteers) to conduct the audit in teams of two. Each team consisted of one expert who could identify plants and trees and one data-entry assistant. Lampa and his design team used scientific techniques to randomly select sites throughout undeveloped lands of the District. In June and July, study organizers conducted five training sessions to familiarize participants with the study procedures. The teams of participants received aerial maps of their assigned sites, each showing the transect start and direction. They received a copy of the instructions, a ¼-square-meter quadrat frame (about 10 inches on a side), and a "cruise stick" (something like a yardstick, but calibrated for measuring tree diameters at arm's length).

Each transect was 200 meters long, or about 650 feet. Every 10 meters (about 33 feet), the monitors inventoried the ground layer (grasses and wildflowers) in a ¼-square-meter quadrat, recording every plant species found in the quadrat, the percentage of the ground that the species covered, and the percentage of bare ground. In total, the teams sampled 87 transects including 1,738 quadrats.

Every 30 meters (about 98 feet), the monitors conducted a "point-quarter" sample. That is, in each of four 90-degree quadrants (northeast, southeast, southwest, and northwest), they recorded the nearest trees, in two size classes: first, those 15 inches or more DBH (the diameter of the tree at breast height) and second, those 1 to 8 inches DBH. Thus they looked at the ancient canopy

trees and the understory, including the future canopy trees. The monitors determined the closest trees' species, size, and distance in each of the four directions, recording data on a total of eight trees at each sampling point. A total of 5,560 trees were sampled in this way.

Teams conducted their sampling in July and August, primarily because this is the period when the most significant (and most threatened) components of forest plant life are in bloom and thus easily identified. The data and analysis presented here include only the most salient and accessible data. When analysis of the data has been completed, a scientific paper for a professional journal will be prepared; it will contain more detailed results.

## Findings

We looked first at the health of the plant communities. The canopy trees and the grassy turf are the foundation of the forest ecosystem. They hold the soil, create the shade, transpire the air and water, and provide the food for the animals.

### *Question 1. What natural ecosystem types make up the District's lands?<sup>1</sup>*

First the good news. According to this study, forty-six percent (approximately 25,000 acres) of the District's natural land consists of wooded lands with forests of sufficient quality to be assigned to natural communities. These lands represent a major resource for Cook County, and for the region. An additional twenty-six percent (14,000 acres) is degraded or artificial woodland that, in the absence of restoration, has low ecological value. Five percent is oak savanna (approximately 3,000 acres). Thus in total, seventy-seven percent (42,000 acres) of the District's natural land is wooded land of some type.<sup>2</sup>

This study found four percent of the District's natural land to be prairie (approximately 2,000 acres). Four percent of the land sampled in this study was wetland (approximately 2,000 acres).<sup>3</sup>

Eleven percent (approximately 6,000 acres) is artificial grassland that could be restored to quality woodland or prairie with substantial effort. The substantial acreage that the District rents out to row-crop farmers is also ultimately restorable, but it was not considered in this land audit.

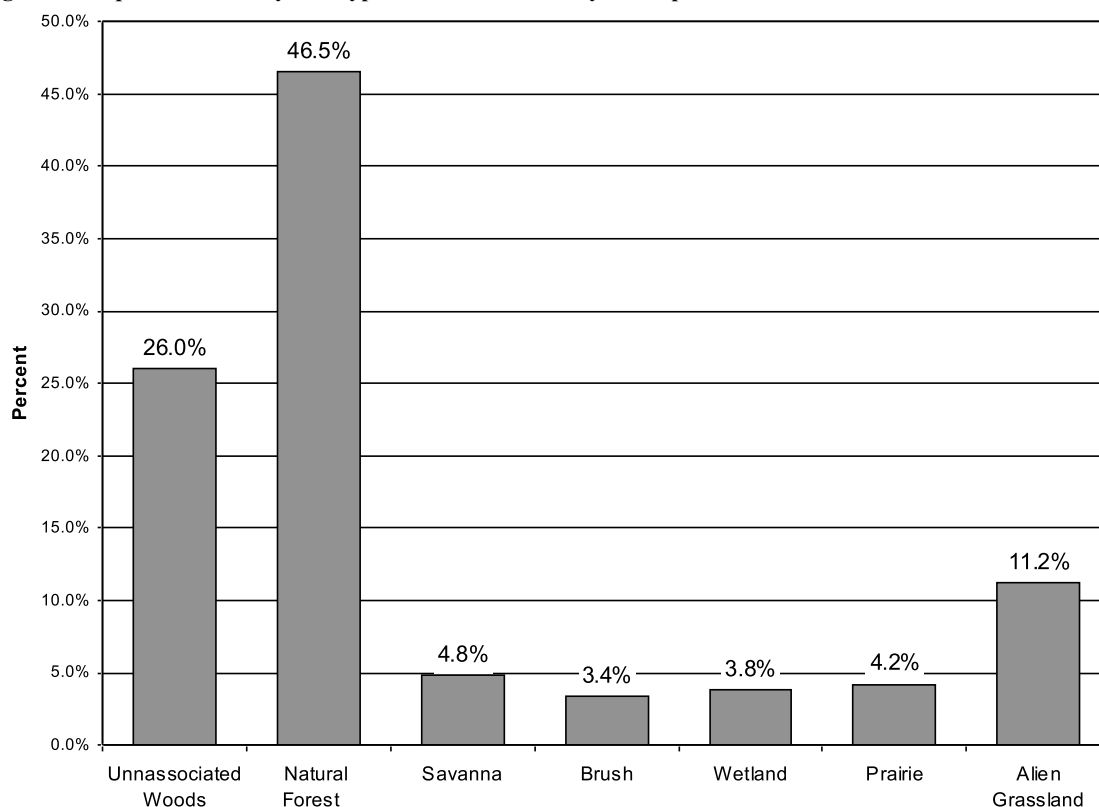
These results are shown graphically in Figure 1.

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<sup>1</sup> These calculations are approximate. We randomly sampled the 80% (54,000 acres) of its lands that the District seeks to maintain in their natural state. This conceptual 54,000 acres has never been mapped by the District. We considered all lands not maintained as parking lots, mowed lawns, row crops, etc. to be part of the natural 54,000 acres. Parcels too small to contain a 200-meter transect are underrepresented in this study.

<sup>2</sup> Quadrats were assigned to community type on the basis of the kinds of plants present. Since the samples were taken at random, approximate acreages were calculated by multiplying the percent of the total number of quadrats that represented a given community type by 54,000 acres.

<sup>3</sup> Wetland figures as given here include marsh and sedge meadow. Floodplain forest, also a major wetland type, is included with the forest acreage. Deep-water aquatic areas were not sampled and are under-represented in this study.

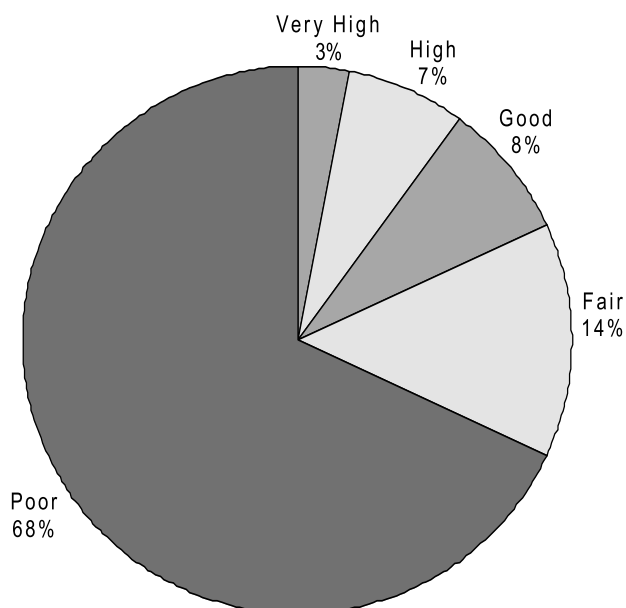
**Figure 1. Proportions of ecosystem types in the Cook County forest preserves****Question 2. What is the quality of the various types of natural lands owned by the District?**

Land managers use a variety of measures to keep track of the health of natural communities, to interpret lands to the public, and to assess and prioritize land management efforts.

Land of “very high quality” has most of the native flora and fauna that have constituted that natural community over the millennia. “High quality” areas have been degraded to some degree but are capable of recovering excellent ecological health with modest effort. High and very high quality areas are worthy of dedication as Illinois nature preserves and very much deserve the limited efforts needed to maintain them in good health. In the absence of appropriate land management, such land will lose its quality at the approximate rate of 2% per year.<sup>4</sup> “Good quality” areas still have most of their native species but may be seriously infested by invasive species or heavily over-browsed by deer. “Fair” and “poor quality” land is typically losing its value for ecosystem services, recreation, and aesthetics. It can be restored to good quality by management work over time. If neglected, however, the community will lose its natural character and restorability. When a forest has reached the point where it becomes “unassociated woods,” it can be restored to a healthy native community only with major effort and expense. Figure 2 shows the overall percentages of the District’s natural lands falling into each of these categories. Table 1 summarizes current quality of the 54,000 acres of the District’s natural land by community type.

<sup>4</sup> Forest Preserve District of DuPage County, *State of the Natural Environment within the Forest Preserves of DuPage County*, January 1993.

Figure 2. Overall quality of the District's natural lands

Table 1. Land quality by community type<sup>5</sup>

| Community               | Acreage       | Very High | High      | Good      | Fair       | Poor       |
|-------------------------|---------------|-----------|-----------|-----------|------------|------------|
| Forest                  | 25,100        | 5%        | 9%        | 12%       | 17%        | 57%        |
| Savanna                 | 2,600         | 6%        | 17%       | 10%       | 11%        | 56%        |
| Prairie                 | 2,300         | 1%        | 4%        | 14%       | 13%        | 68%        |
| Wetland                 | 2,100         | 5%        | 6%        | 2%        | 16%        | 71%        |
| Brushland               | 1,800         | 5%        | 19%       | 16%       | 21%        | 39%        |
| Artificial and degraded | 20,100        | 0%        | 0%        | 1%        | 15%        | 84%        |
| <b>TOTAL</b>            | <b>54,000</b> | <b>3%</b> | <b>7%</b> | <b>8%</b> | <b>14%</b> | <b>68%</b> |

### ***Question 3. How well are the forest trees doing?***

First, the good news. As shown in Figure 1 (p. 3), mature trees of the species that characterize healthy natural forest ecosystems populate 46% of the District's lands. This figure indicates that approximately 25,000 acres of natural forest are either in good health or are readily restorable to an ecologically sound condition. An additional 26% of the lands are degraded or artificial forests ("unassociated woods" in Figure 1). These may not function well for biodiversity or wildlife conservation but may contribute to open space, provide some ecosystem services, and have future restoration potential if substantial resources can be found.

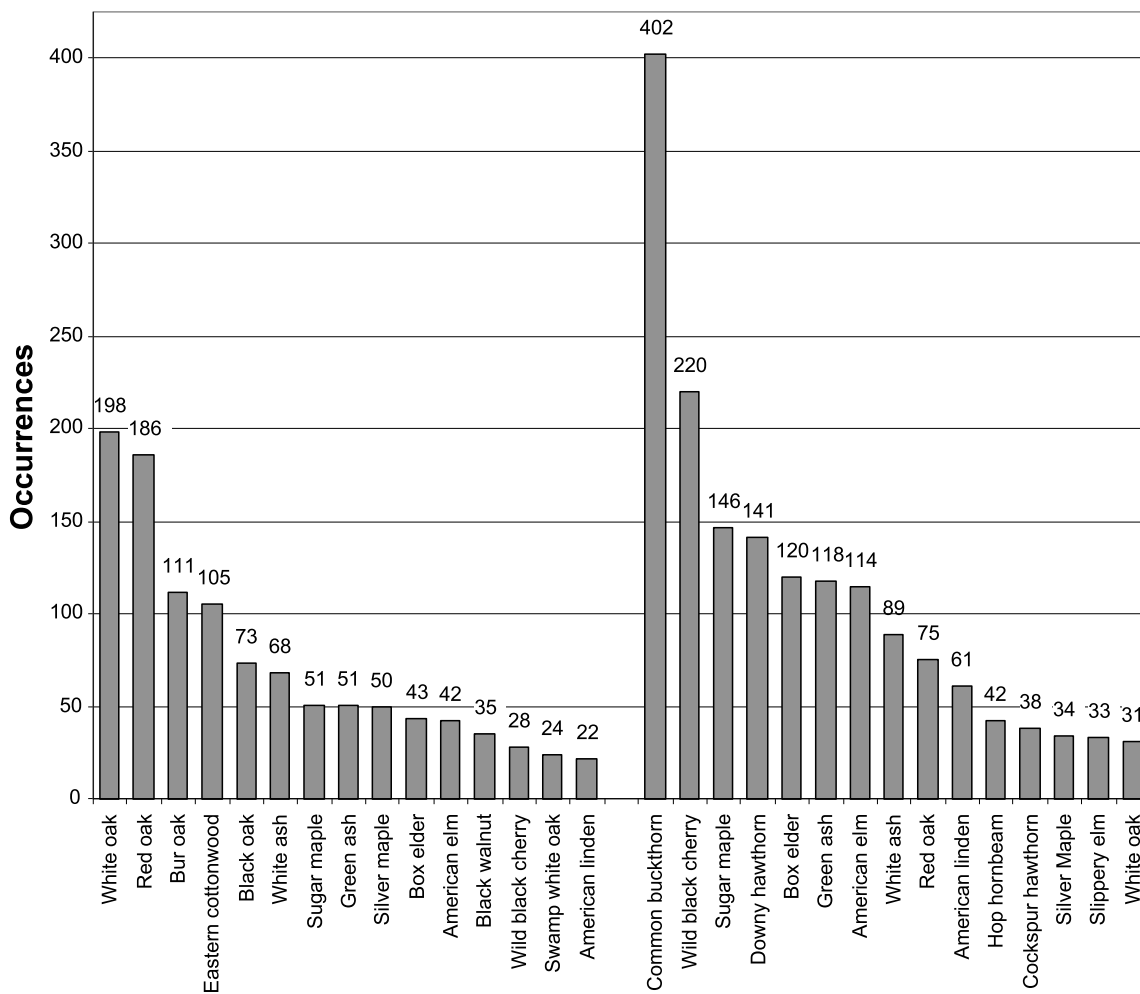
This study considered how successfully the trees are reproducing. This question is important for two principal reasons. The first reflects the conservation function of the preserves. The species of conservation concern generally depend on ancient ecosystems that have developed here for millennia. In other words, the survival of the birds, mushrooms, orchids, and butterflies of our historic woodlands depend on the reproduction of the major tree species. The second reason reflects ecosystem services that are immediately important to people (recreation value, protection

<sup>5</sup> These figures, especially for the smaller communities, are approximate. See footnote 1.

from floods and soil erosion, etc.). There is a strong relationship between the health of forests and the provision of many ecosystem services.

This study found the preserves' most common large old trees to be, in this order, white oak, red oak, bur oak, cottonwood, and black oak (see Figure 3 on the next page). It is not surprising that most of the big old trees—those greater than 15 inches diameter—are oaks. Oaks were overwhelmingly the most common trees in the region for thousands of years. Cottonwood is the exception on this list. It is a quick-growing and temporary native tree of natural disturbance. It helps heal disturbed soil (as in the farm fields that made up large parts of the originally acquired preserve lands). In this study, these five species together constituted 61.9% of the large trees in the preserves.

**Figure 3. Fifteen most common large trees and small trees**



**Mature Trees (15" DBH or More)**

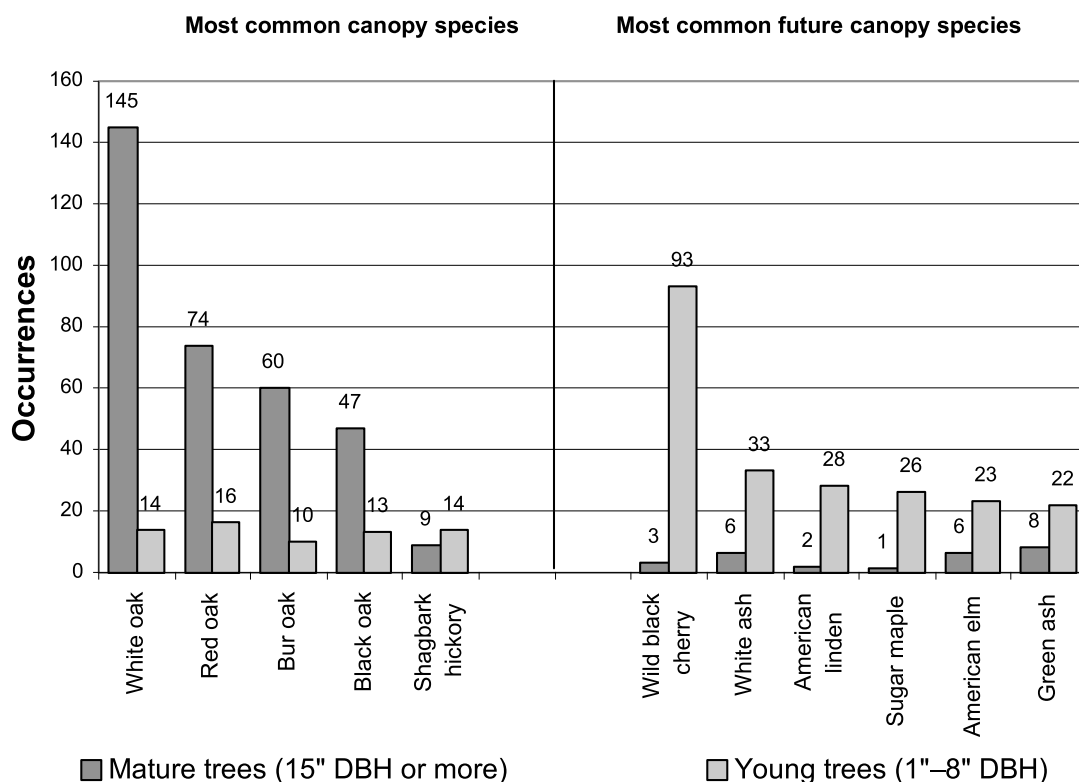
**Young Trees (1"- 8" DBH)**

In the healthy woodlands, the numbers of small trees would reflect (but not precisely duplicate) the distribution of the ancient canopy trees (in this case, mostly the oaks). However, this study found the most common young canopy trees to be, in this order, wild black cherry, sugar maple, box elder, and green ash.

These small trees, those between 1 and 8 inches diameter, speak volumes about the future of the forest if nothing is done. All four of these small canopy tree species are invasive in the oak woods, as are the next two most common, American elm and white ash. And then there was one other species of small tree that was not a canopy tree. It was overwhelmingly the most common tree in the preserves, the Eurasian species common buckthorn. Together these seven species make up 65% of the small trees in the preserves.

In contrast, the four species of oaks, keystone species of most of this region's natural forests, make up only 8% of the young trees. The large old oaks are not reproducing in sufficient numbers to maintain themselves. (See Figure 4 on the next page, which shows the most common large and small canopy species in dry-mesic woodland.) Instead, invasive species are replacing the species that constitute native ecosystems. If this trend is not arrested and reversed, in the foreseeable future we will lose the entire oak woodland ecosystem that supports most of the woodland birds, butterflies, mushrooms, and salamanders that lived here for thousands of years.

Figure 4. Loss of canopy species in dry-mesic woodland



At a scientific symposium on oak woodlands sponsored by the Chicago Botanic Garden in January 2002, researchers reported that runaway populations of red maple were a major threat to the health and character of eastern forests. There is some indication, several scientists said, that the sugar maple is playing that role in the rich soils of the Midwest. This study, in fact, bears out this fear and identifies wild black cherry as an additional threat.

The data are especially compelling when they are separated out by communities (the various kinds of prairies, woodlands, etc.). Dry-mesic woodland was found to be the most widely distributed of all community types in the preserves. The reproduction data for this community are

shown in Figure 4. It compares the large, old canopy trees compared to the small, future canopy trees. It is clear from this data that, in the absence of management, all of our oak forests will be lost—along with the rich biodiversity dependent on them.

***Question 4. What changes are taking place in the density of our forests?***

It is a common mistake to think that the health of a forest is proportional to the number of trees. Ecologists and foresters have long known that pathological densities of trees can degrade a forest, especially where invasive species are concerned. Thus another way of measuring the sustainability of a forest is to determine whether it has too many or too few trees.

Consider the density of trees in the District’s most extensive forest community, dry mesic woodland, or upland oak woods. The canopy trees are shown by the point-quarter data to have a density of 32 trees per acre. This figure is roughly comparable with the tree density of the ancient forests found by the region’s first surveyors (the Public Land Survey of the 1830s). Thus the good news is that the ancient structure of these forests is relatively intact, when only canopy trees are considered.

The bad news is that in the upland oak woods the 1- to 8-inch trees have a stocking rate of 289 trees per acre. The data showed a similar unbalance between stocking rates of the large and the small trees in the District’s other forest communities. According to project director Lampa, the presence of young trees at this density is a sure sign of serious deterioration in the Chicago region’s oak woodlands. According to Lampa, “There are vastly too many small trees for a sustainable, healthy forest. That’s a serious problem. Where little trees make that much shade, there’s nothing growing in the understory, which is why there is so much bare ground in these forests.”

***Question 5. What is the state of the soil?***

In the various woodland communities surveyed, the average amount of bare ground per plot was 57 to 70 percent.

According to Lampa, “A healthy woodland shouldn’t have more than 10 to 15% of bare ground.” For the soil to be well vegetated by woodland grasses and wildflowers means “that plenty of light is reaching the forest floor to support a healthy understory of wildflowers and grasses and the reproduction of young trees,” Lampa said. Higher percentages of bare ground reveal that the soil is eroding and the tree canopy is too dense to permit a healthy groundlayer community—including seedlings of desirable trees.

Moreover, woods and forests lacking a rich understory of flowers and grasses do a much poorer job of controlling storm-water runoff and retaining water in floods. Instead, storm waters contribute to flooding downstream and carry away more and more topsoil, since there are few plants to hold soil with their roots.

***Question 6. What is the overall state of the preserve’s grasses and wildflowers?***

The most common plants seen in the 1,738 ground-layer quadrats were, in order of occurrence, common buckthorn, tall goldenrod, Hungarian brome, Kentucky bluegrass, garlic mustard, tall fescue, and gray dogwood. These plants are, without exception, sources or indicators of ecological distress. The high proportion of buckthorn is especially troubling, since young buckthorn in the ground layer often indicates that most other species will eventually be shaded out.

A healthy ecosystem is full of “conservative” plants: plants that are characteristic of healthy, stable habitats. A weedy ecosystem, on the other hand, has few or no conservative plants. The most common plants found in this study are indicators of low floristic quality. In fact, they are

mostly non-native. The only natives in the list above are tall goldenrod and gray dogwood; these two species are essentially native weeds. When they are the predominant species in an area, as in this study, they are symptoms of ecosystems in distress.

The results of the ground-layer study are shown in Table 1. It gives essentially the same message as the data for tree species, tree distance, and bare soil. This measure is also applicable to non-forested natural communities (prairies, marshes, etc.)

These degraded lands are not only poor habitat for many species but are also losing recreational value for the citizens of Cook County. Few people come to the forest preserves to see a thorn thicket or a forest of pole trees with bare-ground underneath. But, as the user survey found, many people come to walk through areas teeming with birds and butterflies and to enjoy open vistas filled with wildflowers under the branches of majestic trees.

These findings corroborate an earlier study conducted by Marlin Bowles, Jenny McBride, and Christopher Dunn of the Morton Arboretum, Michael Jones of the Natural Land Institute, and Tim Bell of Chicago State University in the fall of 1997.<sup>6</sup> They, too, wanted to determine what was happening in Cook County forest preserves and what effects forest fragmentation and loss of natural processes such as fire were causing. They investigated whether there was an increase in shade-tolerant species (such as maples) and a decline of oaks and loss of understory species, resulting in a negative impact on forest biodiversity.

These researchers tested their hypotheses by re-sampling high-quality oak forests that had been identified and sampled by the Illinois Natural Areas Inventory 20 years earlier, in 1976. At all sites they found troubling changes in the natural canopy trees or in the shrub layer. For example, in mesic old-growth forest at Busse Woods, sugar maple was replacing red oak as the dominant tree species. In dry-mesic old second-growth forest at Busse Woods, oaks had declined in all size classes. In both areas there was a significant decrease in richness and density of shrub-layer species and an increase in relative abundance of sugar maple saplings.

The researchers concluded that the preserves needed increased “disturbance processes”—the thinning and prescribed-burning work of the land managers. “These results suggest that increased levels of disturbance processes are needed to maintain canopy openings that will allow maintenance of shrub-layer species and oak regeneration in these forests. Reducing deer herd sizes also appears necessary to facilitate this process.”<sup>7</sup>

The data reported here are similar to those of studies by the DuPage County forest preserves conducted in the late ‘80s and early ‘90s.<sup>8</sup> In that case, the studies led to the board approving a “Natural Areas Management Program,” initially funded at \$11,000,000. That program continues to this day.

## Discussion

Today, we are at a crossroads. If the Forest Preserve District of Cook County continues on its current course of doing little (aside from restricted volunteer efforts) to care for its natural lands, we will continue to witness degradation. We will suffer loss of natural heritage, biodiversity, and ecosystem services. And the land will be decreasingly able to support the plants and animals that depend on healthy ecosystems for their survival.

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<sup>6</sup> *Twenty-Year Woody Vegetation Changes in Three Cook County, Illinois Forest Preserves*, October 1997.

<sup>7</sup> *Ibid.*

<sup>8</sup> Forest Preserve District of DuPage County, *State of the Natural Environment within the Forest Preserves of DuPage County*. January 1993.

But there is an alternative. The District could hire or assign adequate trained staff that are dedicated to natural land management. It could expedite the work of volunteers and hire private contractors to execute special projects. The success of restoration management has been proven many times over in this county and others. Where sites are managed using best management practices, the rich complex mix of plant and animal species flourishes. Where unmanaged and neglected, species disappear and the original ecosystem begins to die.

This study found a strong consensus among conservationists and even many staff members that a much higher priority should be put on stewardship of the District's most valuable lands. The 6,500 acres of "good" to "very high quality" forests should not be allowed to deteriorate further. The 2,500 acres of "good" to "very high quality" savannas, prairies and wetlands also deserve prompt stewardship. Most of these lands are losing their quality at the rate of 2% per year. When that quality drops to "fair" or "poor," the losses may be permanent and at best are expensive to remediate.

The 33,000 acres of "fair" to "poor quality" natural land is a second priority. Not all of it can be managed in the near future. Some of it may have problems for which no practical solution is now known. Some may be in the back yards of people who wouldn't welcome the attention. Because so much work is needed, the District may need to postpone dealing with areas that are of poor quality and that also pose management challenges. But much of this land has great existing value and greater potential. Plans should be made to restore half of it to good health in ten years.

The 20,000 acres of the most degraded or artificial land are the last priority. Yet, as other forest preserve districts have shown, and as Cook County has begun to show at sites like Bartel Grassland and Camp Sagawau, creative approaches can sometimes yield great benefits with modest investment.

All the other forest preserve districts in the region have substantial staff focused on land management. Cook County has no staff specifically assigned to do the physical work of managing its natural lands. Nearly all the work in Cook County is or was done by volunteers. But at many sites volunteers are no longer active, or they work in greatly reduced numbers. Also, because of a wide variety of limitations, where they do work they are not as effective as they could easily be. "We are committed to land management, and getting back to where we were four to five years ago," Superintendent Nevius has said.<sup>9</sup> But observers—and other forest preserve districts—see things differently. Five years ago the District was already far behind the surrounding districts in the stewardship of its natural lands. In recent years, most of the District's land management program, except for the limited areas cared for by volunteers, is in name only. The prescribed burns do not get done. The invasive species do not get controlled.

Why, then, has Cook County's land management bogged down, as surrounding forest preserve districts moved ahead? There are several reasons. Some stem from the controversy and resulting moratorium. At that time the leadership in other forest preserve districts stood up for their land managers and volunteers. These districts also quickly mounted effective board, community and media education campaigns. Board members became involved, learned the details, and took proactive roles in reaching out to affected constituencies. In Cook County, this kind of leadership did not emerge.

The organization of the District is also to blame. There is currently no central department at the District charged with taking care of the 80% of its lands to be maintained in their natural state. The burden of this work falls on two District departments, neither of which was ever charged with land management. The Forestry Department was founded in the early years of the District, largely to plant and care for trees alone, and the Conservation Department in 1945, largely to

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<sup>9</sup> Joseph Nevius, comments before the Board, January 14, 2002.

handle public education. Both are severely understaffed, given their charge of caring for nearly 54,000 acres as well as operating all educational programs and nature centers. Both departments combined will have 169 employees in the 2002 budget, and this assumes full staffing.

Maintenance, on the other hand, will have 377 employees, nearly 2.2 times the size of the other two departments combined. Yet, unlike their efforts 50 years ago, maintenance employees seldom stray beyond the parking lots and picnic grounds.

Prescribed burning, a key aspect of land management, provides a valuable comparison between Cook and other districts. In 2001 Cook County burned 289 acres. Lake County burned 4,000 acres,<sup>10</sup> though it is a forest preserve district only 35% the size of Cook. Kane County, at only 9,600 acres, fields burn crews of up to eighteen people, who burn 700–800 acres per year—eight percent of its holdings. Significantly, Kane County’s maintenance department is a regular part of these efforts.<sup>11</sup>

In 1996, support from conservationists helped the District secure federal funds for a Seppi, a \$100,000 brush-cutting machine widely used in the counties surrounding Cook. Since the appearance of the critical columns in the *Chicago Sun-Times*, it has mostly sat in the shed. It could in that time have easily cleared the invasives from the 1,800 acres of deteriorating brushland shown in Table 1. When asked why the Seppi is so little used, staff members repeatedly explain that there is no one to run it, although three years would seem to be ample time to train someone.<sup>12</sup>

To emphasize the lack of support for Conservation and Forestry, both superintendents hold only a grade 22 position, while all other department heads have at least a grade 23.

Observers believe that the weak land management program in Cook County may reflect the perception that the Board and the President in recent years were not supportive of the preserves. But some Commissioners have begun to ask tough questions about this program, demonstrating that they are not satisfied with the status quo.<sup>13</sup>

## **Recommendations**

**Dramatically increase the acreage being actively managed.** Otherwise large areas of the District’s finest lands will irretrievably lose their value for both conservation and recreation. The District has tens of thousands of acres in urgent need of invasive species control. Possible resources include:

- District staff, including Conservation, Forestry and Maintenance employees
- Sheriff’s Work Alternative Program
- Outside contractors (a resource recently well-used by the District at Bartel Grassland, Camp Sagawau, and Bergman Slough)
- Volunteers

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<sup>10</sup> Ken Klick, correspondence with Stephen Christy, January 15, 2002.

<sup>11</sup> John Duerr, General Superintendent, Kane Count Forest Preserve District, interview with Stephen Christy, April 25, 2001.

<sup>12</sup> Anonymous interviews, June 14, 2001; August 7, 2001.

<sup>13</sup> The Board’s most recent discussion of the state of the District’s efforts at land management occurred in the public hearing and board meeting on the District’s budget for FY 2002, held in February 2002.

**Substantially increase education and outreach about land management.** Far more effort needs to be made to explain to the public, neighboring communities, and the Board the reasons for and techniques of sound land management.

**Completely map the District's natural communities within two years, and identify those sites most in need of active management.** The District has already begun to map its natural communities, but the pace must be accelerated and priorities established soon.

**Prepare management plans for all preserves of good to very high quality, and present a budget for managing them.** The District should strive to have 10,000 acres under active management in two years, 20,000 acres in four years.

**Redirect Maintenance staff to assist in land management.** Currently, more than 60% of the District's employees (Recreation and Maintenance) take care of 15% of the land. The District should retrain and reassign up to 30% of these to further land restoration efforts.

**Take greater advantage of resources assembled by Chicago Wilderness.** The District should devote additional staff and resources to fully take advantage of grants and collaborations.

**Expand and invest in the volunteer restoration program.** The District currently has one volunteer coordinator on staff who is paid approximately \$37,000 per year. The contribution of volunteers in time and labor to the District is estimated to be \$400,000 a year. The District should devote more resources to recruiting and assisting volunteers—such as hiring a second volunteer coordinator—as this is an excellent way to leverage the District's resources and investment.

**Lift the remainder of the moratorium still in effect.** This temporary expedient has outlived its usefulness. The District should move ahead.

**Review and revise the Land Management Recommendations.** The existing guidelines were assembled hastily in response to negative publicity. The continuing moratorium on some standard land management practices (like the thinning of the four- to eight-inch-diameter “pencil trees,” as they are commonly called, that currently overpopulate some forests) continues to hamper and erode the efforts of District staff and volunteers. Many of the guidelines are widely believed to need improvement.

**Fill all open land management positions in the Departments of Conservation and Forestry by recruiting from among the ranks of this region's and the nation's best experts.** As was true in the past, these key positions should be isolated from patronage influence.