Ecological Assessment of the North Woods of Crown Hill Cemetery

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Overview

This report is an ecological assessment of the Crown Hill Woods located at Crown Hill Cemetery, Indianapolis, Indiana. The goal of this report is to assess the species composition, structure, ecological quality and maturity of Crown Hill Woods and determine the ecological significance of the forest and its status as an old-growth forest. The conclusions are based on our site visit, our experience with studying other forests in Indiana and the evaluation of the available plant community data concerning the property provided by other experts. This report is the professional opinion of the authors and does not reflect any position of Ball State University.

Methods

A site visit was conducted on December 12, 2016. During the visit we traversed the entire acreage of the Central Till Plain flatwoods forest, excluding the cleared area in the southwest quadrant of the property. The property was surveyed to determine plant community species composition and to assess the structure of the forest. Additional data reviewed include an assessment of the site by the Indiana Department of Natural Resources Division of Nature Preserves and woody plant and herbaceous plant inventories provided by Dr. Rebecca Dolan from Butler University. These data were evaluated and compared to forest community studies we have conducted throughout East-Central Indiana.

Results and Conclusions

Species Composition

Woody Plants

There were 30 species of trees in the overstory of Crown Hill Woods. These species are native to Indiana and typical of high quality Flatwoods in East-Central Indiana. There are some invasive non-native species of woody plant along the perimeter of the property that are typical of this region, but alien species are not prominent in the interior of the forest. The most dominant canopy species across the site were *Quercus* spp. (Oaks), *Carya* spp (Hickories) and *Acer saccharum* (Sugar Maple). At lower landscape positionsthe forest was dominated by *Platanus occidentalis* (Sycamore), *Quercus shumardii* (Shumard's Oak), *Populus deltoides* (Cottonwood) and *Carya laciniosa* (Shellbark Hickory). At higher elevations dominant species included *Liriodendron tulipifera* (Tuliptree), *Quercus rubra* (Red Oak) and *Acer saccharum* (Sugar Maple).

The understory and shrub layers reflect the overall diversity of the overstory. However, as expected there is a greater percentage of shade tolerant species in the understory than in the overstory. *Acer saccharum* is the most prominent of the understory species but its distribution is greatest on the better drained portions of the site. Large colonies of *Lindera benzoin* (Spicebush) are found throughout the site and are more prominent in poorly drained areas.

Deadwood Biomass

Standing and fallen dead trees are defined as deadwood biomass. These dead tree stems are important ecological components in forests. They provide habitat for animals and eventually result in the recycling of nutrients through decomposition. During our survey of Crown Hill Woods we noted a relatively high density of standing and fallen deadwood biomass. This quantity reflects the relative age of the forest and the lack of timber harvesting.

Coarse Wood Debris at Crown Hill Woods

Herbaceous Plants

During our visit to the site most of the herbaceous plants were dormant but we were able to confirm several species identities from available plant structures. The most notable species we found was *Epifagus virginiana* (Beechdrops) which is an indicator of a high-quality mature forest.

Beech Drops at Crown Hill Woods

An inventory of the herbaceous flora of Crown Hill Woods conducted during the growing season found a very diverse herbaceous flora with several species typical of high quality minimally disturbed plant communities. These species do not persist if a site is highly disturbed.

Forest Community Structure

The overall size class distribution for all stems > 20 cm dbh at Crown Hill Woods is a descending monotonic curve. This distribution is characteristic for uneven mature forests that are replacing themselves by reproduction as larger trees die.

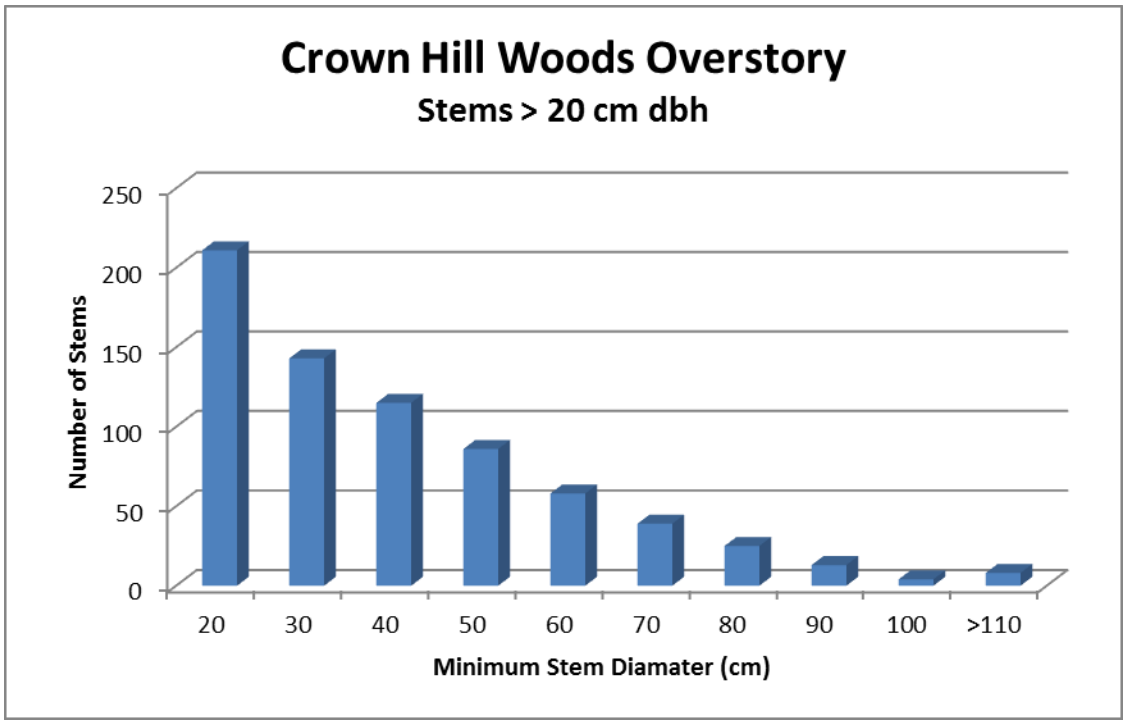

Figure 1. Overstory stem size-class distribution for Crown Hill Woods. (Forest Inventory Data)

Our observation of Crown Hill Woods is that the forest is a mosaic of different-aged canopy gaps with a variety of stem sizes due to localized mortality of overstory stems. This provides further evidence that Crown Hill Woods is a mature forest. A forest recovering from a disturbance such as clear cutting would have a more uniform distribution of stem size classes across the site. We did not find any evidence of any recent tree harvesting at Crown Hill Woods.

We found several stems greater than 90 cm (approximately 3 feet) in diameter. We conservatively estimate these stems to be greater than 200 years old based on the aging of other large trees in East-Central Indiana. 200 years is a minimum estimate and actual ages of stems this size could be much greater, but would need confirmation from increment-core or cross-sectional analysis.

Status of Crown Hill Forest as an Old Growth Forest

There is no standard definition of an old-growth forest. Strict quantitative criteria are difficult to establish for old-growth forests due to the variable effects of regional climate, local site conditions and disturbance regime. These factors all influence forest species composition and structure. Typically, the criteria in a particular region are based on a variety of quantitative and qualitative forest parameters that are associated with the maturity of the forest following disturbance. These parameters combine functional, structural and historical attributes.

We did observe that the forest at Crown Hill Cemetery exhibits the following structural characteristics that define forest maturity and are most often included in definitions of old growth forest for forests in Indiana.

a. High Diversity of woody and herbaceous plants

b. Old- Growth indicator plants prominent

c. All-aged size structure with many size classes indicating that major disturbance has been rare

d. Mosaic of canopy gaps of different ages

e. Deadwood biomass relatively high

f. Large trees prominent (>80cm dbh)

g. Old trees (>150 years)

h. Overstory basal area high

i. Little human disturbance last 100 years

Status of Crown Hill Forest as a Wetland

During our survey of Crown Hill Forest we noted the significant amount of standing water and a free flowing stream. Associated with these wetter soils were several species frequently found in wetlands such as *Quercus shumardii*, *Platanus occidentalis* and *Populus deltoides*. Wetland species were also found in the herbaceous flora. It appears that a significant portion of the property may meet Army Corps of Engineers criteria to be classified as wetland (hydrophytic) vegetation. We have found wetland vegetation prominent at other poorly drained flatwoods in Indiana. Additional efforts should be made to delineate these areas and evaluate the associated soils and hydrology to determine the extent of Crown Hill Woods which could be correctly classified as a wetland. This is especially true if any alterations are planned for Crown Hill Woods that would result in the need for wetland remediation.

Ecological Significance of Crown Hill Woods

Crown Hill Woods is a diverse high quality mature Central Till-Plain flatwoods forest. This forest is a high quality remnant of a once extensive forest that covered most of central Indiana. Very few high

quality forest stands of this type remain in Central Indiana. This diverse site ranks among the most biologically diverse sites of this type that we have studied. Most other sites have a less diverse flora due to extensive logging and animal grazing. We agree with the assessment of the Indiana Division of Nature Preserves that this site is of nature preserve quality. All efforts should be made to conserve this example of Indiana's natural heritage.