



Forest Vegetation Monitoring Summary, 2011–2015

Overview

Forest vegetation communities were selected as a high priority resource for monitoring by all the parks within the Cumberland Piedmont Network (CUPN). Forests are a dominant part of the CUPN landscape and provide recreational opportunities and wildlife habitat, protect soil and water resources, influence weather patterns, and store carbon that would otherwise contribute to climate change. Studying the components of a forest provides information on the overall health of the forest vegetation community. Key stressors affecting forest vegetation communities include non-native plant species, insect/fungal pests, and climate change, just to name a few. The network's monitoring effort is designed to detect meaningful changes in species composition and vegetation structure within each park's forested habitats and determine whether these changes are correlated with trends in key stressors (e.g., forest pests) over time.

In the first phase of vegetation monitoring, permanent plots were established across all CUPN parks over a five year period (2011–2015). These plots will be revisited every five years in order to monitor changes and trends in forest vegetation conditions. By the conclusion of the 2015 field season, 382 permanent plots had been established across the network. This includes 24 plots on Abraham Lincoln Birthplace National Historical Park (ABLI; 8 on the Birthplace unit and 16 on the Boyhood Home unit). This brief summarizes monitoring data collected from these 24 plots established in the park (Figure 1).

Monitoring plots are 20 × 20 meters with multiple nested sampling frames ranging in size from 1 to 100 square meters. Data collection is intensive, with data being grouped into the following broad categories: plot characteristics (slope, landform, etc.); species presence; frequency and cover (tree, sapling, seedling and herb layers); canopy cover; tree growth and health; evidence of forest pests, snags, and coarse woody debris (CWD); and community characterization/classification. The CUPN Forest Vegetation Monitoring Protocol provides detailed descriptions of the field and analytical techniques used for forest vegetation monitoring (<https://irma.nps.gov/DataStore/Reference/Profile/2192468>).

Significant Findings

Species Diversity

Species diversity is a function of community type which is influenced significantly by geology, slope position, slope aspect, and disturbance. The park boasts the highest average plot-level plant species diversity found within the CUPN parks, averaging 81 species per plot (see Figure 2). Most of this diversity is attributed to the Boyhood Home unit, which averages 90 species per plot. In addition, of the 528 monitoring plots established across the network, the Boyhood Home unit contains 8 of the 20 most diverse plots, including the two most diverse plots in the entire network—one with 119 species and one with 118 species. The combination of both basic and acidic parent rock material (and acidic and neutral-slightly alkaline soils) as well as

high amounts of topographic variation at the Boyhood Home unit at ABLI help contribute to this remarkable plant diversity.

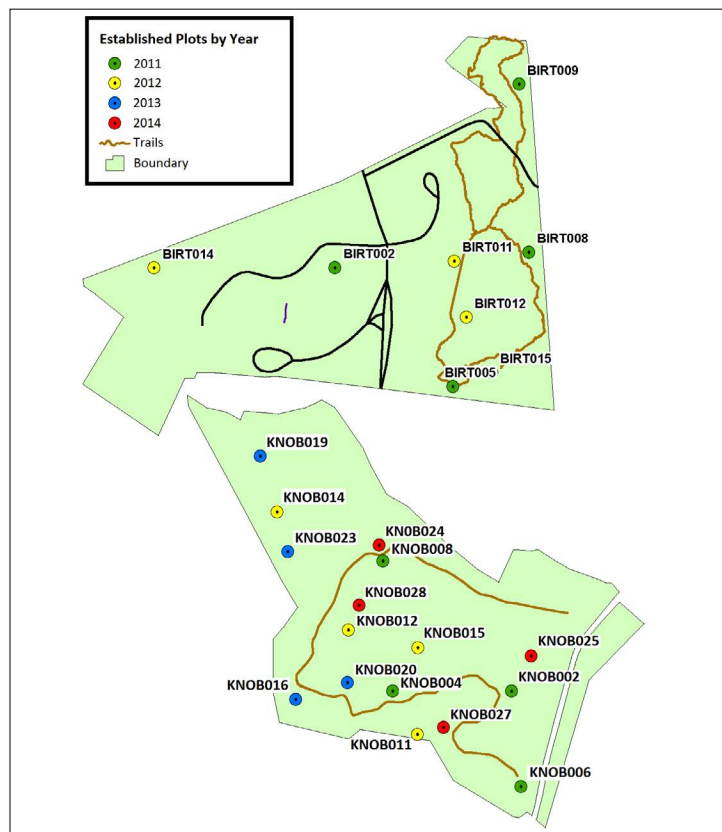


Figure 1. Map of forest vegetation monitoring sites at Abraham Lincoln Birthplace National Historical Park, Kentucky. NPS map by Lillian Scoggins.

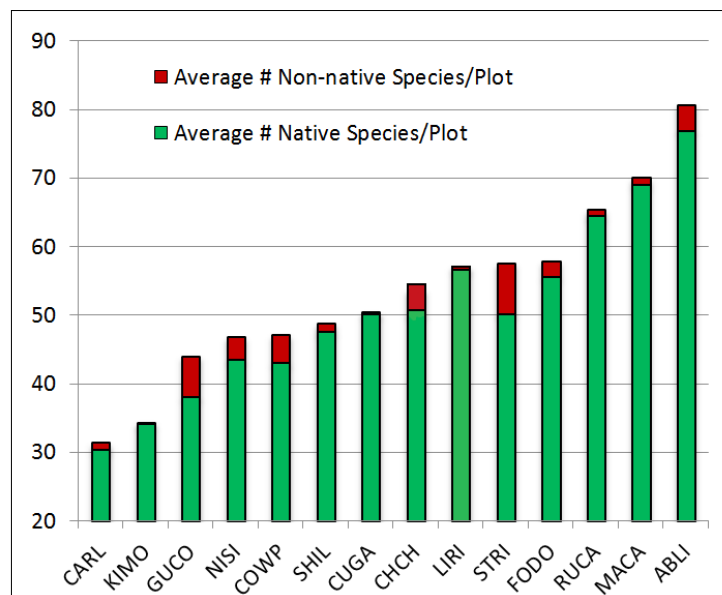


Figure 2. Plot-level average species diversity across CUPN parks, with native species shown in green and non-native species shown in red.

Significant Findings

Non-native Plants

Non-native species are present at each of the 14 parks within the network. Ideally, forest vegetation baseline monitoring and revisits to plots will help park managers understand how heavily non-native plants are affecting the native plant populations in their parks. Of the 338 plants identified to species at ABLI during forest vegetation monitoring, 22 of them (6.5%) were non-native. While non-native plants comprised 5% of the overall average plot-level species diversity at ABLI (see Figure 3), they were much more prevalent at the Birthplace unit (10%) than at the Boyhood Home unit (2%). Of the 24 plots established across ABLI within the forest matrix, the most commonly found non-native plants included Japanese honeysuckle (*Lonicera japonica*), Japanese stiltgrass (*Microstegium vimineum*), multiflora rose (*Rosa multiflora*), and Oriental bittersweet (*Celastrus orbiculatus*), occurring at 21 (88%), 14 (58%), 11 (46%), and 10 (42%) plots, respectively. Unfortunately, five non-native plant species not previously documented at ABLI were detected during monitoring, four of which were found only at the Birthplace unit. These were silk tree mimosa (*Albizia julibrissin*), sweet autumn virginibower (*Clematis terniflora*), lesser burdock (*Arctium minus*), sacred bamboo (*Nandina domestica*), and Callery pear (*Pyrus calleryana*).

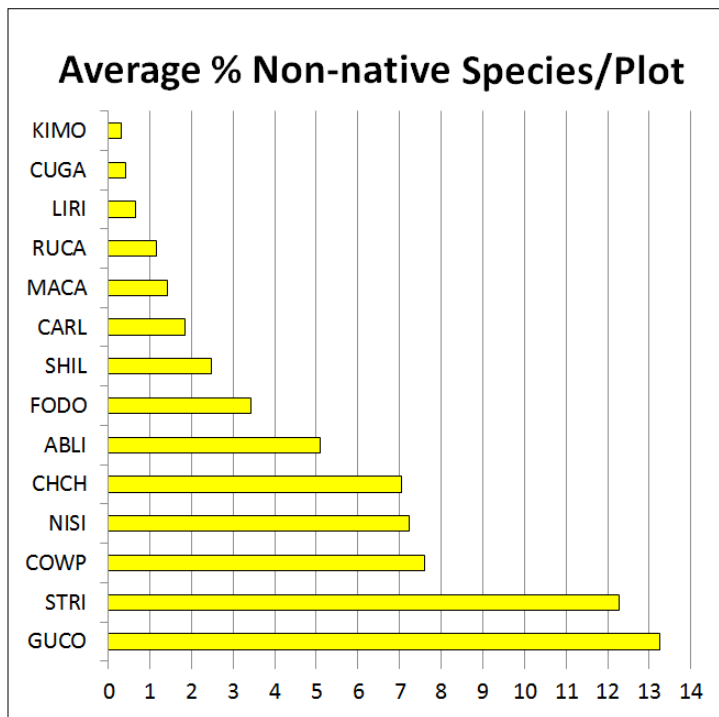


Figure 3. Plot level average non-native plant species diversity across CUPN parks by percent.

Other Findings

No new discernible issues related to tree health or decline were detected at ABLI during the first phase of monitoring, though it should be noted the emerald ash borer (*Agrilus planipennis*) continues to expand its range in Kentucky and was confirmed in Larue County in 2016. Plot revisits took place at eight of the ABLI vegetation monitoring plots in 2016, and no signs of emerald ash borer were found.

NatureServe botanists added 38 species to the park's current list as "present in park" as a result of this monitoring effort. Plots are monitored at ABLI during September.

About the Cumberland Piedmont Network

In 1999, the National Park Service initiated a long-term ecological monitoring program, known as "Vital Signs Monitoring," to provide the minimum infrastructure to allow more than 270 national park system units to identify and implement long-term monitoring of their highest-priority measurements of resource condition. The overarching purpose of natural resource monitoring in parks is to develop scientifically sound information on the current status and long-term trends in the composition, structure, and function of park ecosystems, and to determine how well current management practices are sustaining those ecosystems.

The NPS Vital Signs Monitoring Program addresses five goals for all parks with significant natural resources:

- Determine the status and trends in selected indicators of the condition of park ecosystem,
- Provide early warning of abnormal conditions,
- Provide data to better understand the dynamic nature and condition of park ecosystems,
- Provide data to meet certain legal and congressional mandates, and
- Provide a means of measuring progress towards performance goals.

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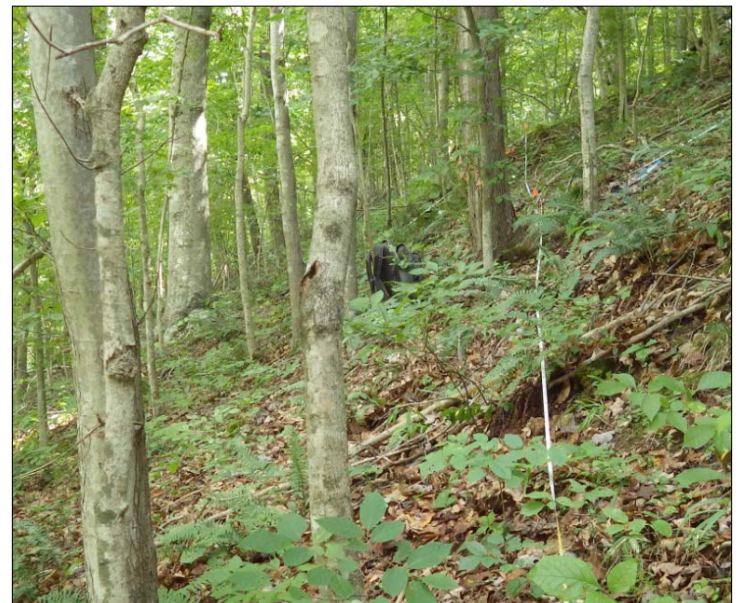


Figure 4. Vegetation monitoring plot at the ABLI Boyhood Home unit. The rich slope forests found at ABLI's Boyhood Home unit support some of the highest species diversity observed within CUPN parks.