Cleveland State University Campus Trees Analysis

College of Science and Health Professions at Cleveland State University
Audrey Atzel, Jillian Bastock, Madelyn Jablonsky, Elijah Williams

ABSTRACT

Urban forests are incredibly distinct ecosystems existing directly within city and town centers. These forests provide numerous ecosystem services that can increase quality of life in cities. Stormwater mitigation, cooling through shade and evapotranspiration, energy conservation, air and water filtration, and noise reduction are just a few of the services these trees can provide, adding economic and public health values to their presence (1). However, the health of the urban forest is essential to the effectiveness of ecosystem services so it is important to not only plant new and diverse trees, but to evaluate the health and condition of trees in urban spaces. Cleveland State University (CSU) is located in downtown Cleveland and spans 85 acres. The university is home to about 1,180 trees and 69 unique tree species (2). An incredibly diverse sample of Cleveland's urban forest, CSU's campus holds great potential for ecosystem services.

REFERENCES

1. U.S. Forest Service. (n.d.). *Urban Forests.* https://www.fs.usda.gov/managing-land/urban-forests

2. Cleveland State University. (n.d.). *Buildings and Grounds.* https://www.csuohio.edu/sustainability/buildings-and-grounds

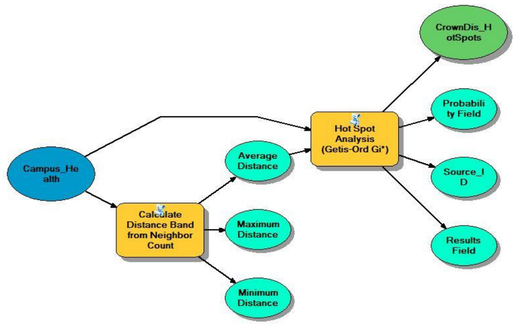
INTRODUCTION

Individual health and growth potential impacts the effectiveness of the ecosystem services these trees are able to provide. Health assessments can help to improve the benefits received from trees. These assessments were conducted to answer several questions:

What condition are campus trees in?
Does limited soil access impact the DBH of campus trees?
What are the general sizes of campus trees in 2012 vs. 2021?
Which trees are most susceptible to invasive pests?

METHODS AND MATERIALS

To understand how effective or sustainable campus trees are, 14 students performed individual health assessments on about 300 campus trees ten years after the university's original assessment.
Student data was compiled in Excel and entered into i-Tree Eco software to analyze the provided ecosystem services, structure, composition, economic value, and management analyses of the trees on campus. Graphs were produced in RStudio and Excel. GPS points were downloaded from Cleveland State to be used in ArcMap and QGIS.



FURTHER RECOMMENDATIONS

The tree assessment around CSU indicated that the health of the trees is in decline. Recommendations would be to:

- Replace species prone to high insect attack with a less susceptible species
- Replace other trees with higher shade and low quality soil tolerance
- Utilize chemical and mechanical management to prevent or treat invasive pests

RESULTS

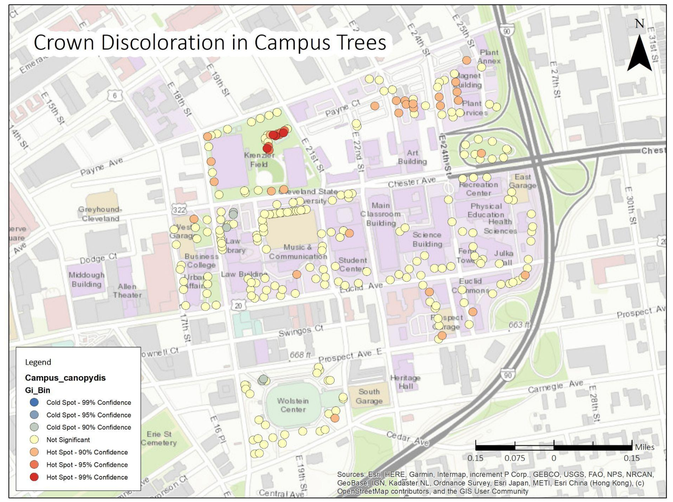


Figure 1: Hot spot analysis of crown discoloration on Cleveland State University trees

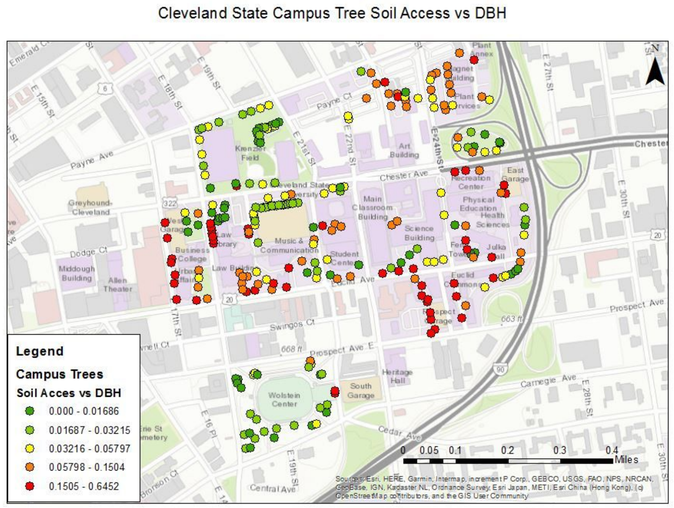


Figure 2: Soil accessibility in relation to tree size for trees on Cleveland State University's campus. Tree points in red have poor soil access in relation to their DBH while tree points in green have relatively greater soil access in relation to their DBH.

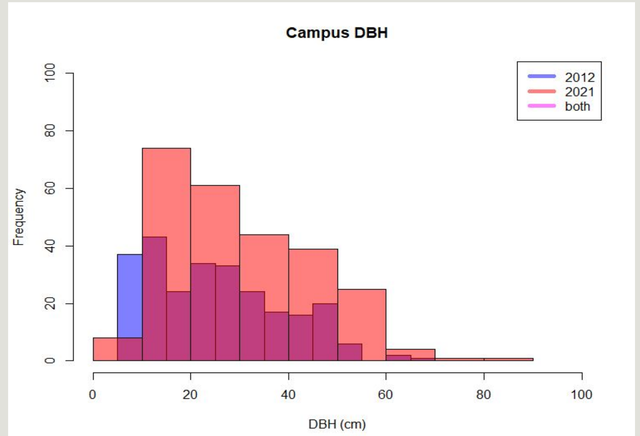


Figure 3: Frequency of campus trees' measured diameter at breast height in 2012 and 2021

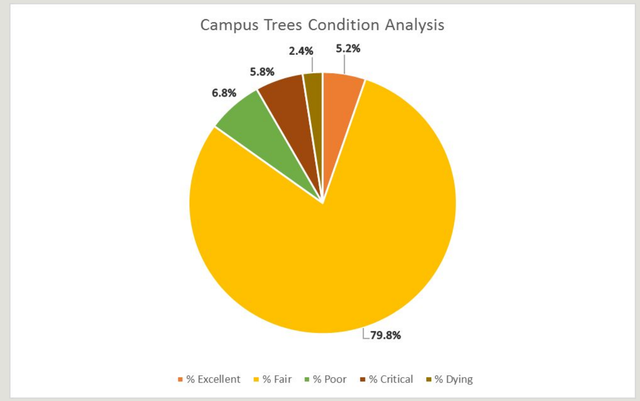


Figure 4: Percent of campus trees in excellent, fair, poor, critical, or dying condition

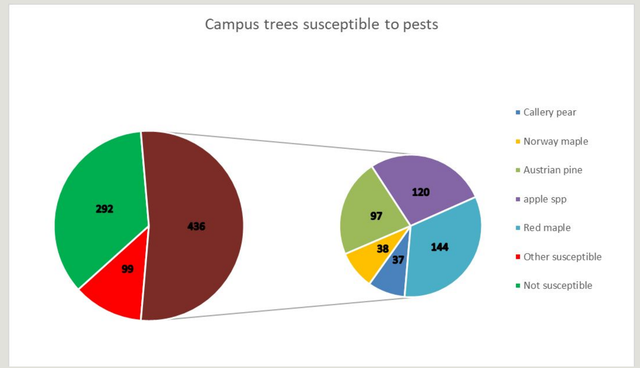


Figure 5: Number and species of campus trees most susceptible to pests