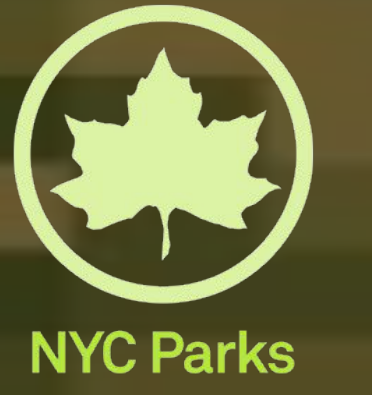
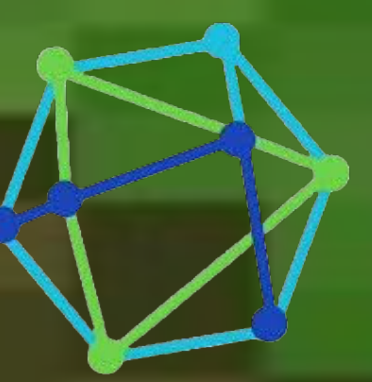


Impact of Anthropogenic Disturbances on the Midstory & Overstory in Urban Forests

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The Pinkerton Foundation

Introduction

Urban forests account for 10,542 acres within New York City (Pregitzer et al., 2018). However, urban forests often experience anthropogenic disturbances (creation of desire lines, littering, soil compaction, etc) which oftentimes impact forest health. In Forest Park, Queens, there is a noticeable presence of human interaction through recreational uses. In this study, we collected data at two sites (one in a higher traffic area and one in a more isolated area) on the amount and type of anthropogenic litter within each plot to determine whether human activity affects relative abundance of tree species in different forest layers.

According to NYC Parks & Recreation, Forest Park is the third largest park in New York City with over 500 acres for public use. Forest Park is mainly used for hiking, biking, horseback riding, sports, and other recreational activities. However, individuals make changes in the parks without even realizing; for example, creating desire lines and trampling small saplings. This can lead to many disruptions within the natural areas, causing a decline in forest health (Tian et al., 2025). Additionally, an awareness of the complexities in the relationship between people and forests is beneficial to limit any future major and negative human disturbances in urban forests (Referowska-Chodak, 2019). Studies have also shown that human presence in urban forests can lead to decreased vegetation diversity (Bensti-Enchill et al., 2022). Based on these previous studies, we hypothesized that the areas with higher human disturbances would have a significant impact on the success of tree species in the understory, midstory, and overstory.



Figure 1: Forest Park- the third largest park in Queens, covers 543 acres, with 411 acres of oak-hickory woodlands



Figure 2: Desire lines are trails made by humans that diverge from constructed Parks trails.

Materials

- Chaining Pin x2
- Transect Tape
- Compass
- Pin flags x16
- Sharpie Marker
- Diameter Tape
- iNaturalist
- Phone camera
- Data sheets



Methodology

Establishing the Data Collection Plot:

1. Once the sites were chosen, a chaining pin was inserted into the ground to act as the center point of the plot.
2. A transect tape and a compass were used to measure a distance of 5 meters North. Flag pins were used to mark the 5 meter point as well as the halfway point at 2.5 meters.
 - a. This process was then repeated for the directions of East, South, and West, splitting the plot into four quadrants. The 5 meter flags marked the boundaries of the plot.
3. Pictures were taken of the sites. (NAC, 2025).

Data Collection Process*:

- a. In each plot quadrant, the following data was collected:
 - i. We counted trash and categorized different types of anthropogenic trash based on their material.
 - ii. Measurements of the diameter at breast height (DBH) of all midstory trees within both of the sites. [2.0 - 9.9 cm DBH].(Natural Areas Conservancy, 2025)

* Raw data about the Overstory were collected by other SUN interns to compare the abundance and the average DBH of each species at different layers.

Images



Figure 3: Site 1 – Open and exposed area situated beside a popular trail, likely subject to increased human disturbance.

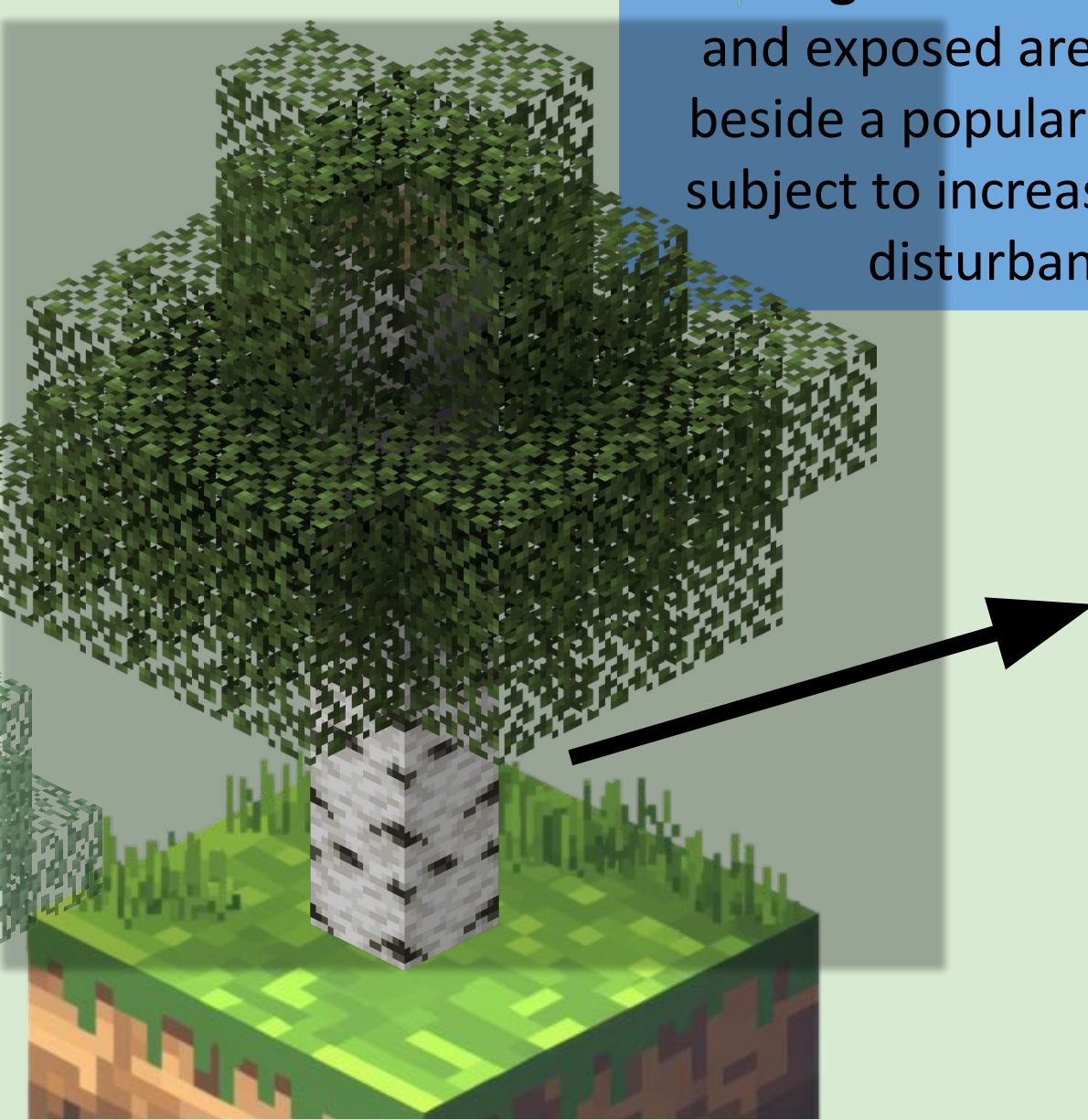


Figure 4: Site 2 – Located in a quieter forested zone, away from the high-traffic trails.

Pin Oak Tree [Quercus]- The most common in overstory layer. Leaves are dark green and leathery with small lobes and rounded tips



Sweet Birch Tree [Betula lenta] - The most notable abundant species at Forest Park. Leaves are toothed edge, triangular, and alternate in a branchlet.



Results

Anthropogenic disturbances at different sites

Material of trash Vs. Trash count



Figure 5: Graph of all trash found in both data collection sites. Site 2 had twice the amount of total trash than site 1, despite being further away from the main trail. Miscellaneous trash includes any material of trash that was not abundant enough to be quantified on its own.

Midstory Trees

The abundance of midstory trees and their DBH

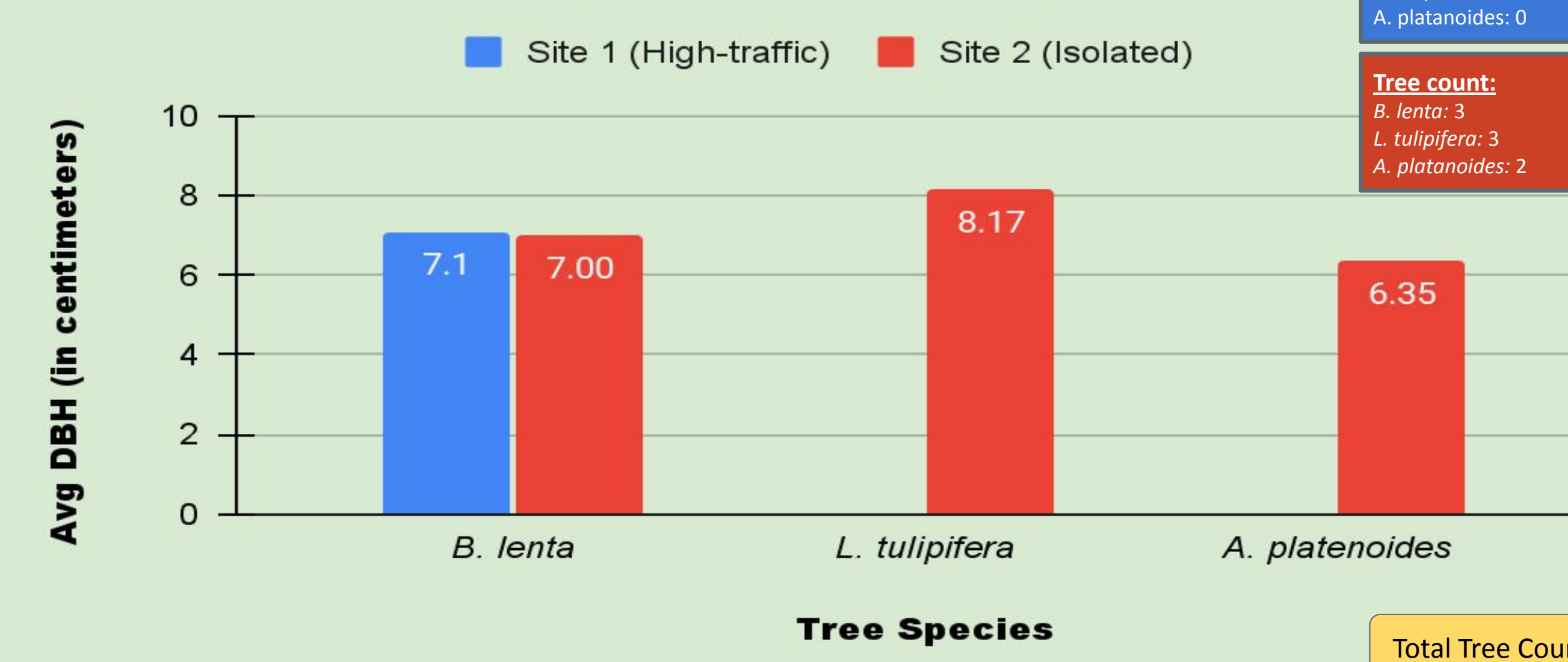


Figure 6: Graph of the average DBH of midstory trees. Midstory trees range from 2-9.9 cm DBH. There was more variety and abundance in site 2 than the site 1. For example, *L. tulipifera* and *A. platanoides* were not seen in the site 1, but there were plenty in the site 2.

Overstory Trees

The abundance of overstory trees and their DBH

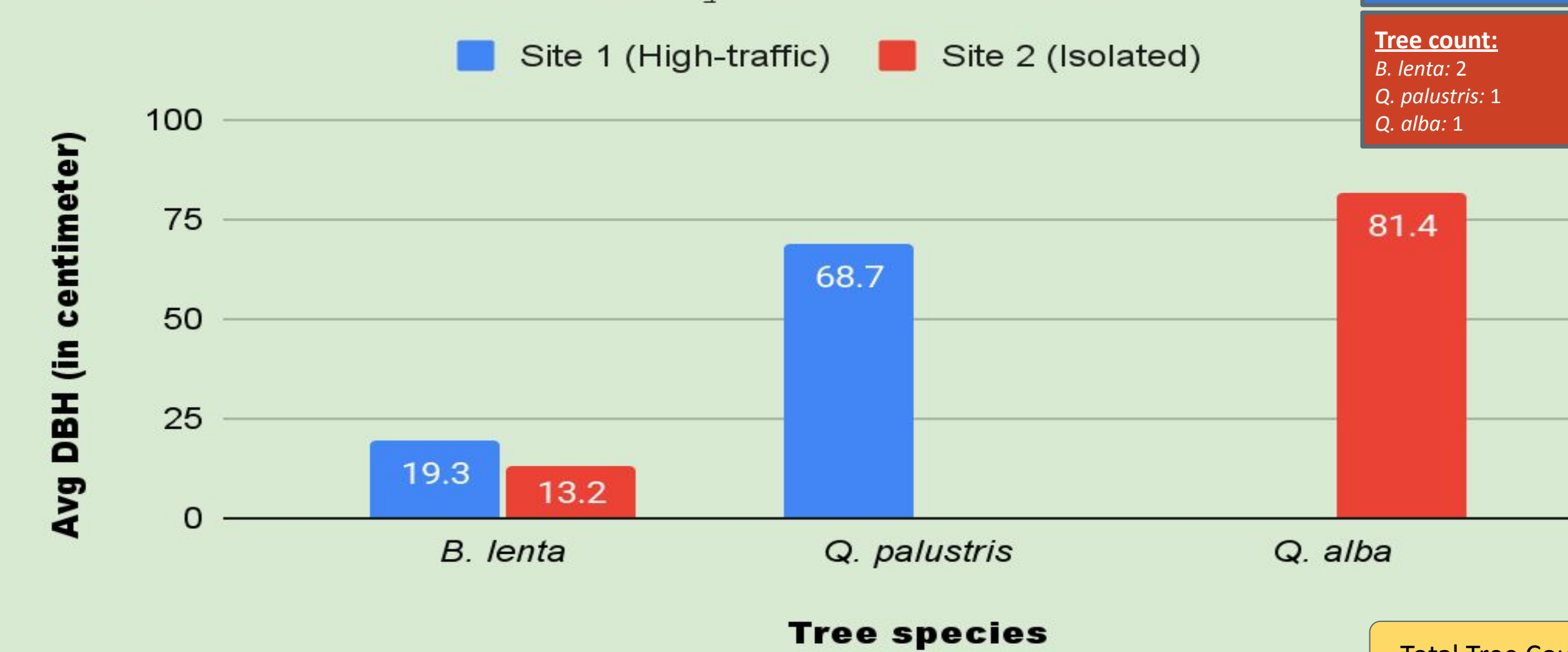


Figure 7: Graph of the average DBH of overstory trees. Overstory trees have a DBH of greater than 10 cm.

Discussion/Conclusion

According to the data we collected, there is a high possibility that anthropogenic disturbances are impacting the success of midstory and overstory trees within Forest Park. This could mean that too much human presence in urban forests affects overall tree growth. As depicted in figure 5, there were nearly twice as more trash found in site 2 than site 1 despite it being in an isolated area and this site had fewer overstory trees (figure 7). This suggests that there is a significant amount of human interaction within the less monitored trails of the forest and that this human presence affects overall tree growth. Additionally, there is a notable amount of desire lines found in and around both data collection sites, further showcasing the ways people use urban forests (figure 2). These desire lines could lead to trampling of tree saplings and compaction of soil, which can lead to poor vegetation health (Referowska-Chodak, 2019). There were more midstory trees than overstory trees found in the second site. Additionally, majority of the trees found in both midstory and overstory were *Betula lenta*. While the focus of our study was human impact on forest health, it should also be noted that Forest Park is not an old growth forest (a forest that has grown for a long period of time without disturbance), which could explain the lack of overstory trees. Forest Park was used for several purposes before it was left undisturbed to grow. In the future, the high success rate of *B. lenta* can also be investigated to see if they have adaptations that help them grow in disturbed environments. We would also be interested in collecting data in larger plot sizes to see if these trends are reflected at a larger scale.

It is necessary to protect our green spaces, especially in New York City as we do not have many and they are a precious resource to those who reside in the city. To keep urban forests healthy, we need to reduce human disturbances (desire lines, soil compaction, littering) and closely monitor human interaction within urban forests. This will prove beneficial to not only the forest, but to us as well, as humans use urban forests for a plethora of reasons.

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