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Weinland Park: Urban Tree Canopy

PROJECT PROPOSAL
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Abstract

In the continually expanding cities, trees and tree canopies have slowly been diminished to make room for homes, restaurants, and workspaces. The Weinland Park neighborhood is no exception. This area is working with about 14% tree canopy which is extremely low. The reason for the low canopy has to do with the fact that Weinland Park is predominantly an urban community with a lower median income. Typically, lower median income communities have less canopy cover than their wealthier counterparts. Trees and high percentages of tree canopy are important for a variety of ecological and long-term reasons, some of which being a reduction in urban heat islands and carbon sequestration. For these reasons, stronger and more mature trees are of the utmost importance. Since Weinland park has such a low canopy cover, the goal is to find where the mature trees are and check their health and environmental conditions (proximity to power lines and houses, etc). These trees were added to a Geographic Information System (GIS) to be used to help educate the public on the importance of healthy tree canopy and how to keep the trees healthy. Additionally, yard signs were designed to spread the word from neighbor to neighbor. Tree Love, a tree advocacy group based in Weinland Park, in addition to students from The Ohio State University will execute the tree inventory by measuring the diameter at breast height (DBH) for each tree and damage or disease parameters. Once all measurements are taken, Tree Love will distribute yard signs and funds to assist homeowners in maintaining their trees. Finally, recommendations for future tree planting were made in hopes of expanding the Weinland Park tree canopy.

Introduction

In many urban areas around the world, there exists tree coverage inequity (Krafft & Fryd, 2016). Urban tree canopy cover can be attributed to the overall wealth and education of the surrounding residents; poorer communities tend to have less cover than wealthier communities (Landry & Chakraborty, 2009). Negative environmental effects caused by urban development will impact those of lower income in the community the most (Riley & Gardiner, 2020). Specifically, urban development loses the natural shading within the area turning into an “urban heat island” (Loughner et al. 2012). These heat islands result in temperatures being significantly hotter when compared to surrounding areas (Loughner et al. 2012). As more urban development occurs, having a large coverage of urban tree canopy will mitigate the environmental concerns that arise with urban development (Riley & Gardiner, 2020).

Urban development is occurring rapidly in the Columbus area like many other cities around the United States. To combat the issue of urban heat island effects, Columbus has developed a plan to improve upon its green spaces and canopy coverage. The area of study for our research is the Weinland Park community and is one of the many areas of Columbus integrated into this plan. Currently the Weinland Park Canopy Coverage is at 14%, and ideally the city says 40% is needed to see positive effects (Columbus Urban Forestry Plan, 2021). Efforts within the community to advocate for the protection of mature trees along with the planting of new trees will help reach this need. By following in the city of Columbus’s footsteps,

the Weinland Park community's canopy coverage can positively change the lives of those living in the community.

The Weinland Park is a unique area to look towards developing its tree canopy and improve upon the City of Columbus's overall canopy coverage. The housing in the Weinland Park neighborhood has homes that have been newly updated to those that have been in the area for decades. Also, the area has unique socioeconomic status, as people from a variety of different income levels reside in the community. Through the study of mature trees and their spatial mapping, the community and organizations in the area can be educated on the susceptibility to an urban heat island effect and the amplification of environmental injustice. Many mature trees are at risk of being removed so the survey of trees will allow the Tree Love advocacy group to allocate funds to best utilize the money to give these trees the care they need to remain in the Weinland Park neighborhood. A report will be created that indicates the most at-risk trees so that these can be prioritized for pruning and cabling.

Objectives

The objectives for this project are as follows:

To access the canopy trees on the residential property to gather information about various properties of each tree's health. Then identify trees that may be of concern and prune and cable them to make sure that those trees can live a long life and ensure areas where more trees can be planted. Next, create a GIS tree registry to track and protect large old growth trees in Weinland Park. Lastly, educate the local community about how to care for trees with the help of Tree Love.

Methods

Tree Selection

Predetermined criteria for the trees to be considered for the purposes of this analysis were decided prior to sampling. The criteria are as follows a mature tree or a tree of concern. Mature trees were defined as trees with a diameter at breast height (DBH) equal to or greater than 20 dbh. Trees of concern where those that have numerous branches on or near power lines or homes, those that have more than two dead branches, and those with severe bark damage. Additionally, if there were signs of disease or other abnormalities on a tree, the tree was deemed "a tree of concern". For the purposes of this project, all trees had to be easily accessible. If there were inaccessible trees of concern i.e., in someone's fenced yard, these trees were written down and given to Tree Love for follow up. Finally, the trees being inventoried could not be trees for the City of Columbus which means any trees in the right of way, between the sidewalk and road, were not counted in this inventory.

Tree Sampling

The group members were split into groups of two or three students and one Tree Love neighbor if one was available when sampling the trees. The neighborhood was divided into

sections on each sampling day and the groups available that day walked each street and measured any trees of concern or mature trees. As shown in **Error! Reference source not**

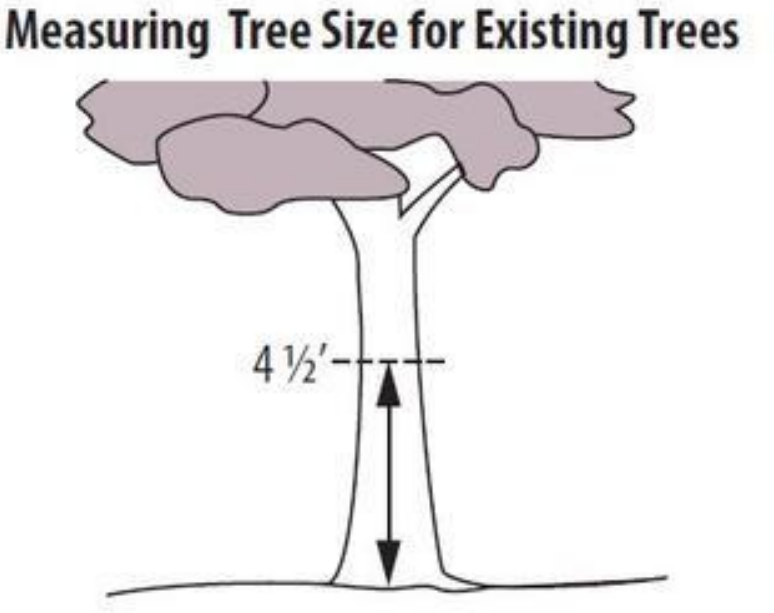

Figure 1. *Diameter at breast height (DBH) was measured using girthing tape for every tree[3]. The DBH is a commonly used metric to determine tree size and is measured at 4.5 feet above the ground.*

found., a group member used the DBH measuring tape and held the front of the tape measure to the bark at 4.5 feet up the tree and wrapped the tape around the trunk of the tree until the front overlapped the tape. The point of intersection of the tap and the starting point of the tap was written as the DBH.

The coordinates were recorded, and the groups conversed to rate the tree on a scale of 0-3 on the following parameters: proximity to powerlines, dead branches. These qualitative analyze were discussed and shown in Tables 1 and 2.

Table 1. The parameters used to explain the qualitative observations for the proximity to powerlines criteria.

Value: Proximity to powerlines	Definition
0	No powerlines
1	Recently trimmed branches near powerlines
2	Some branches hanging over powerlines
3	All branches over powerlines or powerlines crossing through the tree

Table 2. The parameters used to explain the qualitative observations of the dead branches on the tree.

Value: Dead Branches	Definition
0	No dead branches
1	A few dead branches
2	Larger limbs/branches appear dead
3	Trunk is rotting

Sun damage, mow damage, and disease were seldom seen and are on a scale of 0-1, either yes (1) or no (0). Any other observations, such as proximity to houses or buildings were listed in the "other" column. The tree species was identified using PictureThis plant identification app.

The work for the project was divided between the group members shown in the following table.

Group Member	Work Completed
Etain Brunner	Objectives, Methods, and Discussion
Loong Choi	Introduction and Objectives
Alexandra Haritos	Abstract, Methods, and Acknowledgments
Ainsley Lightcap	Objectives and Results
Alonzo Madaris	Abstract, Objectives, Future Recommendations and Discussion
William Novotny	Introduction, Objectives, and Future Recommendations

Study Area

The area of study is the Weinland Park Neighborhood area. The neighborhood is urban and mostly housing with some retail shops. Most of the vegetation in the area is turf grass or a few yard flowers. Many students from The Ohio State University live in the neighborhood as well as families. The study area is bound by High Street to the west and railroads on the east. The southernmost extent of the neighborhood is 5th Avenue. The northern extent is Chittenden Avenue except the between Summit Avenue and 4th Avenue where the neighborhood extends to 12th Avenue.

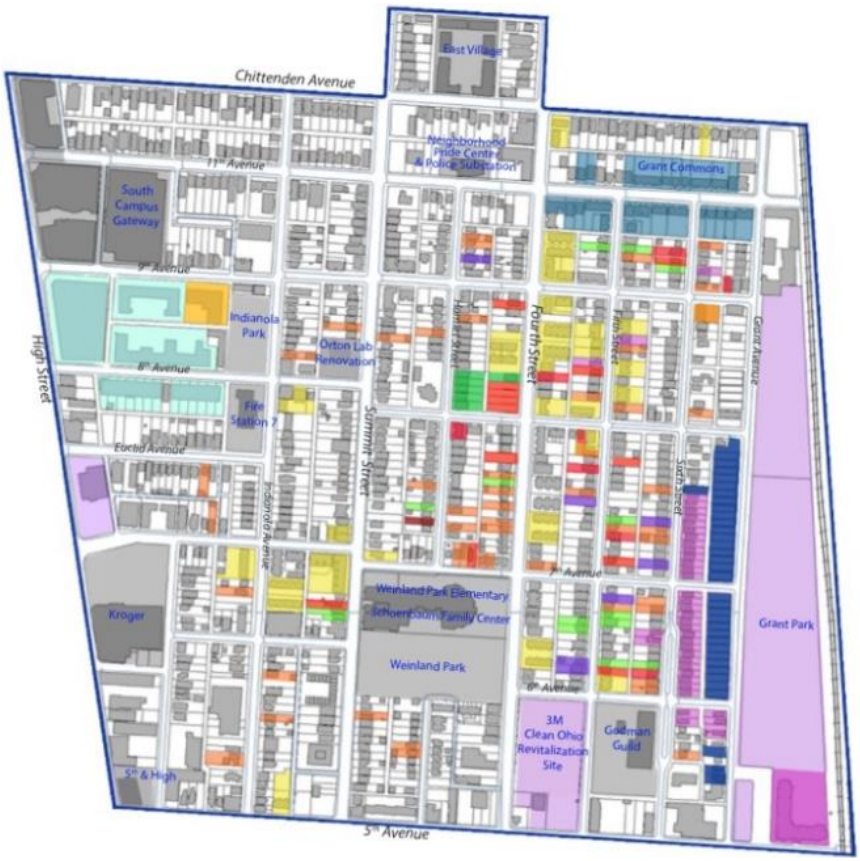

Figure 2. *Map of the Weinland Park neighborhood with area labels from 2009-2015*[9].

GIS

With the help of the Friends of the Lower Olentangy Watershed (FLOW) partners Esri's ArcMap Web was used to map the mature trees and trees of concern in the Weinland Park neighborhood. The 150 trees were divided up by the six group members (25 trees per person) and located on the GIS map set up by FLOW. The DBH and qualitative data collected was added to each attribute on the map. Additionally, the coordinates were added to each attribute to ensure all data collected was available in the GIS map.

Yard Sign

A yard sign was created using Adobe Illustrator to communicate information and results of our study to the Weinland Park community. A QR code was created using the Adobe QR code generator which was linked with the online version of the GIS map, displaying the mature trees and trees of concern and included on the yard sign. The purpose of the sign is to aid those in the neighborhood with advocating for the trees and assisting with education and outreach to the community.

Figure 3. *The complete yard sign that is read for production with a QR code for easy map access.*

Results

In total, 159 trees were measured and assessed for damage and power line proximity. Of the 159 trees, there were 25 different tree species present at a mature age in Weinland Park. The majority of the surveyed trees were Silver Maple and comprised 22.8% of the total trees (Figure 4). Other common tree species found in large numbers included trees of heaven (12%) and black walnuts (10.1%). Though the silver maples, black walnuts, and trees of heaven were the most common species found in Weinland Park, these trees were not the largest found in the neighborhood. Oak trees had the highest average DBH, with Shumack Oaks showing a DBH of 47 and Pin Oaks with a DBH of 35.5 (Table 3). Sugar berries had a high DBH of 38, though there was only one found in Weinland Park. However, the most populous tree species in Weinland Park had an average DBH of 32.3, which is high compared to the rest of the tree species (Table 3). Of the mature trees in Weinland Park, 78% of them had branches that were above or crossing over powerlines. Of these trees, 43.5% had a concerning amount of branches over powerlines or had powerlines that posed a threat to the ability of the tree to remain within the neighborhood (Table 4).

Weinland Park had the highest density of old-growth trees in the center of the neighborhood, between 7th and 9th avenue, and between Indianola Ave and 6th street. However, the east and west sides of the neighborhood were severely lacking in mature tree presence, as there were none on N 6th street and N Grant Ave. This southeast corner especially could benefit from tree planting. The section around Euclid Avenue was also lacking in mature tree presence.

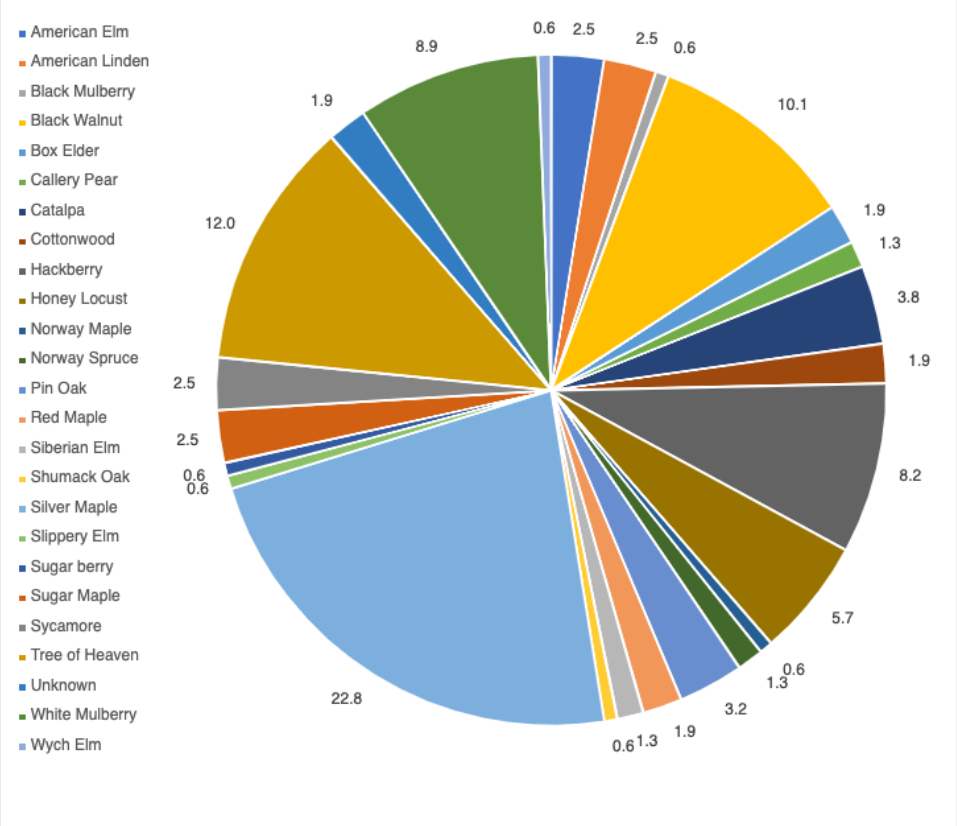

Figure 4: Distribution of tree species in Weinland Park shown in percentages.

Table 3: Average DBH of mature trees by species.

Tree Species	Average DBH
American Elm	32
American Linden	34
Black Mulberry	26.9
Black Walnut	29.5
Box Elder	23
Callery Pear	24.9
Catalpa	26.5
Cottonwood	27.5
Hackberry	25.2

Honey Locust	30.5
Norway Maple	21.5
Norway Spruce	25.5
Pin Oak	35.5
Red Maple	29.1
Siberian Elm	27
Shumack Oak	47
Silver Maple	32.3
Slippery Elm	35
Sugar berry	38
Sugar Maple	26.1
Sycamore	31.9
Tree of Heaven	30.5
Unknown	26.1
White Mulberry	29.6
Wych Elm	21

Table 4: Percentage of trees in proximity to power lines.

Trees in Proximity to Power Lines	**Percentage**
0	18
1	16
2	28
3	32
4	2

Table 5: Percentage of trees with dead branches or signs of rot.

Trees with Dead Branches	**Percentage**
0	40
1	21
2	23
3	15

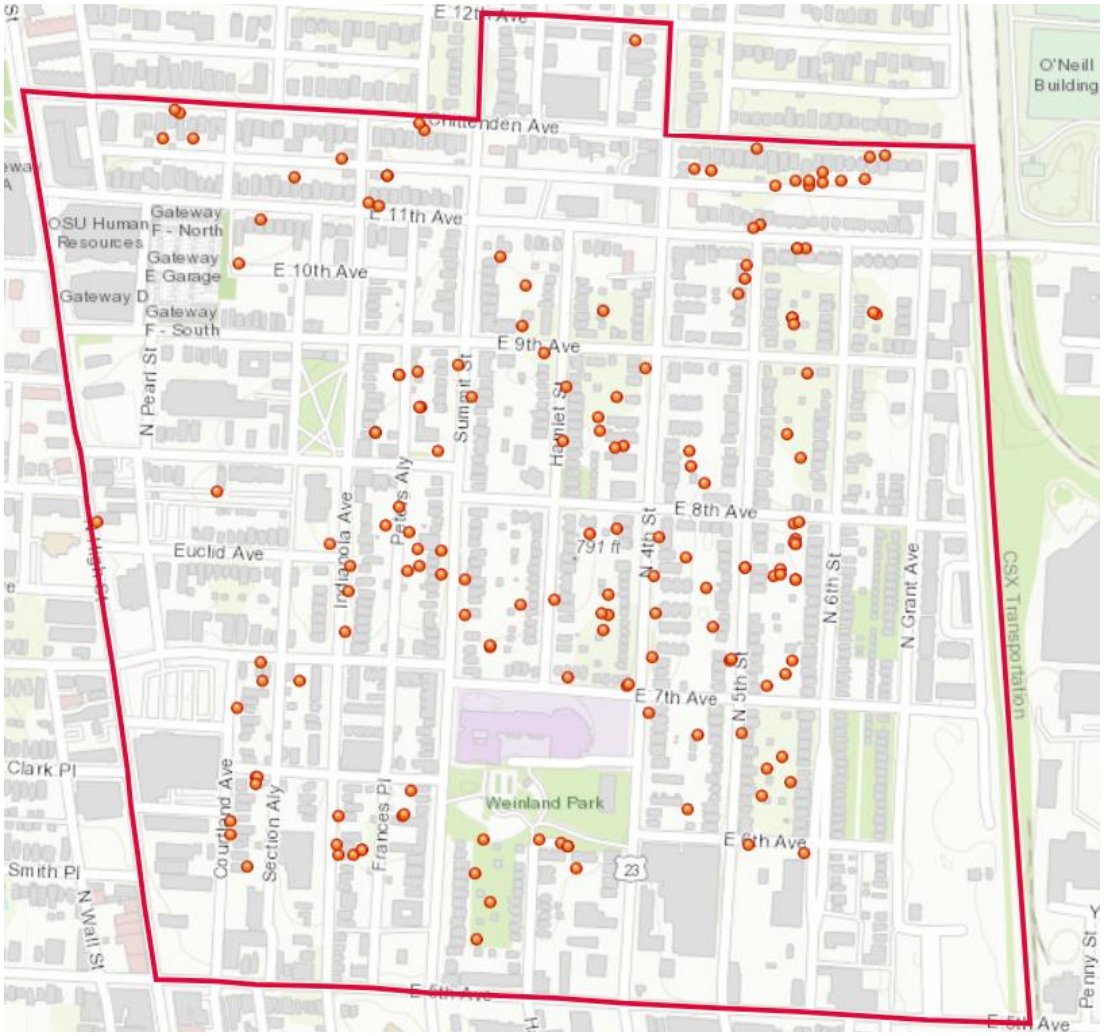

Figure 5. GIS map made with all the trees

Discussion

One challenge to maintaining and improving tree canopy cover in areas like Weinland Park that are primarily private property is that property owners have their own preferences on how to manage trees and whether the presence of trees are worth their potential risks and the additional money and effort required for their maintenance. For example, trees may produce unwanted fruits that are hard to clean up and may produce smells, they may block sunlight from shining into properties, many drop leaves in the fall that need to be disposed of, and depending on their size and proximity to buildings, can pose a financial and safety risk to owners and tenants. As explained by our stakeholders, many property owners cut down trees on their property due to these reasons to reduce the cost of maintenance efforts and for aesthetic reasons. This can be a potential additional factor to why tree canopy is so low in this area and points to the need for

educational interventions in this community. This helps provide the basis for the yard sign that was created to aid in increasing education and awareness of the benefits and importance of tree canopy cover to local residents and ecosystems. This also can help guide and inform where money needs to be directed to maintain and increase current tree canopy cover.

Another inherent challenge of increasing tree canopy in this study area is due to the urban characteristics of it. Lack of tree presence in the east, west, and southeast areas of the study area was primarily due to lack of planting locations, areas for trees to exist, and removal of trees for construction of roads, new housing and apartment developments, and industrial buildings. This significantly limits areas for trees to currently exist or be planted in the future to right of way areas or between the sidewalk and street. Trees are also less likely to live long enough and grow to a size that would be significant to increasing tree canopy in these types of environments due to the high concrete cover. This further highlights the importance of efforts made to identify and protect existing old growth trees to increase tree canopy in this area since there is already limited areas for additional trees to be planted and less likelihood of newly planted trees reaching mature age.

Future Recommendations

Moving forward a plan of action to increase tree canopy in the Weinland park area should include steps to direct money and efforts to manage trees that were identified as trees of immediate concern, plant trees in areas where tree canopy is the lowest and where there is low concrete cover and follow up and engage with local community to maintain awareness of the importance of urban tree canopy. Continued monitoring or additional studies can track how tree canopy cover is being maintained or increased by these efforts. Future studies could explore what type of tree species would be the most effective and efficient at increasing tree canopy cover in urban environments like Weinland Park. Finally, efforts to increase the tree canopy in Weinland Park must remain an important priority and other funding programs or mechanisms should be explored and implemented. Tree Love's fund is limited to 50 thousand dollars which is not enough to facilitate continued and long-term efforts that are necessary to increase tree canopy. Additional fundraising efforts or nonprofit participation may be required or perhaps the most effective intervention may involve policy solutions from local government providing funds or incentives for protecting existing trees and planting additional ones.

Acknowledgments

We would like to take some time to express our gratitude to a few influential figures while we were creating this report. First, we would like to acknowledge Laura Fay who proposed the problem to us and supported us through the process. David White was instrumental in creating the GIS for the results. Next, we would like to thank Dr. Zachary Steffensmeier as he provided guidance, support, and encouragement whenever we needed. Additionally, Dr. Steffensmeier assisted us with the use of ArcGIS. Time must also be taken to thank Louceline Fleuridor for the helpful advice and guidance on how to improve our report. We would also like to acknowledge the assistance from those in Tree Love and tree advocacy group for the neighborhood for their encouragement and assistance in measuring trees. Additional thanks must be given to Lucas Anderson-Clark for his assistance in designing the yard sign, which would not have been

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