A Market Analysis of TreePhilly's Yard Tree Program, Spring 2012—Spring 2014

Project Background

This report is motivated by the following questions:

1. Where were TreePhilly's Yard Trees planted?
2. Who participated in the Yard Tree program?
3. Did participation in giveaways vary by available space in yards?
4. What are the seasonal or annual variations?
5. Where are opportunities for the Yard Tree program to improve and grow Philadelphia's urban forest?

Why Tree Canopy is Important

Tree canopy (TC) is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above. Tree canopy provides many benefits to communities, improving water quality, saving energy, lowering summer temperatures, reducing air pollution, enhancing property values, providing wildlife habitat, facilitating social and educational opportunities, and providing aesthetic benefits[1]. Mayor Michael Nutter's 2009 *Greenworks Philadelphia* plan included a goal to increase tree canopy in each neighborhood in Philadelphia to 30% by 2025, as one of 14 goals to make Philadelphia the greenest city in America[2,3]. A report on Philadelphia's tree canopy identified private residential lands as one of the largest opportunities to increase tree canopy in the city[4].

How TreePhilly's Yard Tree Program Works

TreePhilly is an education and outreach program of Philadelphia Parks & Recreation, focused on promoting Philadelphia's urban forest and providing resources for Philadelphians to plant and care for trees. The Yard Tree Giveaway is one of several TreePhilly programs that provides free trees for Philadelphia residents, and is the only program focused on private property. TreePhilly partners with community groups to host between 4 and 6 giveaway events each planting season, and residents pre-register to get their tree at one of the events. Some trees are reserved for walk-in participants at the end of each event. From Spring 2012 to Spring 2014, participants chose their tree at the pickup event on a first-come, first-served basis, but in Fall 2014 participants chose their tree when they register. Planting demonstrations and mulch are also available for free at each event. Once established, some sites grow in popularity (ex. Tioga and Hunting Park, Kensington; Figure 1), while other sites are more consistent in the number of giveaway trees at each event (ex. Frankford). Sometimes popularity wanes (ex. Haddington). Participants provide an address when receiving their tree (Figure 2).

Geodemography

Geodemographic market segmentation is the process of classifying neighborhoods into categories based on a combination of demographic, socioeconomic and lifestyle characteristics. These useful categories do not correspond neatly to a single characteristic such as race/ethnicity, or the age distribution within a neighborhood. Instead, each market segment describes a range of useful traits among people clustered in similar geographical locations, such as consumer behaviors, consumer preferences and lifestyles. This analysis uses Environmental Systems Research Institute's (ESRI) Tapestry Segmentation system and "LifeMode" groups[5]. Figure 3 (next page) shows how these categories are distributed across the city.
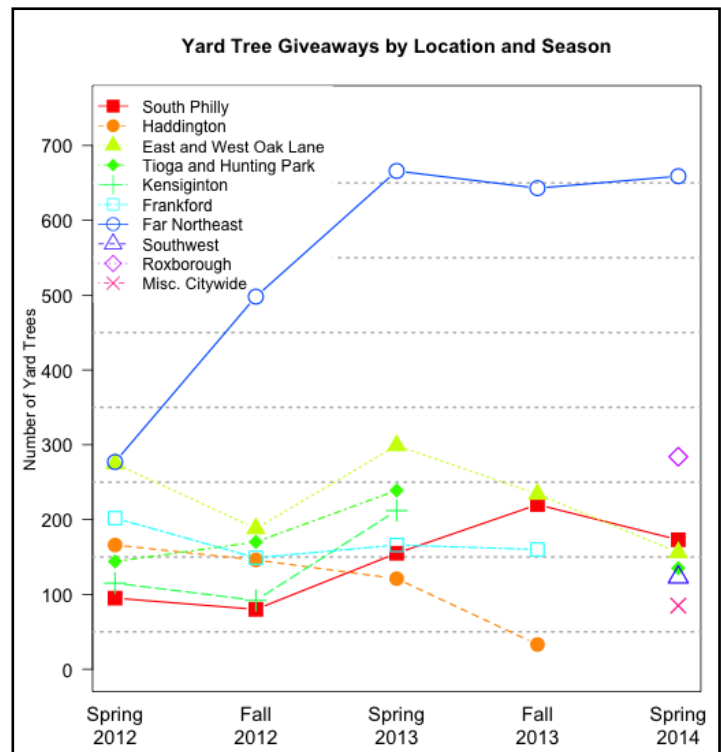

Figure 1. The number of giveaway Yard Trees varies by location & season. Over time, the number of giveaway locations has grown.
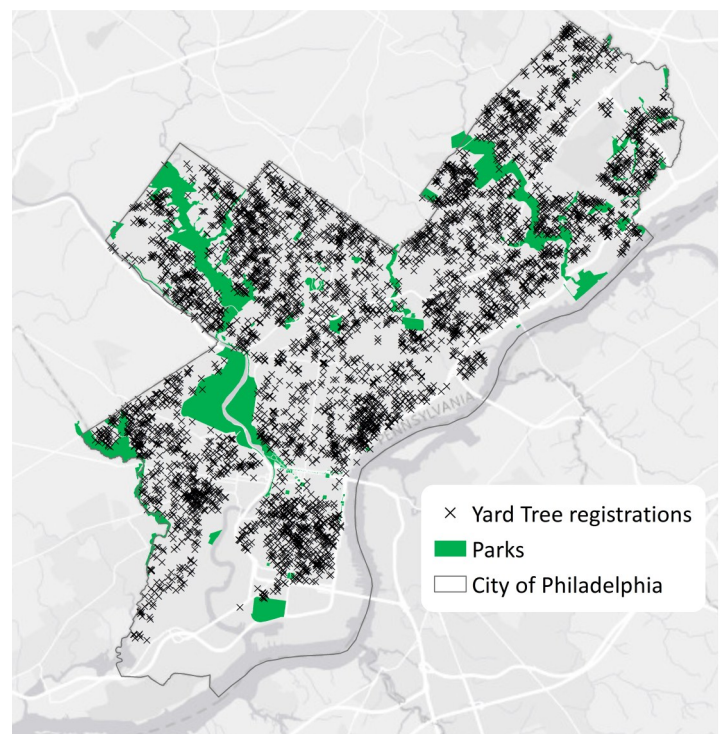

Figure 2. Yard Trees distributed by TreePhilly & partners are planted throughout the City of Philadelphia. There are more opportunities for additional planting on private residential properties.

Not all LifeMode groups are present within the City of Philadelphia. The three most common LifeMode Groups are Metropolis (comprising 35% of all households), Senior Styles (18%), and Traditional Living (14%; Figure 3). Together these three LifeMode Groups contain approximately 2/3 of all households in the City of Philadelphia. Below some of the dominant and defining characteristics of each of these three LifeMode Groups are highlighted from ESRI's Tapestry geodemographic segmentation. More information on all LifeMode groups can be found in the Reference Guide.

Metropolis: They live in older, single-family homes or row houses built in the 1940s or earlier. Workers in most of the *Metropolis* segments commute to service-related jobs. The *Metropolis* group reflects the segments' diversity in housing, age, and income. For example, ages among the segments range from Generation Xers to retirees; households include married couples with children and single parents with children. Employment status also varies from well-educated professionals to unemployed. Their lifestyle is also uniquely urban and media oriented.

Senior Styles: These households comprise one of the largest LifeMode Groups. Settled seniors are looking forward to retirement and remaining in their homes. Residents in some of the older, less privileged segments live alone and collect Social Security and other benefits. Their choice of housing depends on their income. This group may reside in single-family homes, retirement homes, or high-rises. Their lifestyles can be as diverse as their circumstances, but senior markets do have common traits among their preferences. They read the newspaper daily and prefer to watch news shows on television. Their use of the Internet is nearly average.

Traditional Living: The households in *Traditional Living* convey the perception of real middle America—hardworking, settled families. The group's higher median age of 38.2 years also conveys their lifestage—a number of older residents who are completing their child-rearing responsibilities and anticipating retirement. Many still work hard to earn a modest living. They typically own single-family homes in established, slow-growing neighborhoods. They buy standard, four-door American cars, belong to veterans' clubs and fraternal organizations, take care of their homes and gardens, and rely on traditional media such as newspapers for their news.
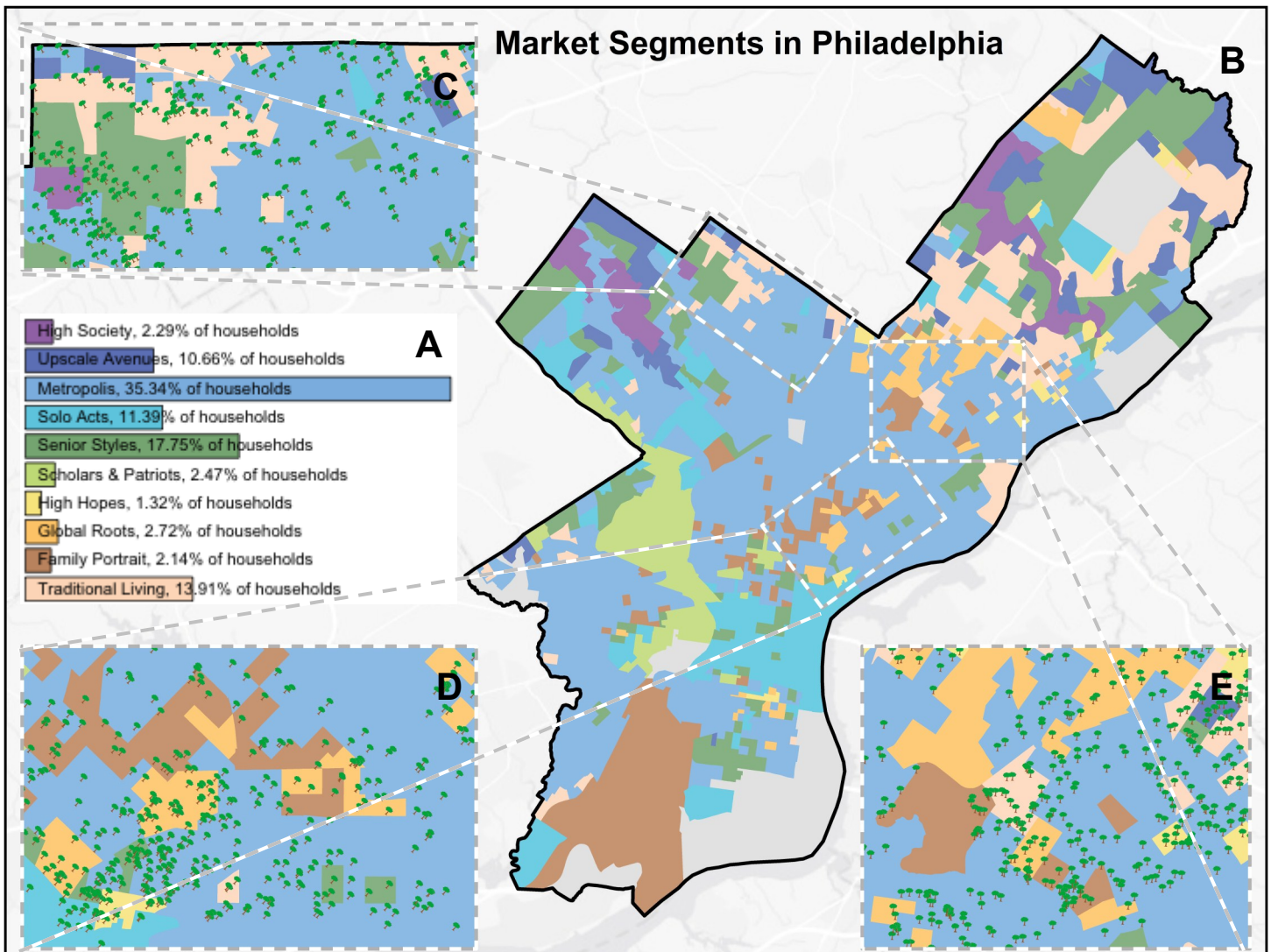

Market Segments in Philadelphia

High Society, 2.29% of households
Upscale Avenues, 10.66% of households
Metropolis, 35.34% of households
Solo Acts, 11.39% of households
Senior Styles, 17.75% of households
Scholars & Patriots, 2.47% of households
High Hopes, 1.32% of households
Global Roots, 2.72% of households
Family Portrait, 2.14% of households
Traditional Living, 13.91% of households

Figure 3. *There is both a quantitative distribution of households per LifeMode Group (A) and a spatial or geographic distribution of households by LifeMode Group (B). The insets (C, D, E) show the location of Yard Tree registrations and LifeMode Groups.*

Key Terms

Geodemographic market segmentation: the process of classifying neighborhoods into categories based on a combination of demographic, socioeconomic and lifestyle characteristics. LifeMode Groups are an example of a market segment.

Tree Canopy: Tree canopy is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Land Cover: Physical features on the earth mapped from aerial or satellite imagery, such as trees, grass, water, and impervious surfaces.

Existing TC: The amount of urban tree canopy present when viewed from above using aerial or satellite imagery.

Impervious Possible TC: Asphalt or concrete surfaces, excluding roads and buildings, which are theoretically available for the establishment of tree canopy.

Vegetated Possible TC: Grass or shrub area that is theoretically available for the establishment of tree canopy.

Not Suitable: Areas where it is highly unlikely that new tree canopy could be established (primarily buildings and roads).

Odds ratio: A measure of association where 1 indicates that participation is proportionate with the number of households in that LifeMode Group. A value of 2 would indicate that twice as many trees were registered than if giveaways were equitability distributed by LifeMode Group. See Figure 7 (over).

Residential Tree Canopy

For every residential property the amount of existing and possible tree canopy and areas not suitable for planting were calculated within each LifeMode Group (Figures 5 and 6). Residential properties include apartments, condominiums, row homes, single family and two family homes. The possible tree canopy has two sub-types: possible—vegetation and possible—impervious categories. High Society block groups have the most tree canopy already (42%), while Global Roots have the least tree canopy (9%). There are ample opportunities for additional tree canopy in residential lands in every LifeMode Group. The vegetated possible tree canopy ranges from 23% in the Metropolis block groups to 40% in the Upscale Avenues areas. Similarly, possible tree canopy on impervious surfaces ranges from 8% (High Society) to 24% (Global Roots).

Canopy calculations were made possible with the combination of Philadelphia's parcel database, and the 1-foot freely available land cover data created by the Spatial Analysis Lab at the University of Vermont[6].
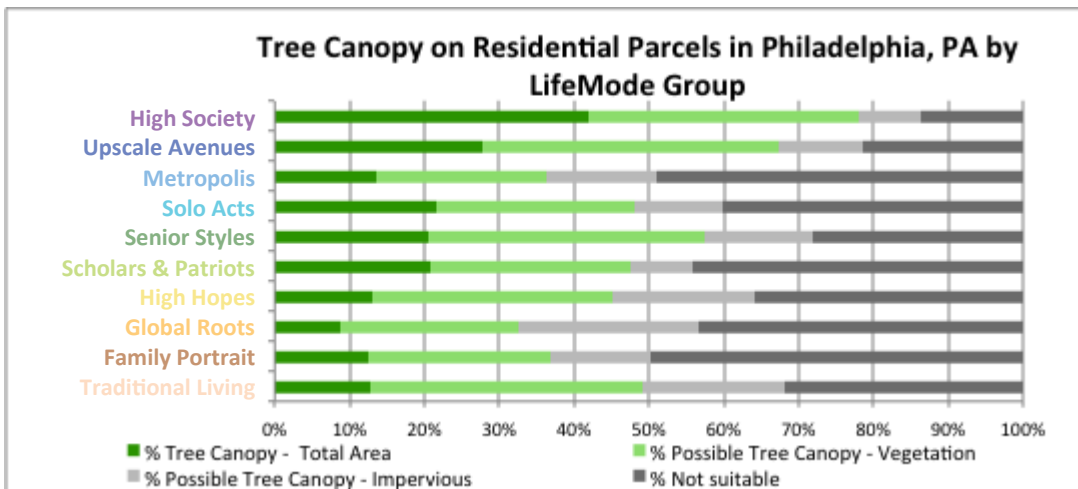

Figure 5: Existing and possible tree canopy, and areas not suitable for tree canopy on residential land in Philadelphia per LifeMode Group. There are opportunities for additional planting in every LifeMode Group.
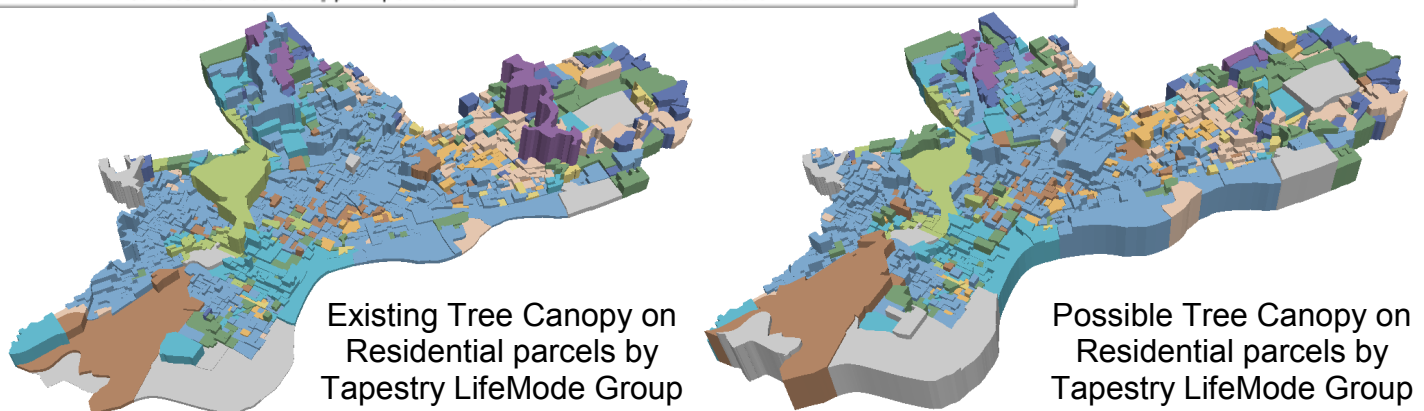

Figure 6: *Existing tree canopy (left) and possible tree canopy (right) for residential parcels only by Tapestry LifeMode. The colors correspond to the LifeMode Groups. The height of each block group indicates the existing or possible tree canopy.*

Giveaway recipients provided an address when receiving their free tree. Those addresses were converted to points using a geographic information system (GIS), or computer mapping software. These analyses assume that the tree was planted at that location, but the actual location is unknown. These points were counted within each LifeMode Group as defined by ESRI's Tapestry Segmentation system. Giveaways were analyzed within LifeMode Groups. Figure 6 describes how odds ratios were calculated with points representing the assumed planting location of trees within LifeMode Groups, using the fictitious example of "Phake City"[7]. Actual odds ratios for all Giveaway Yard Trees from four seasons spanning Spring 2012 through Fall 2013 are shown in Figure 8.
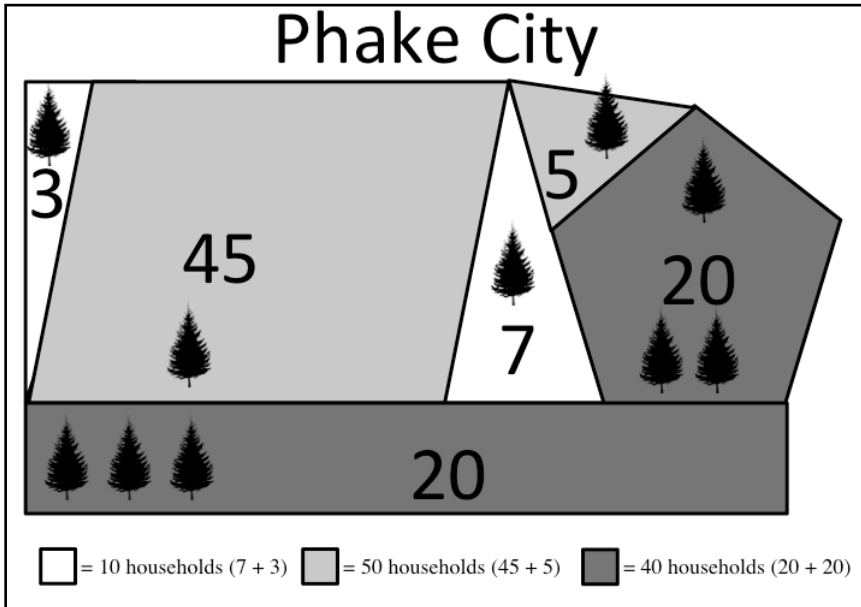

Figure 7: Phake City[7] has 3 types of market segments, the number of households are shown in each market. The hypothetical urban forestry program gave out 10 trees last year, reaching 10% of all households. If each type of market segment were reached equally, then the white segment would have 1 tree, the gray would have 5 trees, and the remaining 4 would be in the darkest gray. But that is not the case. Instead households in the white market segment received 2 (twice as many), the gray received 2 trees (40% of expected), and 6 trees went to the households in the darkest gray segment (50% above expected).
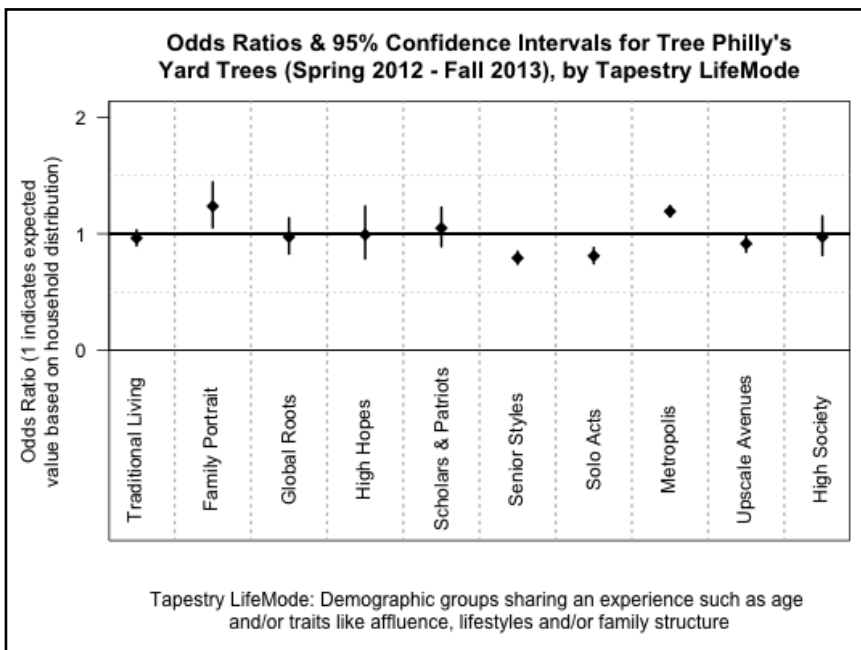

Figure 8: An odds ratio of 1 indicates that participation is proportionate with the number of households in that LifeMode Group. Participation in the Yard Tree Giveaway is fairly equitable with respect to the different types of LifeMode groups in Philadelphia. Participation rates (ie Odds Ratios) are statistically indistinguishable from 1 in the Traditional Living, Global Roots, High Hopes, Scholars & Patriots, and High Society LifeMode Groups. In both Senior Styles and Solo Acts LifeMode Groups participation is less than anticipated. The opposite is true for households in Family Portrait and Metropolis.

- Returning to the five motivating questions (page 1) it appears that participants in the free Yard Tree Giveaway were spread out throughout the City of Philadelphia (Figures 2 and 3). Tree canopy is less than 20% of residential land area in Metropolis, High Hopes, Global Roots, Family Portrait, and Traditional Living LifeMode Groups, and there are many further opportunities to increase tree canopy in every LifeMode Group (Figure 4).

- By far the most trees were given away at locations in the Far Northeast (Figure 1).

- The program was most popular among households in the Family Portrait and Metropolis LifeMode Groups. The program was least popular among households in the Senior Styles and Solo Acts LifeMode Groups (Figure 8). Older residents in Senior Styles neighborhoods might be less physically able to care for trees, and are less likely to have internet. Residents in Solo Acts may not make their own landscaping decisions because they are predominantly renters.

- Participation in the Yard Tree Giveaway program does not appear to vary or co-vary with the existing tree canopy, or the opportunities for additional tree canopy on residential properties. This is because participation in the program was almost always proportional to the number of households in the LifeMode Group (Figure 8), but the existing and possible tree canopy varies greatly LifeMode Group (Figures 5 and 6). Therefore living in a relatively high-canopy neighborhood does not appear to be a deterrent from participating in the YardTree Giveaway Program.

- Participation is generally higher at events held in the Spring for most sites (Figure 1). The number of trees given away was high in the Spring of 2013 at the Kensington location, even after two successful previous seasons. The opposite was true for participation at the Haddington location. It is possible that saturation could play a role in decreasing turn out in some neighborhoods but not others. Alternatively there could be other reasons for the seasonal and annual variations in participation at each of the giveaway locations.

- There are opportunities to plant trees on residential lands in every LifeMode group (Figures 5 and 6). Households in Metropolis have the most area to plant on grass (Figure 5), and they participate the most (Figure 8). Because participation rates are low among households in Senior Styles and Solo Acts LifeMode Groups , TreePhilly may consider more targeted approaches in those areas.

- When possible-vegetated and possible-impervious are combined, four LifeMode groups have more than 50% possible tree canopy: Traditional Living, High Hopes, Upscale Avenues, and Senior Styles. Three are ample opportunities for additional tree planting on residential properties in these areas.

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For additional information see: http://treephilly.org/yard-trees/

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