Arboretum Accessibility – A Tennessee Case Study

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Introduction

Arboreta are botanical gardens full of trees that are an important component of the urban forest, providing biological, communal, and ecosystem service benefits to communities. The Tennessee Urban Forestry Council's Vision for their arboretum certification program is to have a certified arboretum within a 30-minute drive of every community in Tennessee. The objectives of this study are to identify the communities in Tennessee that do not have reasonable access to a Tennessee Urban Forestry Council certified arboretum and assess variability of accessibility.
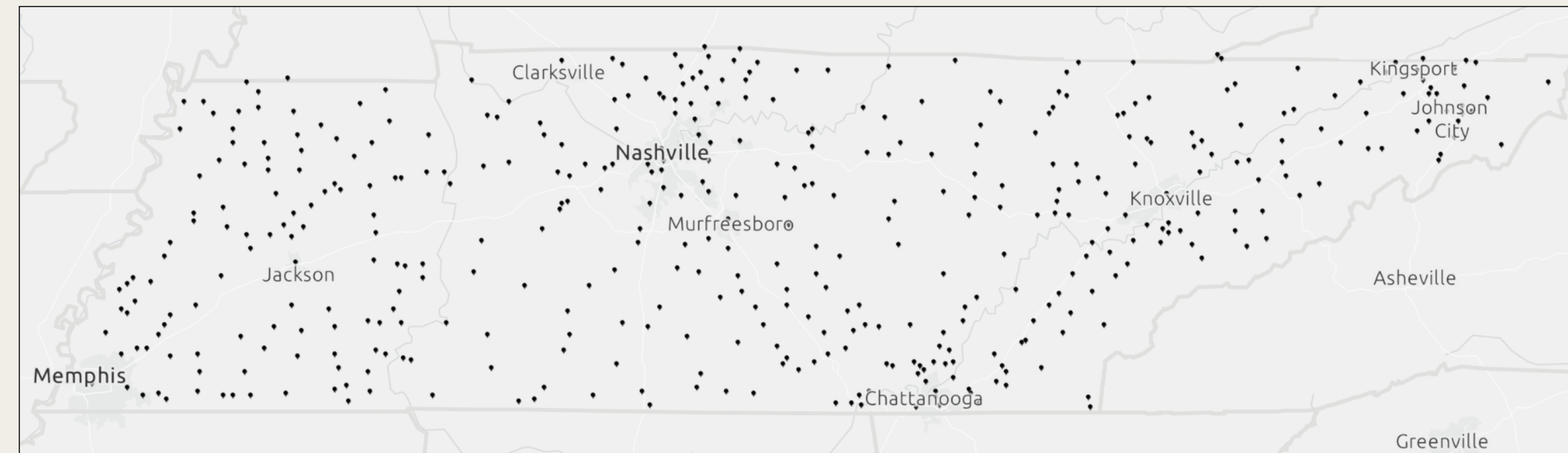
Methodology

1) Tennessee communities are defined by TIGER Line 2018 Places from the United States Census Bureau, identified by the Tennessee State Data Center.
2) A list of addresses provided by the Tennessee Urban Forestry Council for certified arboreta was turned into points in ArcGIS Online.
3) Using ArcGIS Online, arboretum points were summarized within a 30 minute drive from community center points (Figure 3).
4) A list of Tennessee communities outside the 30-minute driving proximity was extracted to Excel (Table 1).
5) Variables were analyzed using a generalized linear regression (GLR) count Poisson model. The dependent variable was the "Count of Points" value that represents the number of arboreta within a 30-minute drive of the community's center point. The explanatory variables used were median household income, population density, diversity index, and forested land cover.

Results

The Tennessee Urban Forestry Council is more than halfway (262/429, 61%) to their goal of having a certified arboretum within a 30-minute drive of every community in Tennessee. There was no statistical significance between the three grand regional divisions (East, Middle, and West) when examining variables of the size of arboreta when looking at both their levels of certification and the number of arboreta in each region.
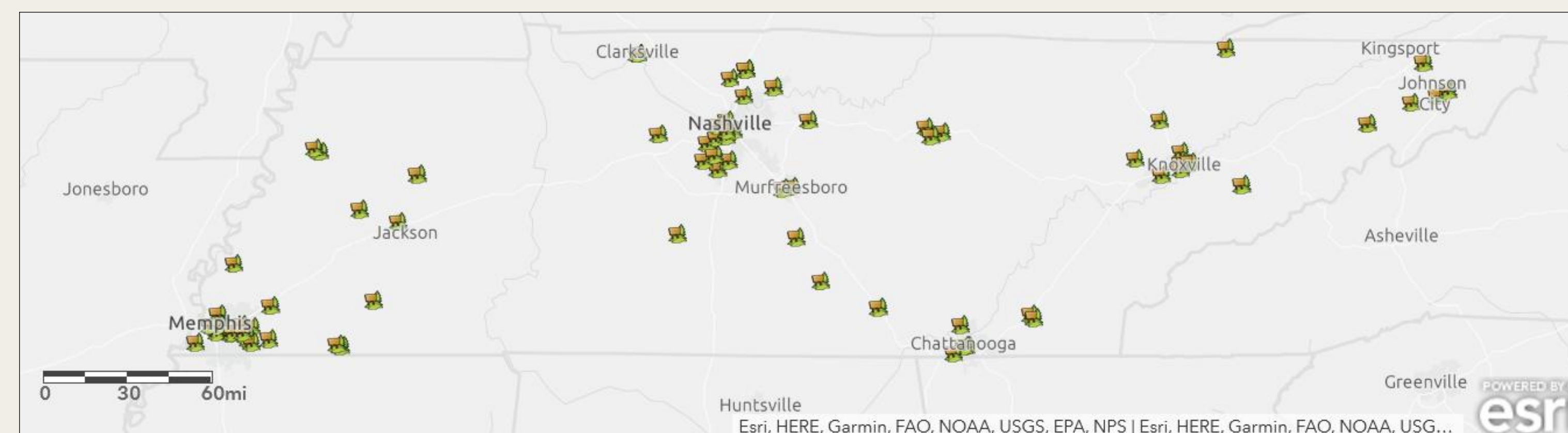
The GLR relationship values between Count of Points and explanatory variables were 0.47 (median household income), 0.77 (population density), 0.61 (diversity index), and -0.22 (forested land cover). The X2 is -1.137 with 4 degrees of freedom and p=0.000000, showing statistical significance. As accessibility to TUFCCA increases, areas are more densely populated, more racially diverse, have higher income, and have lower forested land cover percentage.

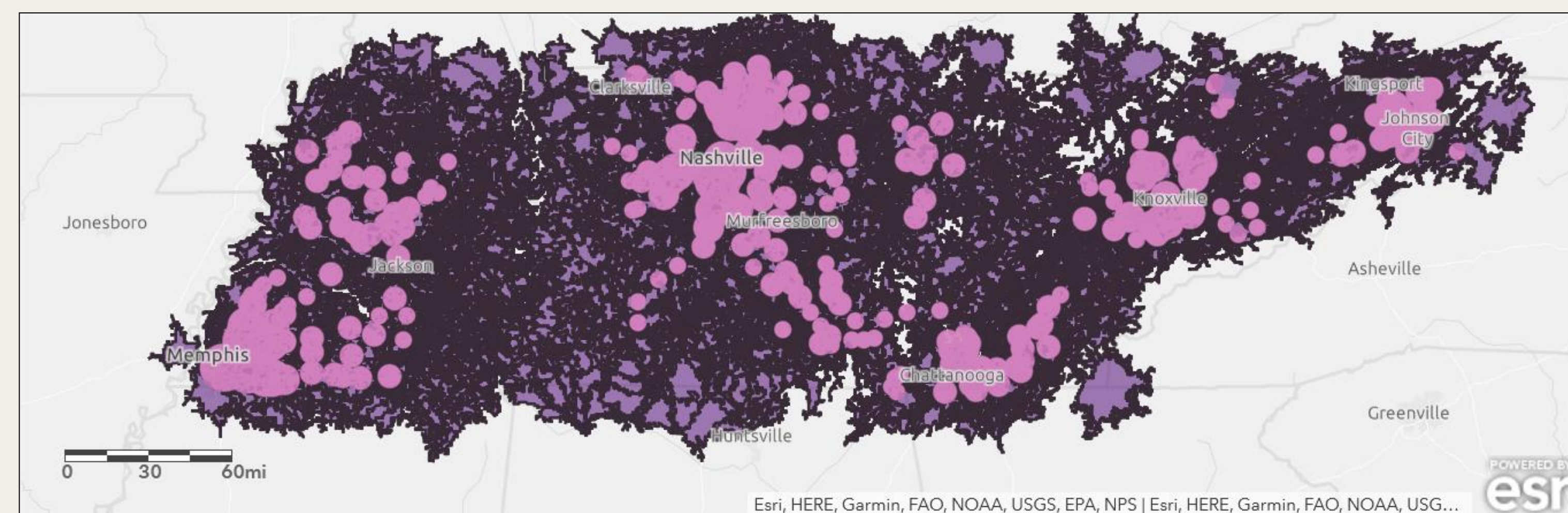### Tennessee Community Center Points

Map 1. Center point of each Tennessee Community (USCB, 2018)

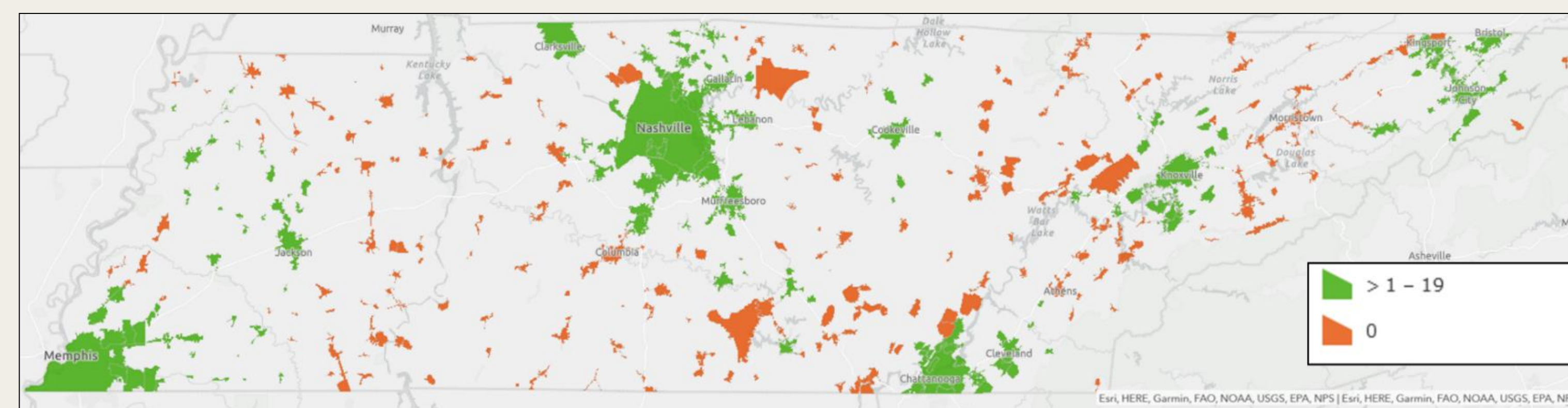### Tennessee Urban Forestry Council Certified Arboreta

Map 2. TUFC Certified Arboretum Locations (TUFC, 2022)

Arboreta Summarized within a 30 minute Drive from Community Center Points

Map 3. Pink Dots Show Communities with TUFC Arboretum Accessibility (USCB, 2018; TUFC, 2022)

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Map 4. Communities in green have access to one or more TUFC certified arboretum. Communities in red are more than a 30-minute drive to any TUFF certified arboretum.
(USCB, 2018; TUFC, 2022)

Discussion

The Tennessee Urban Forestry Council can use this analysis to focus their efforts on community outreach in strategic areas within the 167 communities that lack arboretum accessibility. Further analysis can be done to determine specific areas that would be optimal geographic locations for future certified arboreta so that the least amount of certified arboreta additions can impact the most amount of Tennessee communities. Variables to consider would be the number of communities that would gain accessibility to a TUFC certified arboretum with each additional location, the population of the communities, economically disadvantaged communities, and communities that are the greatest distance from any TUFC certified arboretum.

Potential Certified Arboreta Communities

Adamsville	Englewood	Loudon	Rogersville
Allardt	Enville	Lynnville	Rutherford
Altamont	Erin	Madisonville	Rutledge
Ardmore	Etowah	Martin	Sale Creek
Baneberry	Eva	McEwen	Saltillo
Bean Station	Fairfield	McMinnville	Samburg
Beersheba Springs	Fairfield Glade	Michie	Sardis
Bethel Springs	Fayetteville	Midtown	Savannah
Big Sandy	Fincastle	Milledgeville	Scotts Hill
Bowman	Finger	Minor Hill	Selmer
Bruceton	Flat Top Mountain	Mooresburg	Sharon
Bulls Gap	Flintville	Morrison	Slayden
Byrdstown	Gleason	Morristown	Smithville
Camden	Graysville	Mount Carmel	Sneedville
Celina	Greenback	Mountain City	South Fulton
Centertown	Grimsley	New Johnsonville	Spencer
Centerville	Guys	New Market	Spring City
Chapel Hill	Harriman	Newport	St. Joseph
Chesterfield	Helenwood	Niota	Stantonville
Church Hill	Henderson	Oakdale	Sunbright
Clarkrange	Henning	Olivet	Surgoinsville
Clarksburg	Henry	Oneida	Sweetwater
Clifton	Hohenwald	Orme	Tellico Plains
Collinwood	Hollow Rock	Palmer	Tellico Village
Copperhill	Hornbeak	Paris	Tennessee Ridge
Cornersville	Huntingdon	Park City	Tiptonville
Cottage Grove	Huntland	Parker's Crossroads	Townsend
Crab Orchard	Huntsville	Parrottsville	Union City
Crossville	Iron City	Parsons	Viola
Crump	Jamestown	Petersburg	Vonore
Cumberland City	Jefferson City	Philadelphia	Walland
Darden	Jellico	Pikeville	Walnut Grove
Dayton	Kenton	Pleasant Hill	Wartburg
Decatur	La Follette	Powells Crossroads	Waverly
Decaturville	Lafayette	Pulaski	Waynesboro
Dover	Lake Tansi	Puryear	Westmoreland
Dowelltown	Lawrenceburg	Ramer	White Pine
Dresden	Lewisburg	Red Boiling Springs	Whitwell
Ducktown	Lexington	Ripley	Winfield
Eastview	Linden	Rives	Woodland Mills
Elgin	Lobelville	Robbins	Wrigley
Elkton	Loretto	Rockwood	

Table 1. Tennessee Communities Lacking Arboretum Accessibility