Montgomery Urban Forest Summary

The Chicago Region Trees Initiative (CRTI) goal is that, by 2050, the Chicago Region will support and host a healthier urban forest, comprised of a diversity of tree species and ages, appropriately distributed across land use types in the region. The forest will provide the region improved environmental, economic, and social benefits. In order to achieve that goal CRTI works with a wide variety of people who work with and manage trees. This document is intended to help municipalities understand their urban forest, and identify strategies that they can use to make it better.

The *urban forest* is comprised of all of the trees in an urban setting, regardless of who owns or manages them. It is made up of street trees, forested natural areas and even the trees in resident's back yards. These trees are all included in the urban forest, because they all provide benefits that municipalities depend on. They improve air and water quality, reduce flooding and the urban heat island effect, and reduce energy use by shading buildings. Trees provide habitat for wildlife and improve residents' quality of life by reducing crime rates, increasing property value and boosting social cohesion in neigborhoods.

The magnitude of benefits that trees provide correlates with the size, structure and location of their canopy. Understanding the extent of tree canopy is critical for urban planning. Canopy maps can be used to quantify the benefits that their trees provide, identify where new plantings would have the greatest impact and to develop priorities and strategies for expanding the canopy.

The Chicago Region Trees Initiative, USDA Forest Service, American Forests, and the University of Vermont mapped land cover across the seven-county Chicago Region. This project not only identifies tree canopy, but also other green infrastructure including vegetation under 10 feet tall, bare soil and water; and gray infrastructure including buildings, roads and rail and other paved surfaces like sidewalks and parking lots (Fig. 1). Here after, these seven layers will be referred to as *land cover types*.

Fig. 1: Comparison of satellite image and land cover map. Seven types of gray and green infrastructure are in the land cover map.

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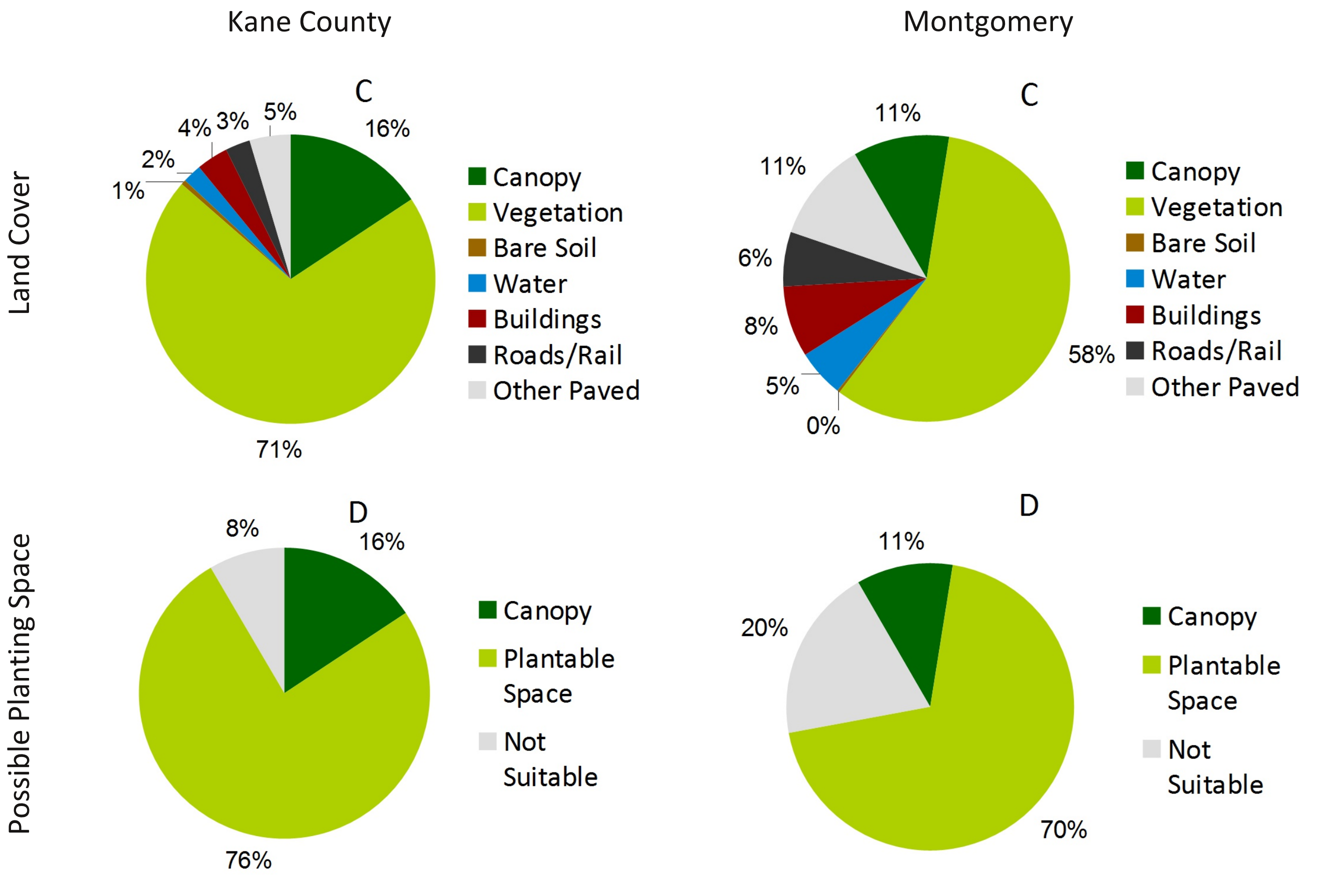


Fig 2: Kane County's current land cover (A), including 16% canopy cover. An additional 76% of the county is suitable for planting (B). Montgomery currently has 11% canopy cover (C), and 70% of the land cover could potentially be converted to canopy (D).

Overall, 16% of Kane County is covered by tree canopy (Fig. 2). There is a lot of room for growth across the county. We can identify spaces where trees could potentially be planted by adding together the vegetation, bare soil and other paved surface land cover types, as these land cover types could be converted to canopy with minimal effort. In all, these land cover types make up 76% of the county's area, meaning that canopy cover could potentially be raised to 92% if all of these surface were converted to trees. It is important to note, that while these surfaces could theoretically be covered with canopy, it is not necessarily preferable. Agricultural fields and baseball diamonds are included as “plantable space,” but few would agree that these are ideal sites to expand the forest canopy.

These land cover data can also describe canopy at the municipal scale. Montgomery currently has 11% canopy cover, and could potentially increase their canopy to 80% (Fig. 2).

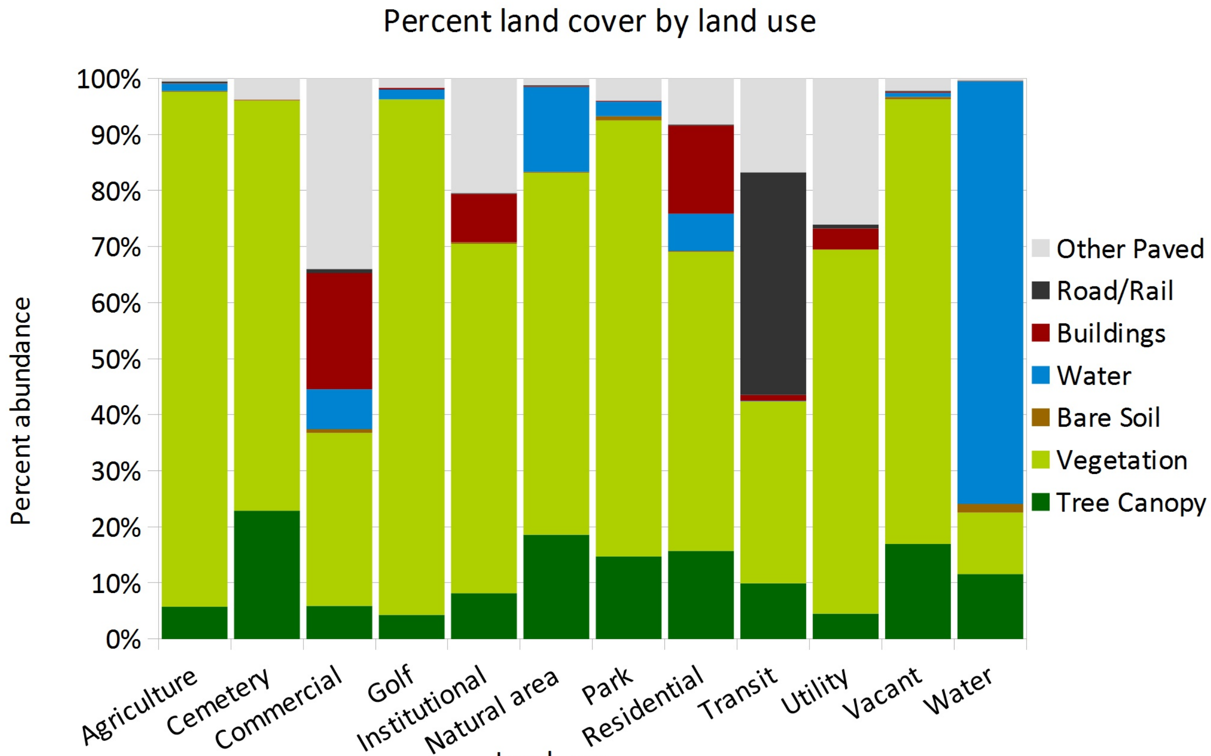


Fig 3: Variations in land cover across land use types.

Canopy cover is not distributed evenly across the region, nor within municipalities. To better understand how land cover patterns vary, we can compare them across land use types, like residential, commercial or park properties. In Montgomery, the highest percentage of canopy is found in natural areas and cemeteries (Fig 3). Golf courses and utility sites have the lowest canopy cover. As one might expect, transit areas have the largest proportion of roads, and residential and commercial land use types have an abundance of buildings. See Table 1 at the end of this report for more details.

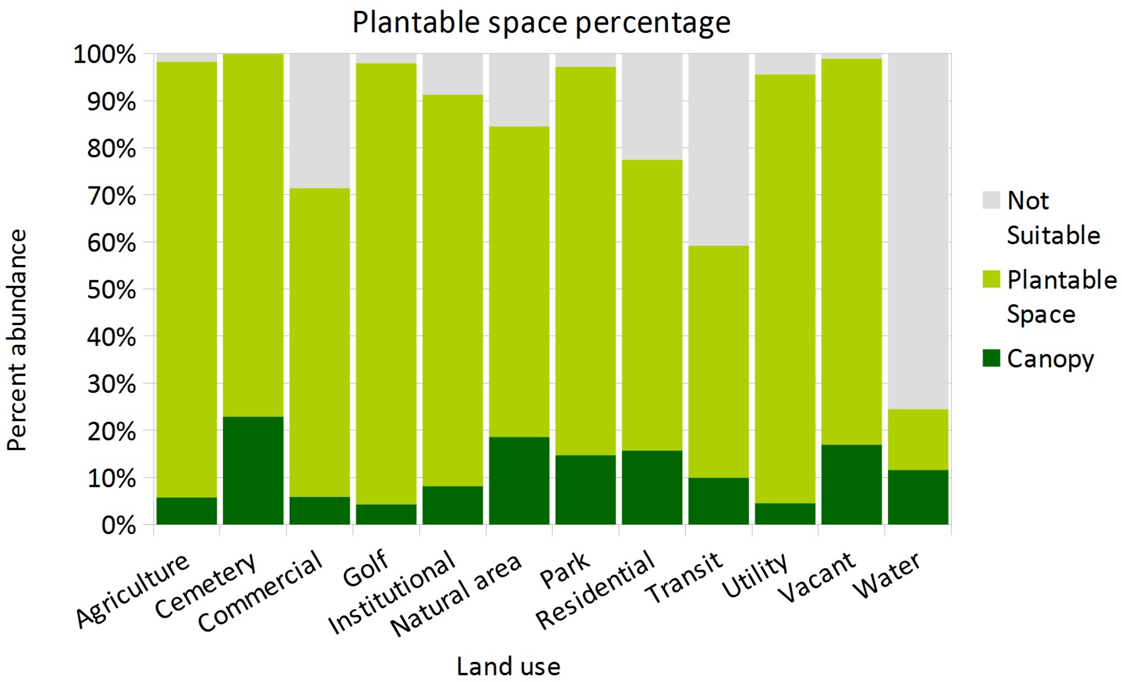


Fig 4: Current canopy and possible planting space across land use types.

By combining vegetation, bare soil and other paved surface categories we can identify which land use types have the most room for growth. In Montgomery, the highest proportions of plantable space are found in agricultural properties, golf courses and utility sites (Fig. 4).

While utility properties and golf courses have a high proportion of plantable space, they make up a relatively small area in Montgomery (Fig. 5). The majority of its land is residential followed by agricultural and commercial.

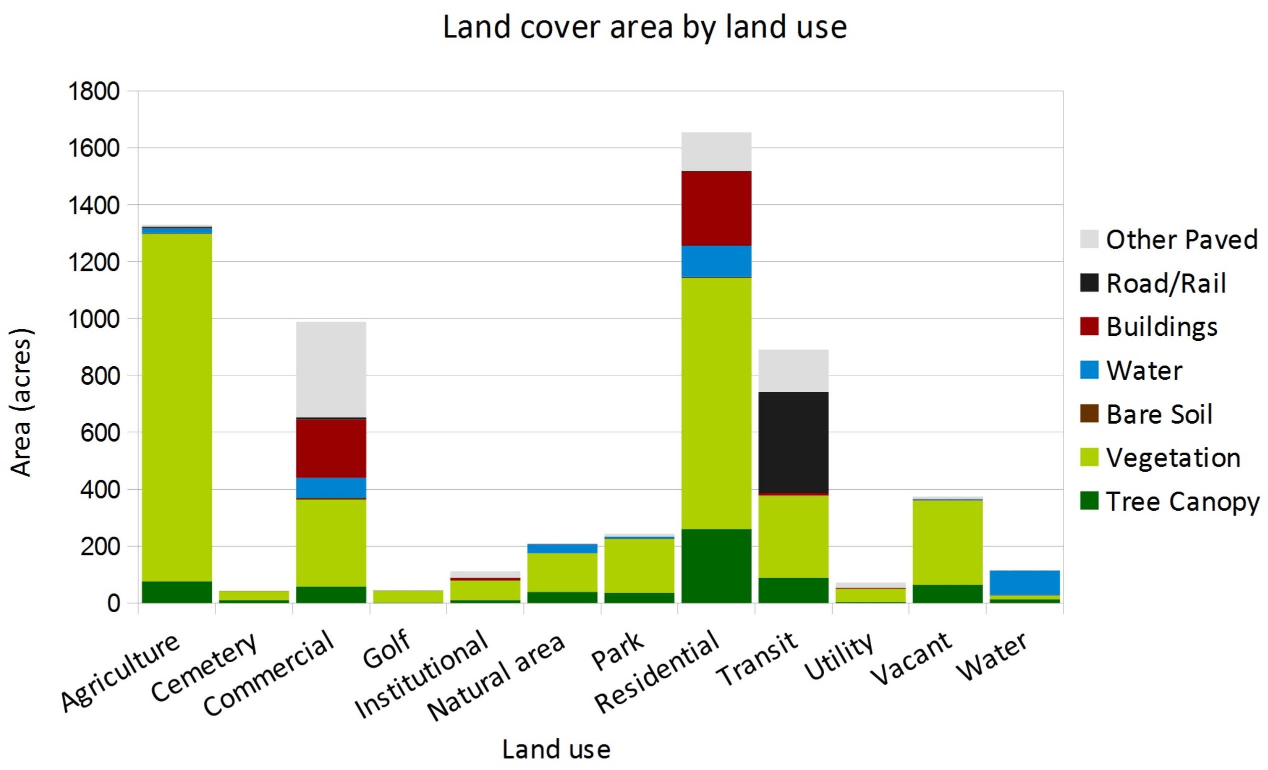


Fig 5: The majority of Montgomery is residential land use, followed by agriculture.

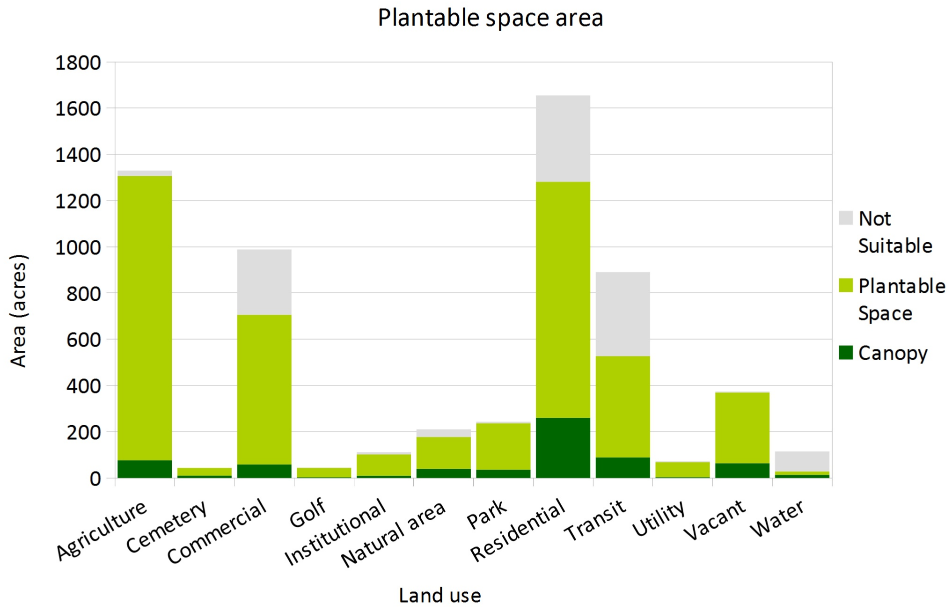


Fig 6: Agriculture has the greatest potential for increasing the canopy, followed by residential.

Residential, transit, commercial and agricultural land use types have the most area that could possibly be converted to canopy (Fig. 6). Targeting these areas could have the greatest impact in expanding the canopy. However, each of these land use types will require different strategies to increase canopy. Many of the transit properties are publicly owned, and could therefore be the easiest to work with. Residential and commercial property owners could be encouraged to plant more trees through tree giveaways, ordinances that encourage tree preservation, or stormwater tax breaks for properties that have more tree canopy. Agricultural properties can be more challenging to plant trees on, but some canopy expansions can be made along roadways and drainage areas. Additionally, ordinances can mandate that trees be planted if these sites are converted from agricultural use.

Table 1: Summary of land cover across land use types.

	Tree canopy		Vegetation		Bare soil		Water		Buildings		Roads and rail		Other paved	
	Acres	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*	*Acres*	*Percent*
Agriculture	76.4	5.7%	1220.9	91.8%	2.3	0.2%	17.3	1.3%	0.8	0.1%	4.7	0.4%	6.8	0.5%
Cemetery	10.0	22.9%	31.8	73.2%	0.1	0.1%	0.0	0.0%	0.0	0.1%	0.0	0.0%	1.6	3.7%
Commercial	58.2	5.9%	305.2	30.9%	6.5	0.7%	70.3	7.1%	204.9	20.7%	7.0	0.7%	336.2	34.0%
Golf	1.9	4.3%	41.0	92.0%	0.0	0.0%	0.8	1.7%	0.1	0.3%	0.0	0.0%	0.7	1.7%
Institutional	9.1	8.2%	69.6	62.3%	0.3	0.2%	0.0	0.0%	9.7	8.6%	0.1	0.1%	22.9	20.5%
Natural area	39.1	18.6%	135.7	64.6%	0.3	0.1%	31.9	15.2%	0.3	0.1%	0.3	0.2%	2.6	1.2%
Park	35.8	14.7%	189.3	77.8%	1.8	0.7%	6.4	2.6%	0.4	0.1%	0.0	0.0%	9.6	3.9%
Residential	260.2	15.7%	882.7	53.3%	2.5	0.2%	109.9	6.6%	260.5	15.7%	3.0	0.2%	136.0	8.2%
Transit	88.5	9.9%	288.6	32.4%	0.4	0.0%	0.7	0.1%	9.4	1.1%	353.6	39.7%	149.2	16.8%
Utility	3.2	4.5%	46.7	64.9%	0.0	0.1%	0.0	0.0%	2.7	3.7%	0.5	0.7%	18.8	26.1%
Vacant	63.5	17.0%	296.8	79.3%	1.6	0.4%	2.8	0.8%	0.6	0.2%	0.6	0.2%	8.3	2.2%
Water	13.3	11.6%	12.6	11.0%	1.8	1.5%	86.4	75.4%	0.0	0.0%	0.1	0.1%	0.5	0.4%
Total abundance	659.2	10.8%	3521.0	57.9%	17.6	0.3%	326.6	5.4%	489.4	8.0%	370.1	6.2%	693.1	11.4%

Montgomery and most of its neigbors have relatively low canopy cover (Fig. 7). The exception is Oswego, which has greater than three times more canopy than Montgomery.

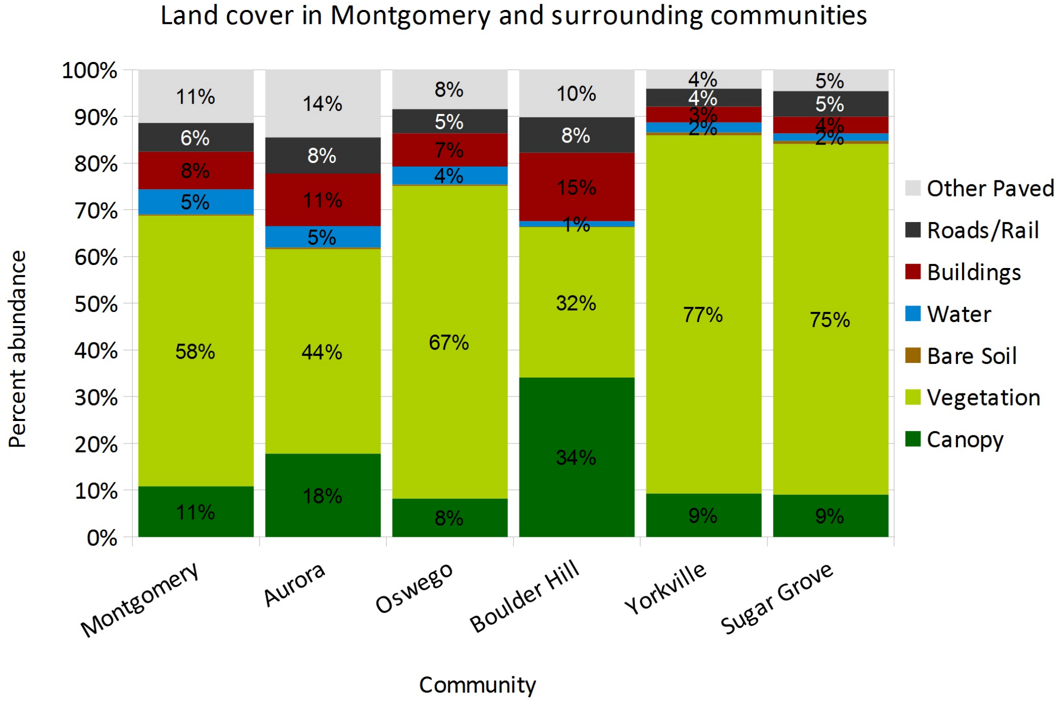
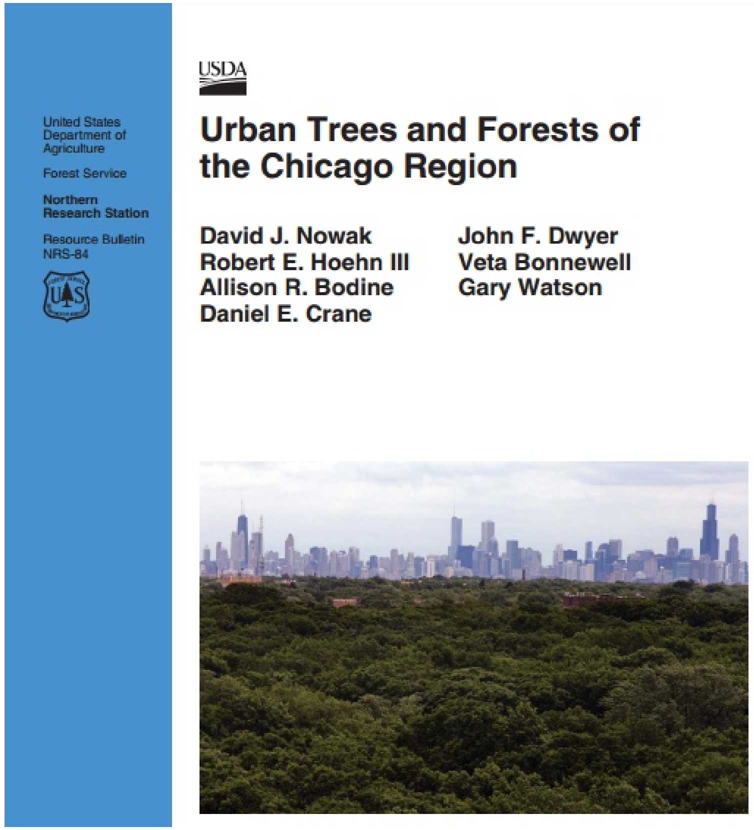


Figure 7: Comparison of land cover of Montgomery and its neighbors.


USDA

United States Department of Agriculture

Forest Service

Northern Research Station

Resource Bulletin NRS-84

Urban Trees and Forests of the Chicago Region

David J. Nowak
Robert E. Hoehn III
Allison R. Bodine
Daniel E. Crane
John F. Dwyer
Veta Bonnewell
Gary Watson

Figure 9: This Forest Service publication be found in its entirety at: http://www.nrs.fs.fed.us/pubs/44566.

While understanding canopy is an important component of urban forestry, canopy alone does not show the whole picture. We can use canopy to quantify the number and extent of trees, but not their identity, health, nor vulnerability to pests, diseases or climate change. In order to better understand the urban forest, we need a tree inventory, which will describe the abundance and location of tree species (Fig. 8).

Tree inventories come in many shapes and sizes. The most complete inventories gather data on every tree in the study area, and include information like each tree's species, any health issues the tree may have, and its specific location. This sort of inventory is invaluable for planning and monitoring the urban forest's health and growth over time. The Morton Arboretum and the USDA Forest Service conducted a sample inventory across the seven county region, and determined species composition at the county scale (Fig. 9). This resource is invaluable in understanding broad-scale composition.

To measure species composition on a finer scale, rely on inventories that measure every tree. Many communities, including Algonquin, have conducted such inventories on public property. We can use these inventories to better understand the state of its urban forest, and to compare municipalities who have an inventories to each other and to the region as a whole.

All calculations in this report were made using a 2013 inventory of Montgomery's municipal trees. It should be noted that this only represents a small portion of the trees in Municipal, and a more compete inventory is necessary to further explore the urban forest.

Figure 8: Measuring tree size is a critical component to completing a tree inventory.

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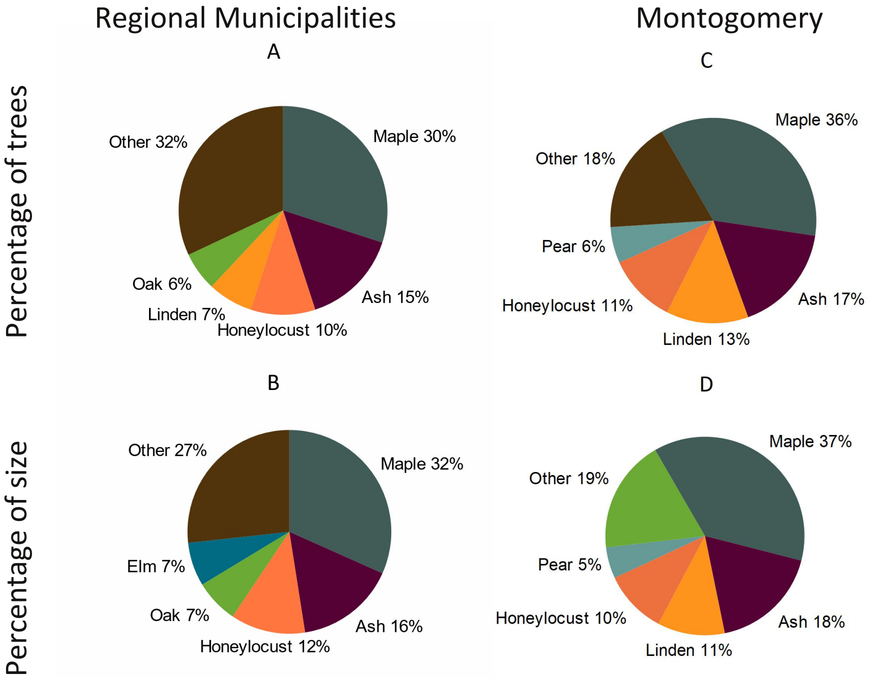

Figure 10: Region-wide, maple is the most abundant genus by number of trees in municipal plantings (A), as well as by proportion of canopy (B). Montgomery has more maples, ashes and lindens than the region as a whole (C and D).

Inventories allow us to look at diversity in two ways, by the abundance of individual trees, and the proportion of the entire canopy that these trees make up. To determine the second figure, we can use the diameter of the trees as a correlate for canopy abundance, as those values are closely related. Both of these measures are important. Number of individual stems is useful when calculating the number of trees that might be affected by a given pest or disease. The abundance of canopy will show how the entire forest might change. That is, losing ten, small apple trees would have a much smaller impact on the ecosystem services that a forest offers than losing ten, mature oaks. Figure 10 shows the most abundant genera in Montgomery and across 55 other municipalities.

Many municipalities have very low species diversity. They rely heavily on tried and true species, like Freeman maples, white ash and honeylocust. Maples, on average, comprise 30% of municipal plantings. Ashes were generally in similar abundances, and losing them was a terrible ordeal. As devastating as losing ashes was for the Chicago region, losing maples would be much worse.

This illustrates how critical it is to actively increase species diversity where possible. Most pests and diseases (like emerald ash borer and Dutch elm disease) only attack a specific species or genera of plants. By diversifying species, we can ensure that our forest is resilient to these attacks. CRTI recommends that municipalities strive to have no more than 15% of a single family, 10% of a genus, and 5% of a species in their plantings. These guidelines should be met not only across the whole municipality, but at smaller scales like individual blocks.

Montgomery has a similar species composition to the rest of the region, but has even more maples, ashes and linden. The top five genera make up four fifths of all trees, leading to a forest that may not be resilient..

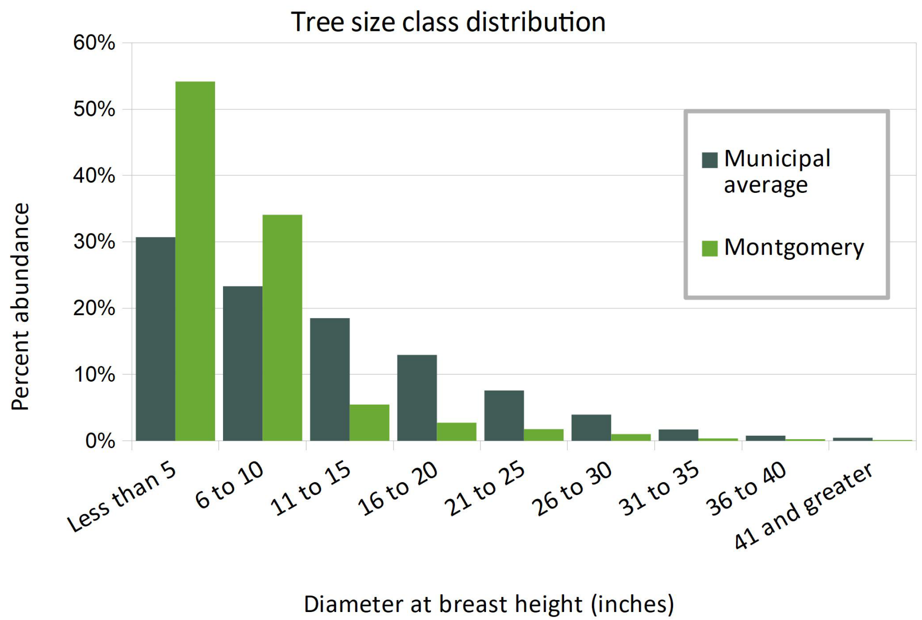

Figure 11: There are more trees in smaller age classes than in larger ones in Montgomery and across all municipal inventories. Montgomery has even more trees in the smaller size classes than the region as a whole.

There is another type of diversity to consider beyond species diversity. A sustainable forest has a variety of ages and sizes of trees. If all of the trees in an area were planted at the same time, they will grow, age and die at the same time. When these trees reach the end of their lives, it could leave a property without trees.

For that reason, it is important to try to increase age diversity of a forest. This can be done by planting trees over several years, planting trees with different growth habits (some trees grow quickly and have shorter lifespans than others), and by under planting aging trees, so that something is ready to replace them when they die.

Paying attention to size diversity is especially critical when recovering from emerald ash borer. Many communities have vowed to replace all of the trees that they remove, but this could become problematic if they are planting all of those trees within a short time period. It may be better for overall health of the forest to space these plantings out over several years.

Overall, size diversity averaged across all municipalities looks sustainable (Fig. 11). There is room for some trees to die between each age class, with plenty to remaining to grow into the next size class. Montgomery has more small trees and fewer large ones. This is indicative of an urban forest that is growing, and if planting continues the municipality should experience an increase in canopy over the coming decades. It is important, however, that Montgomery continues to plant trees to maintain the expanded canopy.

While size diversity is sustainable on the municipal, county and regional scale, it is also important to zoom into smaller areas, like specific subdivisions or properties. Planning for size class diversity on this level is important to local ecosystem services, like reducing energy use, managing stormwater and retaining soil.

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Urban trees are extremely valuable. Research has allowed us to to quantify the values that trees provide, and these values go far beyond the aesthetics that are readily recognized. For example:

- Urban trees save energy by reducing surface temperatures and shading buildings.
- They store carbon dioxide and remove pollutants from the air.
- They intercept stormwater and help reduce flooding.
- Residents preferentially buy properties that have more trees, meaning that trees increase property values.

The i-Tree suite of tools was developed by the US Forest Service. They allow users to calculate tree benefits at a variety of scales, from an individual tree, to entire tree inventories, to landscape scale assessments of canopy and hydrology. For more information on i-Tree tools and methodology visit iTreetools.org.

Figure 12 shows the benefits that all of the trees (including trees public and private property) in Elburn offer. These values were calculated with i-Tree Landscape. Each year, Montgomery's trees provide the municipality with $226,000 worth of benefits. These trees also store a lot of carbon, which is valued at an additional $1,530,800.

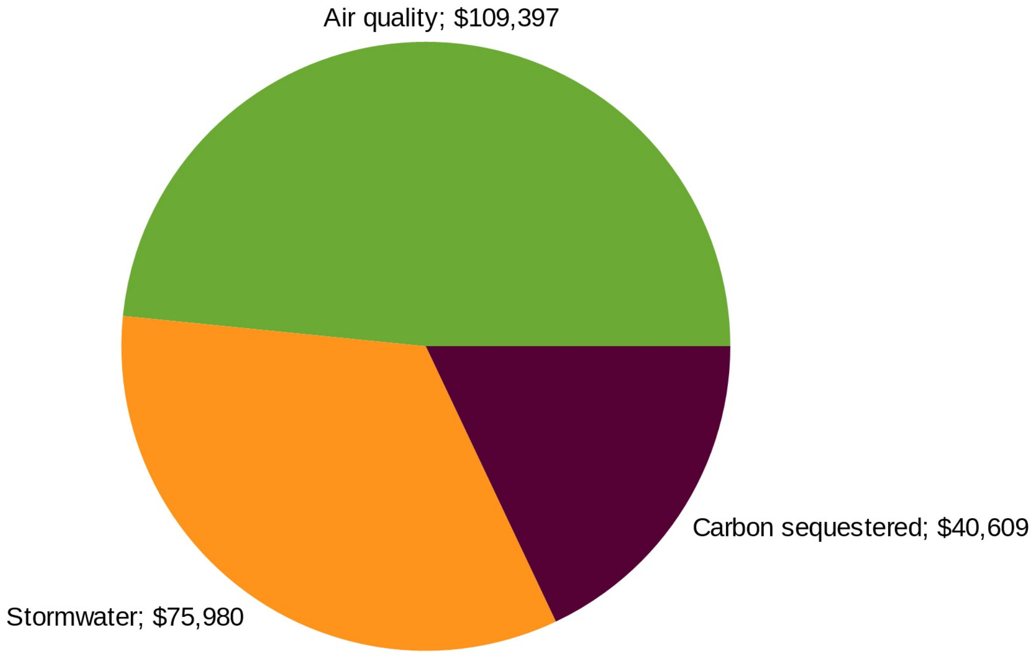

Figure 12: Trees offer myriad benefits, including intercepting stormwater, improving air quality and removing carbon from the atmosphere.

Cities tend to be hotter than rural areas because buildings and pavement absorb the sun's energy and release it as heat. This is known as the urban heat island effect. High urban temperatures increase the use of energy within buildings. It can also cause a variety of health issues to residents, and extreme heat can even cause death. Trees help lower urban temperatures by shading built surfaces and through evaporative cooling. Urban areas that have more tree canopy tend to have lower surface temperatures (Figure 13). Planting more trees in parking lots and around buildings can be especially helpful in reducing urban temperatures and making cities more comfortable.

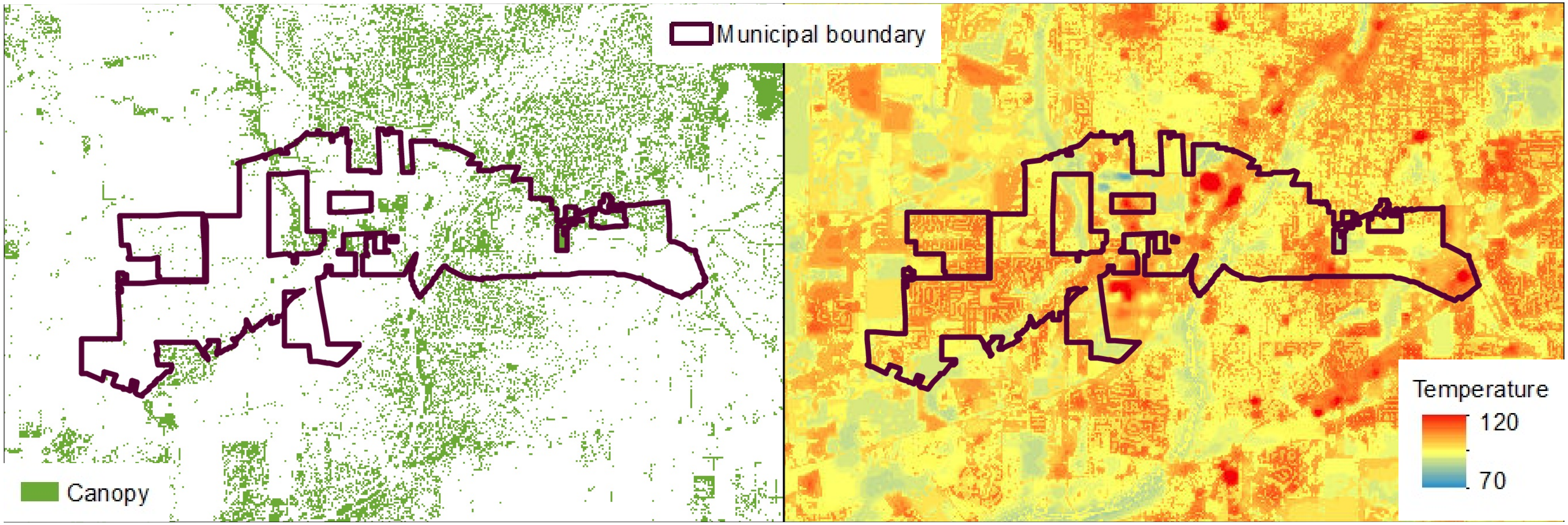

Figure 13: The image on the left shows tree canopy and on the right shows surface temperature. Surface temperature was calculated using a landsat image from September 2014. Areas that have higher tree canopy tend to have lower temperatures.

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CHICAGO REGION TREES INITIATIVE Our Trees. Our Communities. Our Future.

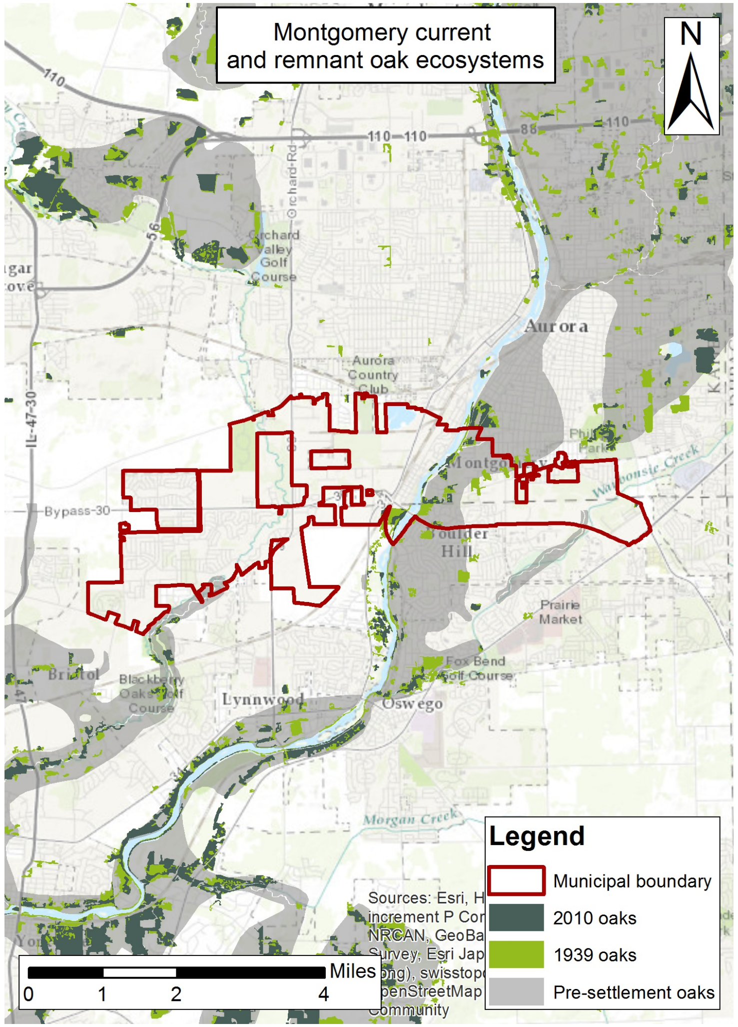

Figure 14: Oak ecosystems were abundant prior to Euro-American settlement. This map shows which of these ecosystems still remained in 1939 and 2010.

Oaks are a keystone species in our region's ecology. They provide habitat and food for countless animals, and they influence which plants grow around them. Prior to Euro-American settlement, they were the most abundant tree species in the region. However, conversion of natural areas to agriculture and development has removed many of the oaks from our region. Only 17% of oak ecosystems remain in the Chicago region. For more information on oak ecosystems in the Chicago region, see Chicago Wilderness's *Oak Ecosystem Recovery Plan*.

Prior to Euro-American settlement, oaks made up 60% of the regions canopy. Currently, in Algonquin, they account for only 4.0% of the canopy. Adding additional oak trees, or using oaks to replace dying ashes, could serve to increase species diversity in Montgomery, and to improve habitat for the birds, insects and wildlife that depend on them.

Restoring oak ecosystems is a major focus of CRTI. It's efforts include improving oak management in natural areas, and encouraging their use in municipal plantings. Many municipalities avoid oaks because foresters believe that they do poorly as street trees. CRTI strives to dispel these biases, and to teach foresters how oaks can be used effectively in urban areas. The expanded use of oaks can help increase species diversity, and continue the legacy of oaks in our region.

Municipal plantings are not the only place where oaks can be used. Algonquin might also consider working with residents and commercial land owners to increase oaks abundance across all land use types. This could be done through programs like tree give-aways, or handouts that describe the benefits of planting oaks. CRTI is creating documents that could help in this endeavor.

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Woody invasive species like European buckthorn and bush honeysuckles make up almost one in three trees in the region. These shrubs were introduced as ornamental specimens, but they have escaped cultivation. Birds eat the berries produced by buckthorn and honeysuckle, allowing the seeds to be dispersed into natural areas. Both genera are extremely disruptive to native plants and animals. They create dense thickets, and prevent other species from growing around them (Fig. 15). In natural areas, they are one of the leading contributors to reduced oak regeneration.

Woody invasives are the most abundant in Cook, DuPage and Lake Counties, but they are becoming problematic region-wide (Fig. 16). While there are very few woody invasives in Montgomery's inventory, these trees likely exist on private property, or on unmanaged land. It is imperative to remove buckthorn from all land uses, as the seeds can easily travel to natural areas. It is difficult to dictate plantings on private property, but educating residents can encourage them to remove it of their own accord. This could include signage explaining invasive removal on public property, or expansion of programs like Conservation@Home.

Figure 15: A buckthorn thicket. Note that no other species are growing beneath the buckthorn.

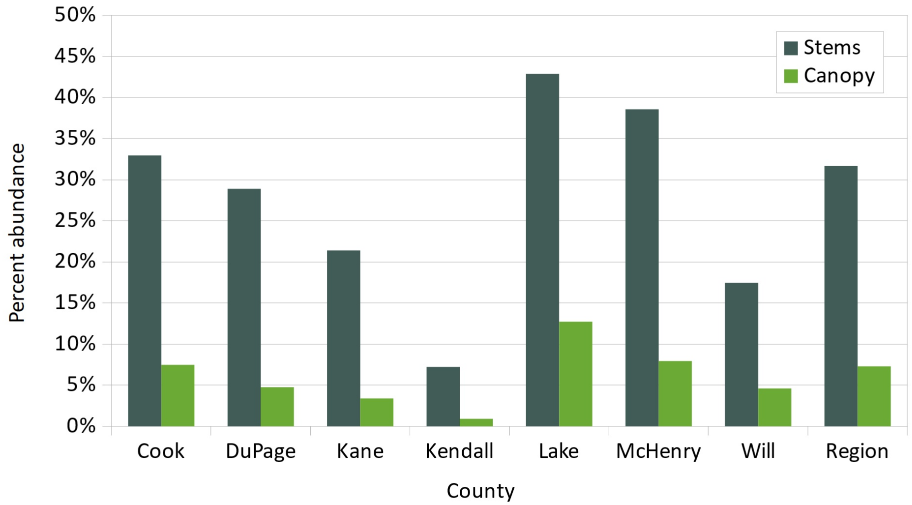

Figure 16: Woody invasive abundance across all counties. They are the most abundant in Lake and McHenry Counties, but is a threat region-wide.