MADISON

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URBAN FOREST in a nutshell

Urban forests are incredibly important, but their true values are only now being appreciated. To better understand the urban forest across the city of Madison, almost 200 randomly located plots were established in the Urban Forest Inventory and Analysis project of the U.S. Department of Agriculture, Forest Service. Large amounts of data were collected about urban trees at each plot, and they will be revisited every seven years. The results, summarized in this publication and in other resources, tell a holistic story about the entire city's urban forest.*

* *Note that it is not feasible to inventory every tree in the city. As such, sampling is used to make the estimates you see in this publication. Like any estimate based on a sample, there is a degree of uncertainty and error.*

Total Live Trees
(1"+ diameter)
2.9 MILLION

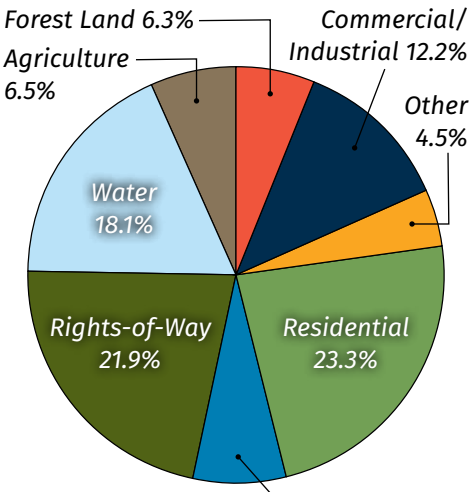
BIGGER TREES (15"+ DIAMETER) • 289,000
Top Species: Norway maple, honeylocust, white oak

SMALLER TREES (5-15" DIAMETER) • 777,000
Top Species: boxelder, northern white cedar, white ash

SAPLINGS (1-5" DIAMETER) • 1.8 MILLION
Top Species: common buckthorn, chokecherry, boxelder

SEEDLINGS (0-1" DIAMETER) • 25 MILLION
Top Species: common buckthorn, sugar maple, chokecherry

Land Use Percentage



Plots were distributed across the city and field visits used to determine the make-up of Madison's land use.

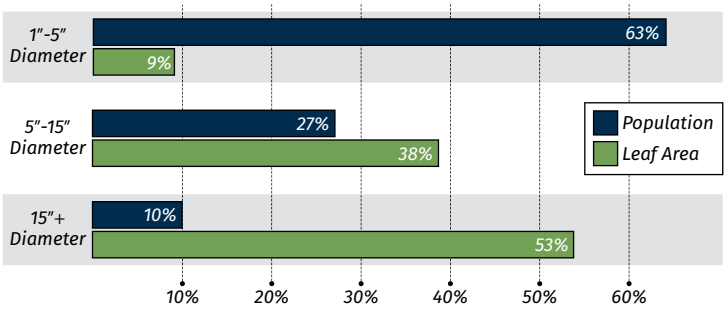
Photo Credit: Wisconsin DNR

Bigger Trees Offer More Benefits

Larger diameter trees tend to have more volume, greater heights, wider canopies and more leaf area. Leaf area is the dominant variable in many ecosystem services such as air pollution removal and stormwater reduction. As the chart shows below, leaf area is disproportionately represented by larger trees. These trees in particular need protection and proactive maintenance to ensure as many as possible stay on the landscape and their ecosystem services prolonged.

How Are Ecosystem Services Calculated?

Trees save us money by providing ecosystem services, or benefits to the environment and society, by their presence or processes. For example, trees reduce hospital visits by capturing some airborne pollutants on and through their leaves, and may reduce building energy use by providing shade or blocking wind.



Though there are fewer large trees, they contain the greatest leaf area, which drives many ecosystem services.

Ecosystem Service	Quantity	Value Provided
Air Pollution Removal	368 tons/year	$2.7 million/year
Avoided Runoff	273 million gals/year	$2.4 million/year
Carbon Removal	11,000 tons/year	$1.9 million/year
Reduced Building Energy Use	225,000 GJ/year	$3.2 million/year
Carbon Storage	420,000 tons	$71.6 million
Compensatory Value	Not Applicable	$1.3 billion

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Madison

Maintained Areas (Diameter > 5″) vs. *Unmaintained Areas* (Diameter > 5″)

TOP SPECIES IN MAINTAINED AREAS

Northern white cedar

Norway maple

Honeylocust

TOP SPECIES IN UNMAINTAINED AREAS

Boxelder

Black locust

White ash

Dead Trees (Diameter > 5″)

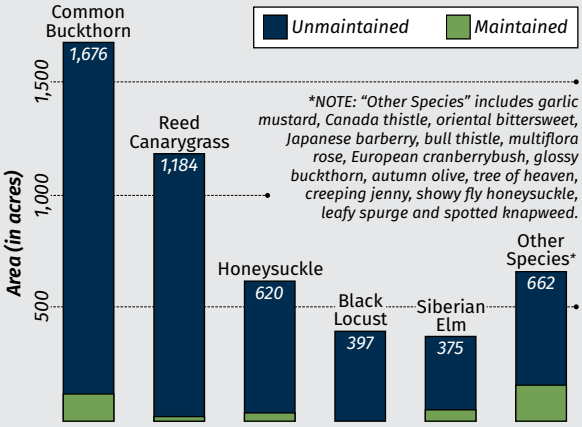
Though there is significant uncertainty in estimating the number of dead trees, an estimated 68,000 dead trees over 5″ in diameter were standing in Madison. However, this number does not include many losses due to the emerald ash borer, an invasive insect that has been decimating ash trees in Wisconsin since at least 2008. This is because the plots were established between 2015 and 2021.

Species	*Number Dead*	*Percentage Of Species Is Dead*
American elm	18,813	48%
White oak	11,487	28%
Shagbark hickory*	5,109	11%

** Dead trees only found on one plot*

https://dnr.wi.gov/tiny/3251

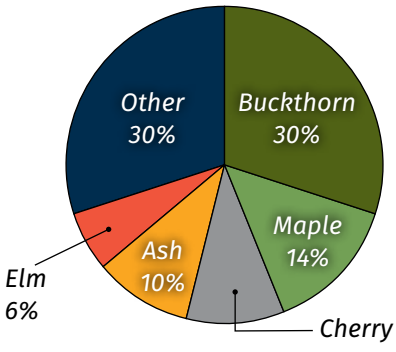
Invasive Species Total Coverage



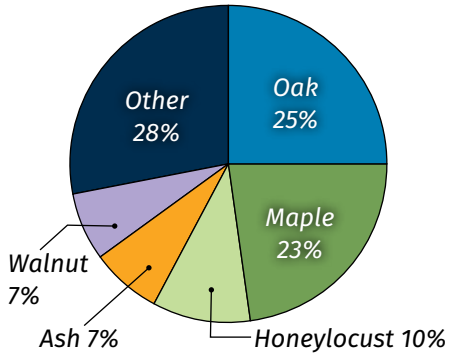
Of the 199 plots examined, invasive plant species were identified on 43% of them. Crews noted the percentage of the plot area covered by the invasive species, allowing for the estimation of total area covered by each species within the city. Note that Norway maple was not included in this document, but is listed as an invasive species in other UFIA resources.

Carbon Removal And Storage In Live Trees

Number of Trees By Genus
(Diameter > 1″)



Carbon Storage By Genus
(Diameter > 1″)



Though invasive buckthorn is plentiful, it cannot store significant amounts of carbon due to its small size. In contrast, species that grow larger can store much more carbon.

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