URBAN FOREST INVENTORY & ANALYSIS

The **Urban Forest Inventory and Analysis** program is the expansion of the U.S. Forest Service's traditional tree "census" into urban environments across the United States. By increasing knowledge of urban trees, the program enables better management and sustainability of their benefits, such as energy savings, air pollution mitigation, carbon sequestration and job creation. The USFS is focusing on implementing UFIA in cities with populations greater than 200,000 people, and the metropolitan areas around them. Since 2014, 35 cities in 25 states (across all four FIA units) have started UFIA monitoring. Within the Northern Research Station, 27 cities and 12 statewide programs are active thanks to state and local partnerships.
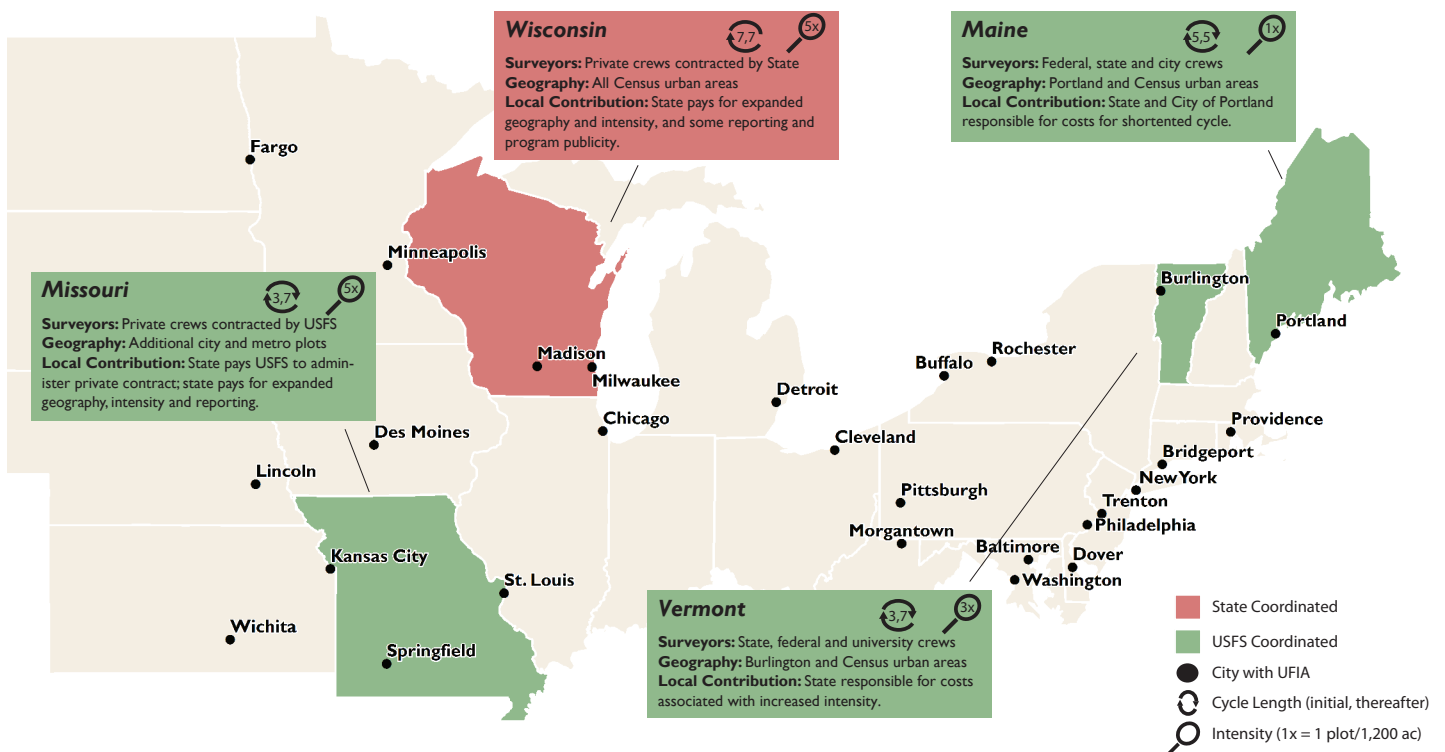
How is UFIA conducted differently across the country?

The UFIA monitoring system is the result of collaboration between the USFS and local cooperators. The goal of the base federal program is to establish 200 plots within the city's limits as well as one plot for every 6,000 acres of surrounding urban area. These plots are measured over seven years followed by remeasurement cycles. Some cities and states have chosen to fund a reduction in the cycle length and/or to add more plots.

The USFS base program also selects plots, certifies crews, processes data and generates reports. See the below examples of how local partners are creatively approaching their own UFIA programs and leveraging USFS resources.

UFIA plots are located across all urban ownerships.

Wisconsin 7,7 6x
Surveyors: Private crews contracted by State
Geography: All Census urban areas
Local Contribution: State pays for expanded geography and intensity, and some reporting and program publicity.

Maine 5,5 1x
Surveyors: Federal, state and city crews
Geography: Portland and Census urban areas
Local Contribution: State and City of Portland responsible for costs for shortened cycle.

Missouri 3,7 5x
Surveyors: Private crews contracted by USFS
Geography: Additional city and metro plots
Local Contribution: State pays USFS to administer private contract; state pays for expanded geography, intensity and reporting.

Vermont 3,7 3x
Surveyors: State, federal and university crews
Geography: Burlington and Census urban areas
Local Contribution: State responsible for costs associated with increased intensity.

Fargo
Minneapolis
Madison
Milwaukee
Chicago
Detroit
Des Moines
Lincoln
Kansas City
St. Louis
Wichita
Springfield
Buffalo
Rochester
Cleveland
Pittsburgh
Morgantown
Burlington
Portland
Providence
Bridgeport
New York
Trenton
Philadelphia
Baltimore
Dover
Washington

State Coordinated
USFS Coordinated
● City with UFIA
Cycle Length (initial, thereafter)
Intensity (1x = 1 plot/1,200 ac)

UFIA examples, Midwest and Northeast

How is UFIA different from other forest data?

Tree inventories

Many municipalities survey trees that they manage, often along streets and in parks. While a community's tree inventory is an important tool in urban forest management, inventories are limited in their attributes, geographic reach, land type and continuity. They do not suffice for a continuous assessment of the municipal or statewide urban forest resource.

Tree canopy

Aerial images are analyzed and land classified into different types, such as tree canopy, grass cover and impervious surface. This top-down perspective is important in assessing the urban forest extent and identifying potential planting locations. But a canopy analysis offers little in terms of species composition, health status, tree size or pest risk; it is an overhead snapshot of tree location.
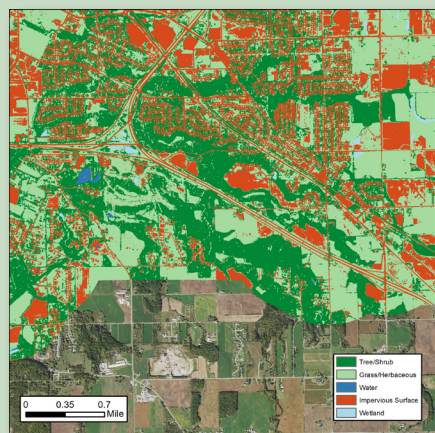
Canopy data gives managers a great perspective on urban forest extent and planting possibilities, but cannot tell you much about the composition and health of the trees.

What data is collected and what does that tell us?

The following attributes are some of the data collected at each plot. Critically, these plots are remeasured on a regular cycle.

Tree species – what trees are growing where and which are most abundant
Tree size – tree growth rate and ability to provide benefits
Tree crown condition – tree health, growing structure and impact on plants below
**Tree damage** – identify current problems and anticipate those in the future
Ground cover – other plants, surface material (e.g. concrete, bare soil) and water infiltration potential
Ownership – who owns what and how to tailor management strategies across ownerships

How are plots established?

In each municipality, 200 polygons of equal size are created. Random plot locations are then selected by USFS within each polygon to assure unbiased estimates of urban forest characteristics. Additionally, plots within the metro area are sampled at one plot for every 6,000 acres. All plots will be measured over a regular cycle by crews determined at the local, state and/or federal level.
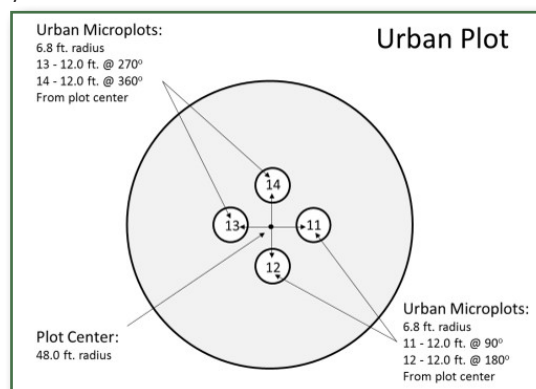
A UFIA plot is composed of a 1/6 acre subplot and four 1/300 acre microplots.

How are urban forest benefits calculated?

i-Tree is a software suite that calculates ecosystem benefits for individual trees and forests. Tree attributes such as species and diameter are incorporated into advanced, peer-reviewed databases and formulas to calculate the value of that tree across a range of environmental services, including air pollution removal, stormwater runoff avoidance and carbon sequestration. For more information, visit: itreetools.org.

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