Public Tree Inventory
City of Bloomington, Indiana

Davey Resource Group, Inc. completed a geographic information systems-based (GIS-based) tree inventory of the City of Bloomington, Indiana from February to August 2019. All trees, stumps, and planting sites along the city's public street rights-of-way (ROW) and within public parks were inventoried. Parks included Bryan Park, Building Trades, Butler Park, Lower Cascades, Miller Showers Park, Olcott Park, Peoples Park, Rose Hill Cemetery, Seminary Park, Twin Lakes Recreation Center and Sports Complex, and White Oak Cemetery.

City of Bloomington, Indiana Tree Inventory

The following statistical summary of the public tree population reflects genus and species composition, condition, primary maintenance recommendations, and tangible annual tree-benefits:

- A total of 24,371 sites were assessed, including 19,013 trees, 741 stumps, and 4,617 planting sites.

- The inventory found 168 species representing 63 genera.

- The ten most common species are: *Acer rubrum* (red maple), 13%; *Pyrus calleryana* (callery pear), 7%; *Quercus rubra* (northern red oak), 6%; *A. saccharum* (sugar maple), 6%; *Quercus palustris* (pin oak), 6%.; *A. saccharinum* (maple, silver), 3%; *Fraxinus pennsylvanica* (ash, green), 3%; *Malus* spp. (crabapple, flowering), 3%; *Gleditsia triacanthos inermis* (honeylocust, thornless), 3%; and *Cercis canadensis* (redbud, eastern), 3%.

- The five most common genera are: *Acer* (maple), 24%; *Quercus* (oak), 13%; *Pyrus* (pear), 7%; *Fraxinus* (ash), 11%; and *Ulmus* (elm), 4%.

- Most (48%) inventoried street and park trees are young, 0–8 inches diameter at breast height (DBH).

- The overall condition of the tree population is healthy (Fair to Good).

- Primary Maintenance recommendations include: 8,833 Discretionary Prunes; 5,997 Training Prunes; 2,881 Prunes; 1,302 Removals; 1,428 Large-growing Tree Plantings; 454 Medium-growing Tree Plantings; and 2,735 Small-growing Tree Plantings.

- The public tree population provides approximately $968,823 in the following annual benefits:

  - *Aesthetic and Other Tangible Benefits*: valued at $643,202 per year.

  - *Air Quality*: 16,230 pounds of pollutants removed valued at $23,884 per year.

  - *Net Total Carbon Sequestered and Avoided*: 3,679,323 pounds valued at $10,870 per year.

  - *Energy*: 853,140 kilowatt-hours (kWh) and 19,190 therms valued at $76,686 per year.

  - *Stormwater:* 34,545,160 gallons valued at $214,180 per year.

The tree inventory is an important planning tool that should help the City of Bloomington establish a systematic program for tree care and determine budget, staff, and equipment needs. Implementation of the maintenance recommendations will improve public safety and help guide future management decisions. When properly maintained, trees return economic, environmental, and social value to the community. These benefits greatly outweigh the time and money invested in planting, pruning, protection, and removal.

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Urban Tree Canopy Assessment
City of Bloomington, Indiana

The City of Bloomington's Parks and Recreation Department contracted Davey Resource Group to translate digital imagery showing detailed leaf-on conditions into different land cover classifications. The project area is within the city limits of Bloomington, Indiana and is approximately 23 square miles or 15,000 acres. The 2018 National Agricultural Imagery Program (NAIP) leaf-on, multispectral imagery acquired and processed by the United States Department of Agriculture (USDA) was used as the primary source to identify the city's current land cover (USDA 2018). Land cover areas and percentages of tree canopy were calculated and made spatially explicit for the following geographic units: census tracts, city-owned parcels, citywide, council districts, Indiana University campus, neighborhood associations, parks, watersheds, and zoning.

City of Bloomington, Indiana Urban Tree Canopy Assessment

The following statistical summary of the urban tree canopy assessment reflects land cover, projected and reasonable maximum tree canopy, prioritized plantable space, historical change in tree canopy, tree canopy health, tree counts and costs needed to plant trees, and tangible tree-benefits:

- Tree canopy is 38%, impervious surfaces is 34%, pervious surfaces is 24%, bare soil is 3%, and open water is 1%.
- An estimate of area available to tree planting is 22%, leading to a maximum tree canopy of 61%.
- Designated High or Very High priority areas for tree planting, based on degradation from storm and flood events and effects of urban heat island, make up 16% of the estimated plantable area or 532 acres.
- There has been a 2% decrease in tree canopy in the last 10 years.
- The overall condition of the tree population is healthy (Fair to Good).
- The number of trees cost to recover from a 2% tree canopy loss 10,841 trees planted and maintained for an estimated cost of $4,770,016.
- Tree canopy (5,735 acres) is a vital asset, providing a value of $54,994,625 in aesthetic and ecosystem benefits and annually provides the community savings-benefit equal to $1,931,950.
    - *Aesthetic and Other Tangible Benefits*: valued at $19,688,555 per year.
    - *Air Quality*: 470,380 pounds of pollutants removed valued at $59,694 per year.
    - *Carbon Sequestered*: 28,673 tons valued at $1,328,918 per year.
    - *Stored Carbon:* 720,088 tons of carbon valued at $33,374,120.
    - *Stormwater:* 90,556,345 gallons valued at $543,338 per year.
- Indiana University's campus encompasses 1,209 acres; tree canopy covers 20% (244 acres) and can increase to 45% tree cover.

City of Bloomington can use the data to set goals with the completion of this urban tree canopy assessment. Reaching the maximum tree canopy will be a challenge; however, preserving existing tree canopy, establishing realistic canopy goals, and harnessing the maximum amount of ecosystem benefits by planting, maintaining, and caring for trees (particularly large-growing trees) when appropriate are prudent and responsible endeavors.

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