Bloomington, Indiana
State of the Urban Forest Results

Completed by: Davey Resource Group
What is an Urban Forest?

Why measure an Urban Forest?

You can’t manage what you can’t measure

✓ Prioritize and schedule work.
✓ Budget predictions.
✓ Understand and plan for threats.
✓ Develop or measure progress towards goals.
✓ Report accomplishments.
✓ Communication and outreach.
A tree inventory provides information about individual trees; collectively the data can provide information about the benefit-services and reliance of the tree population.
An urban tree canopy assessment provides information about public and private trees; collectively the data can provide information about the benefit-services and equity of the natural resource.
Sites included in the inventory:

- Trees, stumps, and vacant planting sites
- Located within the 237 miles of city maintained street ROW and 11 city parks
- Planting sites were identified as small, medium and large

Data fields:

<table>
<thead>
<tr>
<th>Location (Address)</th>
<th>Primary Maintenance Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>GIS X and Y</td>
<td>Defects</td>
</tr>
<tr>
<td>Species</td>
<td>Risk Rating</td>
</tr>
<tr>
<td>Diameter at Breast Height (DBH)</td>
<td>Further Inspect</td>
</tr>
<tr>
<td>Multi-Stem</td>
<td>Overhead Utilities</td>
</tr>
<tr>
<td>Tree Condition</td>
<td>Tree Grate</td>
</tr>
</tbody>
</table>

Data collection: February to August 2019
24,371 Total sites

- 19,013 Trees
- 4,417 Plantings sites
- 741 Stumps
- Stocking Level 77%

Types of Sites

- Trees 78%
- Planting Sites 19%
- Stumps 3%

1994 Inventory
10,522 Street Trees

2019 Inventory
17,541 Street Trees

Differences
Trees 7,019
Stocking Level -14%
168 species representing 63 genera
2019 maple represents 24%
1994 maple represented 30%
Tree Condition

- Healthy population of Fair and Good condition trees make up 92% of all trees
- Poor and Dead make up 8%

1994 Inventory
Healthy population 87%

Difference
Healthier by 13%

Number of Trees

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>8,022</td>
</tr>
<tr>
<td>Fair</td>
<td>9,522</td>
</tr>
<tr>
<td>Poor</td>
<td>1,170</td>
</tr>
<tr>
<td>Dead</td>
<td>299</td>
</tr>
</tbody>
</table>
## Maintenance Needs

<table>
<thead>
<tr>
<th>Category</th>
<th>Number of Trees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Removal</td>
<td>1,302</td>
</tr>
<tr>
<td>Prune</td>
<td>2,881</td>
</tr>
<tr>
<td>Discretionary Prune</td>
<td>8,833</td>
</tr>
<tr>
<td>Training Prune</td>
<td>5,997</td>
</tr>
<tr>
<td>Large-growing Planting</td>
<td>1,428</td>
</tr>
<tr>
<td>Medium-growing Planting</td>
<td>454</td>
</tr>
<tr>
<td>Small-growing Planting</td>
<td>2,735</td>
</tr>
</tbody>
</table>
City-Managed Public Tree Benefits

Total Annual Benefit $968,823
Benefit per capita $11
Benefit per tree $51
TreeKeeper Software

Bloomington uses Davey’s TreeKeeper software; data was delivered in TreeKeeper, ESRI, and Excel.
Land cover included in the urban tree canopy assessment:

- Tree canopy, impervious surface, pervious surface, bare soil, and open water
- 15,000 acres citywide
- Plantable spaces were identified and ranked by priority

Results:

<table>
<thead>
<tr>
<th>Land Cover</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree canopy</td>
<td>5,735</td>
</tr>
<tr>
<td>Impervious surface</td>
<td>5,064</td>
</tr>
<tr>
<td>Pervious surface</td>
<td>3,641</td>
</tr>
<tr>
<td>Bare soil</td>
<td>435</td>
</tr>
<tr>
<td>Open water</td>
<td>125</td>
</tr>
</tbody>
</table>

Data collection: 2018 National Agricultural Imagery Program (NAIP) leaf-on, multispectral imagery acquired and processed by the United States Department of Agriculture (USDA)
Land Cover and Prioritized Plantable Space

Bloomington, IN
Land Cover Classification

Bloomington, IN
Priority Planting Levels

Land Cover Classes
- Tree Canopy
- Impervious Surfaces
- Bare Soil
- Grass/Low-Lying Vegetation
- Open Water
- City Boundary

Priority planting Levels
- Very Low
- Low
- Moderate
- High
- Very High
- City Boundary
3,338 Plantable acres

- 176 acres Very high
- 356 acres High
- 417 acres Moderate
- 455 acres Low
- 1,934 acres Very low

Maximum Tree Canopy

61%

Environmental Factors

- Open Water: 1%
- Impervious Surfaces: 34%
- Other Pervious Surfaces: 5%
- Platable Space: 22%
- Exiting Canopy: 38%
Tree Canopy Change over 50 years

City of Bloomington Tree Canopy Change

City of Bloomington Tree Canopy Projected Change over 10 Years (1.6%)

City of Bloomington Tree Canopy Projected Change over 20 Years (0.6%)
Tree Canopy Change
Canopy Condition

- Healthy population of Fair and Good condition trees make up 74% of all trees
- Poor and Dead make up 24%

<table>
<thead>
<tr>
<th>Number of Acres</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Good</td>
<td>423</td>
</tr>
<tr>
<td>Good</td>
<td>1,840</td>
</tr>
<tr>
<td>Fair</td>
<td>2,007</td>
</tr>
<tr>
<td>Poor</td>
<td>1,081</td>
</tr>
<tr>
<td>Dead/Dying</td>
<td>295</td>
</tr>
<tr>
<td>Shadow/Not</td>
<td>90</td>
</tr>
<tr>
<td>Classified</td>
<td></td>
</tr>
</tbody>
</table>
Other Analyses

- Geographic units: census tracts, city-owned parcels, citywide, council districts, Indiana University campus, neighborhood associations, parks, watersheds, and zoning.

  Neighborhoods with most tree canopy percentage: Bittner Woods, South Griffy, and Woodlands-Winding Brook

  Neighborhoods with most tree canopy acreage: Elm Heights, Covenanter, Sherwoods Oaks

  Neighborhoods with most positive change in tree canopy percentage: Autumn View, Southern Pines, Highland Village

- Urban Tree Resource Analysis and Cost Estimator (UTRACE) tool, utilizes the land cover assessment data to estimate the number of trees required and costs to increase and maintain the newly planted tree canopy.

  2% CANOPY INCREASE = 10,841 TREES for COST OF $4,770,016

  Zoning Types with most trees to be planted: Institutional, Planned Unit Development, and Residential Core
Other Analyses - Socio-Demographic and Economic Analyses

Bloomington, IN
Canopy Percent by Zoning Areas

Bloomington, IN
Population Density by Census Tract
Urban Tree Canopy Benefits

- Total Benefit $54,994,625
- Total Annual Benefit $1,931,950
- Aesthetic and Other Benefits $19,688,555
- Stored Carbon Benefit $33,374,120
TreeKeeper Software

Bloomington’s prioritized planting plan is on TreeKeeper; assessment deliverables in ESRI with projection and metadata and supporting analyses are in Excel with few Maps in jpeg and PDF formats.
Bloomington Storymap

ABOUT THIS STORYMAP

This is Davey Resource Group's customizable cascading Template.
All colors and images are customizable.
There are a variety of basemap options displayed here, and the styling and colors of the map may be customizable as well.
Summary and Next Steps

• Create a 5 to 7 year public tree management plan to develop a strategies for improving genus and species diversity, manage for maturing/mature tree population, and maximize public benefit through planting and building resiliency.

• Prune young trees now to improve structure encouraging better from as they age. Theoretically, this is a cost saver down the road.

• Use TreeKeeper to keep the inventory up-to-date as work is performed, budget for partial re-inventory every year to continually measure progress and adjust, and tree preservation and landscape plans.

• Review and revise as necessary the tree ordinance, adjust tree preservation and landscape ordinance, and refine other policies.

• Consider tree canopy goal establishment and an urban forest master plan to bring the community together in achieving the same goal and building equity.
Thank you for working with Davey Resource Group!

QUESTIONS?

Aren Flint, Senior Associate Consultant
Aren.Flint@Davey.com
765-430-9020