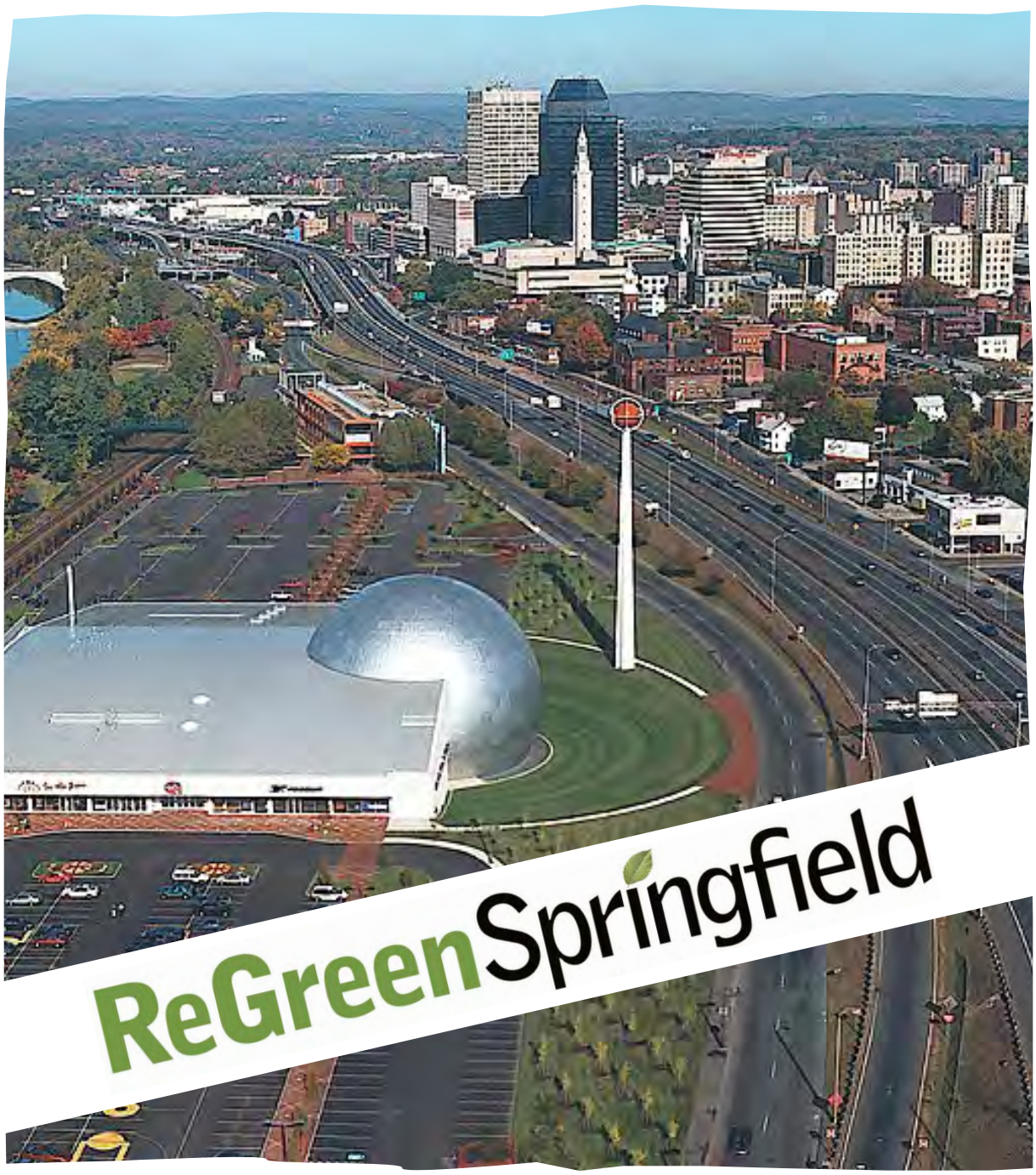
Regreen Springfield in partnership with the US Forest Service:

i-Tree Canopy Assessment

of Springfield, Massachusetts **August 2014**



Prepared August 2014
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i-Tree Tools for Analysis

About this Study

The tree canopy cover in Springfield, Massachusetts was examined in this study, undertaken by the US Forest Service, in partnership with Regreen Springfield, utilized i-Tree Canopy, part of a software suite of urban forest analysis tools developed by the Forest Service. This analysis, completed in August, 2014 provides the City Forestry Division with a baseline measure of Springfield's tree canopy, as it moves toward establishing tree canopy goals for the next decade.

i-Tree Software Toolkit

i-Tree is a state-of-the-art, peer-reviewed software suite from the US Forest Service that provides urban and community forestry analysis and benefits assessment tools. The i-Tree tools help communities of all sizes to strengthen their urban forest management and advocacy efforts by quantifying the environmental services that trees provide and the structure of the urban forest.

i-Tree has been used by communities, non-profit organizations, consultants, volunteers, and students to report on the urban forest at all scales from individual trees, parcels, neighborhoods, cities, to entire states. By understanding the local, tangible ecosystem services that trees provide, i-Tree users can link urban forest management activities with environmental quality and community livability. Whether your interest is a single tree or an entire forest, i-Tree provides baseline data that you can use to demonstrate value and set priorities for more effective decision-making.

i-Tree Canopy

This i-Tree tool offers a quick and easy way to produce a statistically valid estimate of land cover types (e.g., tree cover) using aerial images available in Google Maps. Canopy can be used by urban forest managers to estimate tree canopy cover, set canopy goals and monitor canopy change over time. Canopy can also be used to estimate inputs for use in i-Tree Hydro and elsewhere where land cover data are needed.

Tree Canopy Goals

Tree canopy is the layer of leaves, branches, and stems of trees that cover the ground when viewed above. Tree canopy provides many benefits to communities by improving water quality, saving energy, lowering city temperatures, reducing air pollution, enhancing property value, providing wildlife habitat, facilitating social and educational opportunities and providing aesthetic benefits. Establishing a tree canopy goal is crucial aesthetic benefits. Establishing a tree canopy goal is is crucial for communities seeking to improve their green infrastructure and environment quality. A tree canopy assessment is the first step in this goal setting process, providing estimates for the amount of tree canopy currently present in a city as well as the amount of tree canopy that could theoretically be established.

Regreen Springfield in partnership with the US Forest Service:

iTree Canopy Assessment

Springfield, MA - By Canopy Cover %

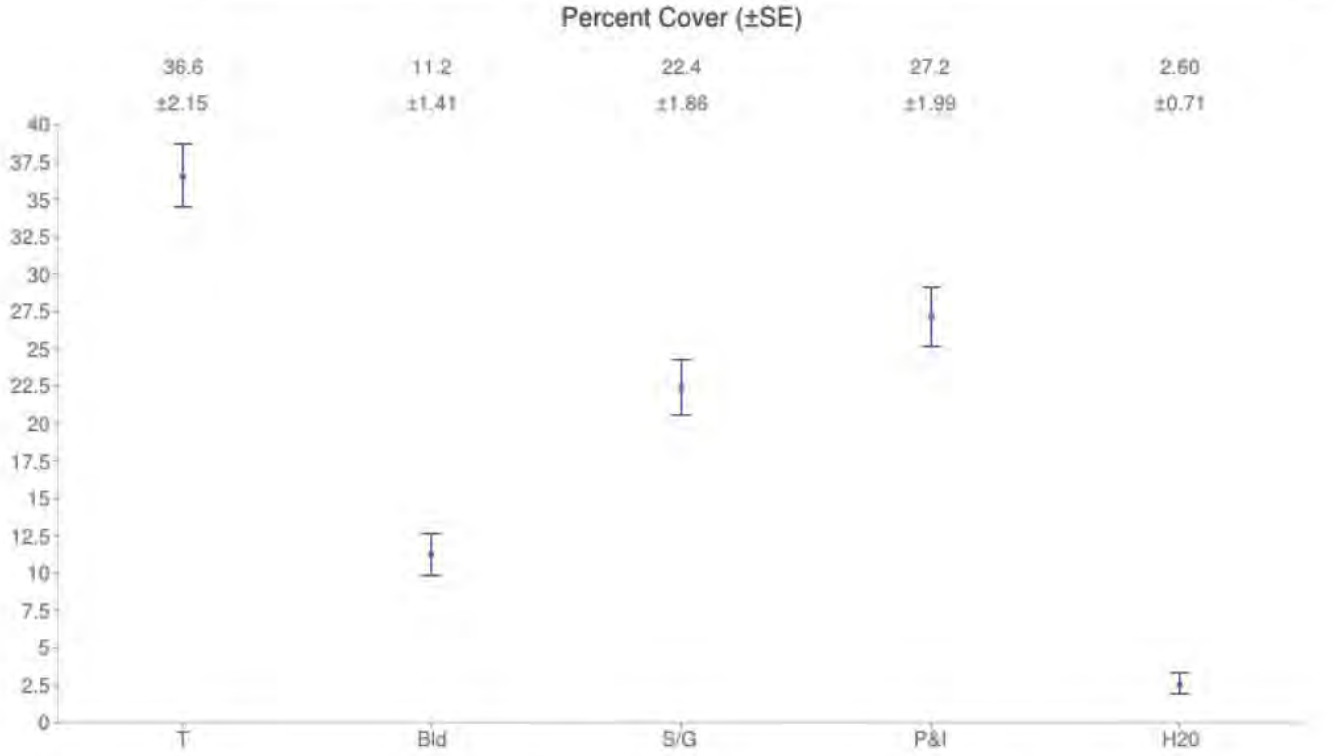
i-Tree

Tools for Assessing and Managing
Community Forests

i-Tree Canopy v 6.1

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 8/15/14



Cover Class	Description	Abbr.	Points	% Cover
Tree	Tree, non-shrub	T	183	36.6 ±2.15
Building	Building	Bld	56	11.2 ±1.41
Shrub/Grass	Shrub & Grass	S/G	112	22.4 ±1.86
Paving and Impervious	Any impervious material	P&I	136	27.2 ±1.99
Water	Pond, stream, river	H20	13	2.60 ±0.71

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iTree Canopy Assessment

Springfield, MA - By Canopy Cover Area (Sq. Mi.)

i-Tree

Tools for Assessing and Managing
Community Forests

i-Tree Canopy v6.1

Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 8/15/14

Cover Class	Description	Abbr.	Points	Land Cover
Tree	Tree, non-shrub	T	183	11.9 ±0.70
Building	Building	Bld	56	3.64 ±0.46
Shrub/Grass	Shrub & Grass	S/G	112	7.27 ±0.61
Paving and Impervious	Any impervious material	P&I	136	8.83 ±0.65
Water	Pond, stream, river	H20	13	0.84 ±0.23

Regreen Springfield in partnership with the US Forest Service:

iTree Canopy Assessment

Springfield, MA - Tree Benefit Estimates

Tree Benefit Estimates

Abbr.	Benefit Description	Value	±SE	Amount	±SE
CO	Carbon Monoxide removed annually	$291.63	±17.17	3.44 T	±0.20
NO2	Nitrogen Dioxide removed annually	$502.07	±29.55	18.76 T	±1.10
O3	Ozone removed annually	$26,146.82	±1,539.00	186.80 T	±11.00
PM2.5	Particulate Matter less than 2.5 microns removed annually	$54,050.26	±3,181.39	9.08 T	±0.53
SO2	Sulfur Dioxide removed annually	$87.75	±5.17	11.82 T	±0.70
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$18,981.92	±1,117.27	62.57 T	±3.68
CO2seq	Carbon Dioxide sequestered annually in trees	$736,510.72	±43,350.90	38,036.35 T	±2,238.81
CO2stor	Carbon Dioxide stored in trees (Note: this benefit is not an annual rate)	$18,569,729.63	±1,093,011.33	959,014.93 T	±56,447.47

i-Tree Canopy Annual Tree Benefit Estimates based on these values in lbs/acre/yr and $/T/yr: CO 0.902 @ $85.08 | NO2 4.917 @ $26.86 | O3 48.968 @ $140.47 | PM2.5 2.379 @ $5,975.67 | SO2 3.098 @ $7.45 | PM10 16.403 @ $304.43 | CO2seq 9,970.817 @ $19.43 | CO2stor is a total biomass amount of 251,395.359 @ $19.43*

Note: Standard errors of removal amounts and benefits were calculated based on standard errors of sampled and classified points.

About i-Tree Canopy

The concept and prototype of this program were developed by David J. Nowak, Jeffery T. Walton and Eric J. Greenfield (USDA Forest Service). The current version of this program was developed and adapted to i-Tree by David Ellingsworth, Mike Binkley, and Scott Maco (The Davey Tree Expert Company).

Limitations of i-Tree Canopy

The accuracy of the analysis depends upon the ability of the user to correctly classify each point into its correct class. As the number of points increase, the precision of the estimate will increase as the standard error of the estimate will decrease. If too few points are classified, the standard error will be too high to have any real certainty of the estimate.

A Cooperative Initiative Between:

DAVEY Arbor Day Foundation SMA ISA Casey Trees

www.itreetools.org

Finding Additional Resources on Urban Tree Canopy Cover

The following links provide useful information on Urban Tree Canopy (UTC) assessments and how they can help you analyze trees in your community —

i-Tree Canopy Software Toolkit
www.itreetools.org/canopy

US Forest Service UTC Homepage
http://www.nrs.fs.fed.us/urban/utc/

University of Vermont
www.itreetools.org/canopy

National Association of State Foresters
http://www.stateforesters.org/urban_forest_canopy_cover_primer

UTC video from US Forest Service
http://www.nrs.fs.fed.us/urban/utc/about/

UTC Bibliography from US Forest Service
http://www.nrs.fs.fed.us/urban/utc/pubs/

ReGreenSpringfield

www.regreenspringfield.org

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http://www.flickr.com/photos/mick3b1g/5707871657/