COMPUTER PROGRAMS THAT AID IN URBAN FOREST MANAGEMENT

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Horticulture Dayz!

March 7, 2016

Front Royal, VA

VirginiaTech
College of Natural Resources and Environment

Virginia Cooperative Extension
Virginia Tech • Virginia State University

OVERVIEW

BACKGROUND

ASSESS

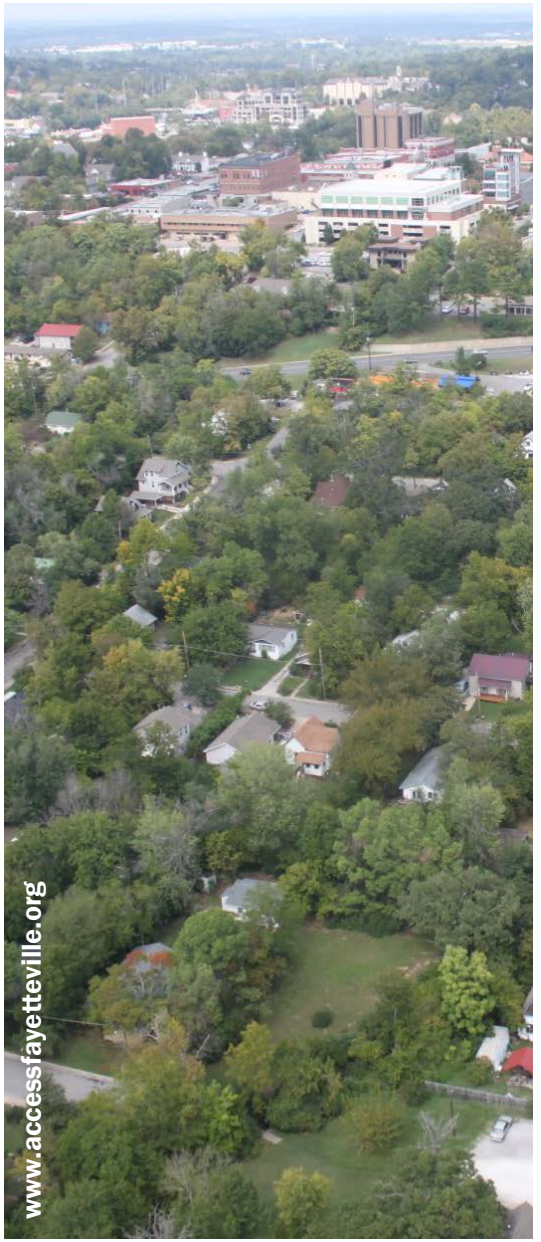
PLAN

MANAGE

TAKE HOME

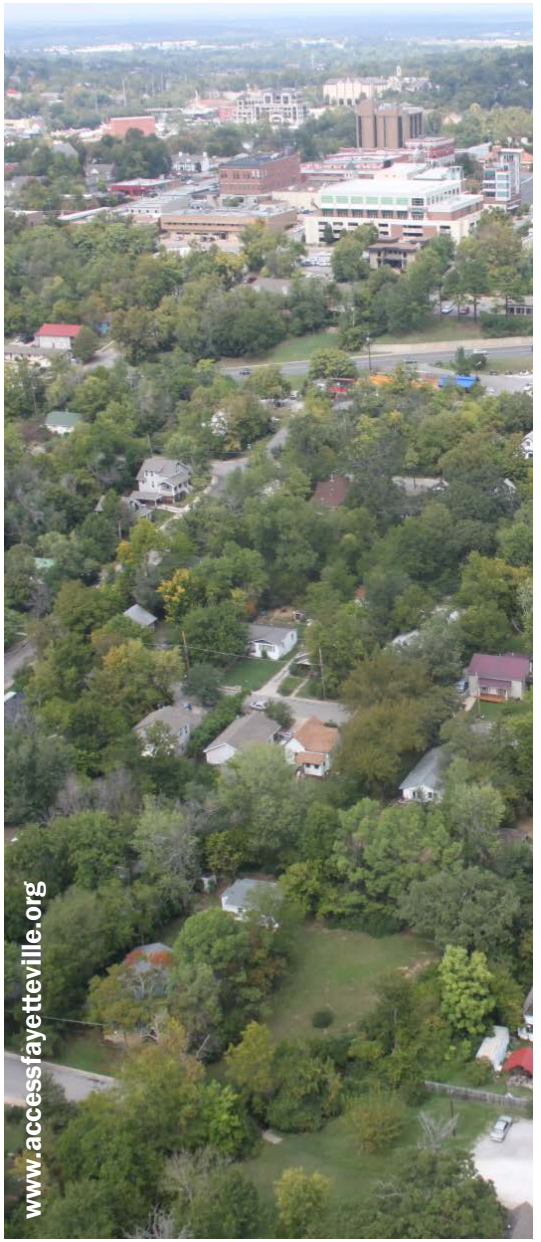
PRESENTATION OVERVIEW

- Why we need technology in urban forestry and how we use it
- Technology for urban forest assessment
- Technology for urban forest planning and design
- Technology out in the field
- Feedback on how you use technology



WHY WE NEED TECHNOLOGY

- Urban forests are complex
- Urban forestry is complex
- Technology facilitates analysis and evaluation
- Technology facilitates decision-making and planning
- Technology facilitates communication and record-keeping



HOW WE USE TECHNOLOGY

Urban Forest Assessment

- Tree inventory
- Tree canopy analysis
- Tree benefits calculation

Urban Forest Planning

- Tree species selection
- Tree landscape placement
- Tree cover prioritization

Urban Forest Management

- Tree and pest identification
- Tree disorder diagnosis
- Tree risk evaluation

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OVERVIEW

BACKGROUND

ASSESS

PLAN

MANAGE

TAKE HOME

i-Tree

Tools for Assessing and Managing Community Forests

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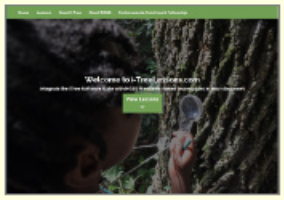
Introducing i-Tree Landscape

Learn more about Landscape

Learn about i-Tree Lessons



Valuing London's Urban Forest

What is i-Tree?

i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban 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 structure of community trees and the environmental services that trees provide.

Since the initial release of the i-Tree Tools in August 2006, numerous communities, non-profit organizations, consultants, volunteers and students have used i-Tree to report on individual trees, parcels, neighborhoods, cities, and even 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 Tools are in the public domain and are freely accessible. We invite

What's New?

i-Tree Landscape (beta) now available
Explore the newest online assessment tool now>>

Grand Rapids, MI uses i-Tree Hydro to assess value of urban forestry initiative
Plan-it Geo Report>>

London i-Tree Results Highlight Value of Urban Trees
An Institute of Chartered Foresters article

London is a forest - who knew?
Article appearing in The Guardian>>

The National Ten-Year Urban

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i-Tree
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OVERVIEW

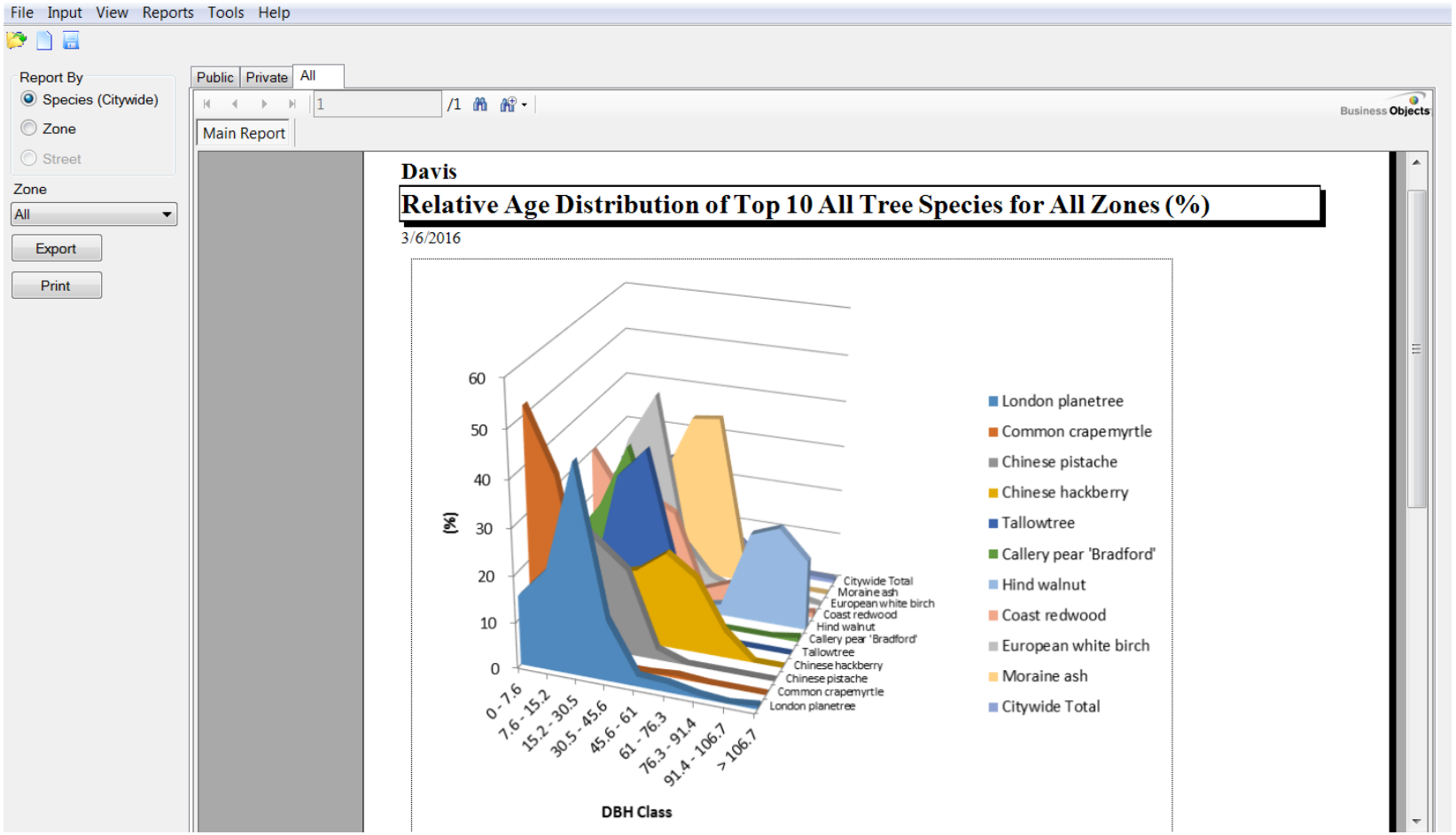
BACKGROUND

ASSESS

PLAN

MANAGE

TAKE HOME



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URBAN FOREST ASSESSMENT

OVERVIEW
BACKGROUND
ASSESS
PLAN
MANAGE
TAKE HOME

File Edit View Reports Tools Help

Result View

Export CSV Metric English

1/3

Percent of Tree Population in Adrian by DBH Class

Series: Adrian_2012, Time Period: 2012

DBH	0 - 3		3 - 6		6 - 9		9 - 12		12 - 15		15 - 18		18 - 21		21 - 24	
Species	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Sugar maple	48.10	4.67	22.60	1.76	13.30	1.46	7.50	1.70	3.90	2.16	0.70	0.00			1.60	1.46
American elm	58.70	9.13	22.20	3.44	12.10	3.69	1.30	1.44	2.70	1.77					1.60	1.82
Green ash	63.70	4.15	4.90	1.50	12.80	2.79	10.90	2.83	3.20	1.39			1.50	0.00	1.60	1.48
Boxelder	30.30	7.17	28.40	5.43	17.60	3.82	10.60	2.92	8.20	3.43	1.60	1.47	3.30	1.47		
Black cherry	20.80	2.53	31.00	5.34	26.20	4.00	13.60	1.89	6.80	2.57	1.60	1.71				
Norway maple	41.80	16.08	11.60	3.66	9.30	3.23	2.30	2.26	9.40	5.86	4.70	3.54	4.60	3.68	7.00	4.40
Eastern hophornbeam	36.30	4.90	41.90	7.25	8.20	3.48	5.30	0.00	5.50	3.48	2.80	0.91				
Silver maple	17.30	5.18	41.50	10.51	8.30	4.21	2.80	2.97	2.80	3.06	5.60	3.76			5.10	3.06
Black walnut	22.30	7.97	11.20	4.59	5.60	3.21	8.30	3.00	14.50	6.47	24.30	3.99	5.60	3.21	2.80	2.37
White ash	66.80	7.99	21.10	5.50	0.10	0.00			6.00	4.87			3.00	3.19		
Red maple	29.10	9.22	28.80	8.13	12.90	5.83	6.60	4.62	6.60	2.51	3.20	3.35	9.60	5.89		
Black ash	36.80	2.58	33.90	7.95	3.40	2.82	14.00	2.89	3.60	4.87	4.20	3.44	4.20	3.44		
Northern hackberry	63.80	5.18	10.80	2.45	0.10	0.00	8.90	0.00	8.90	0.00	3.70	3.47			3.70	3.47
Northern red oak	3.90	2.28	29.80	9.55	10.40	1.86	17.70	7.04	26.70	5.24	0.10	0.00	7.60	4.43	3.80	1.86
Northern white cedar	30.80	6.84	30.80	9.13	34.60	3.74	3.80	4.38								
Red mulberry	33.90	3.30	24.80	1.55	8.30	0.00	17.30	0.00	8.20	1.55	3.50	0.00				
Swamp white oak	27.60	7.88	27.80	8.31	11.40	4.37	12.00	5.79	4.30	4.69	8.50	4.15			4.30	2.08
American hornbeam	84.40	0.00	15.60	0.00												
Eastern cottonwood			10.10	2.04	15.10	3.06	15.10	3.06	11.10	1.02	20.30	4.08	5.00	1.02	6.10	0.00
Ohio buckeye	63.30	0.65	24.10	2.59	6.80	0.00	5.80	1.94								
American basswood	11.80	6.43	41.00	6.18	23.20	2.74	5.80	1.37	12.00	3.31			6.00	6.28		
Norway spruce					5.80	5.24	20.00	5.24	27.00	5.24	21.20	0.00	13.10	5.24	7.10	0.00
Siberian elm	25.80	1.55	5.40	0.77	5.40	0.77	22.30	7.77	5.40	0.77	10.70	1.55	6.20	5.57		
Blue spruce	46.20	20.62			15.40	14.25	7.70	7.74			15.40	10.98	7.70	7.74	7.70	7.74
Black locust	1.50	0.00	11.00	0.00	9.70	0.00					9.70	0.00	50.00	0.00		
Tree of heaven	58.30	25.24					8.30	8.13	25.00	22.13						
Hardwood	18.60	13.18	44.60	5.38	9.00	0.00	27.90	9.32								
Flowering dogwood	90.30	0.00			9.70	0.00										
Bitternut hickory	48.50	23.28	10.40	7.76	30.80	11.98	10.40	7.76								
Callery pear			33.30	12.19	25.00	18.04			41.70	13.29						
Balsam poplar					12.50	0.00	25.00	0.00	62.50	0.00						
Honeylocust	12.90	9.38	25.00	12.89			12.50	10.87			24.60	14.01				

URBAN FOREST ASSESSMENT

plan-it GEO

A geospatial technology firm specializing in urban forestry, planning, and natural resources.

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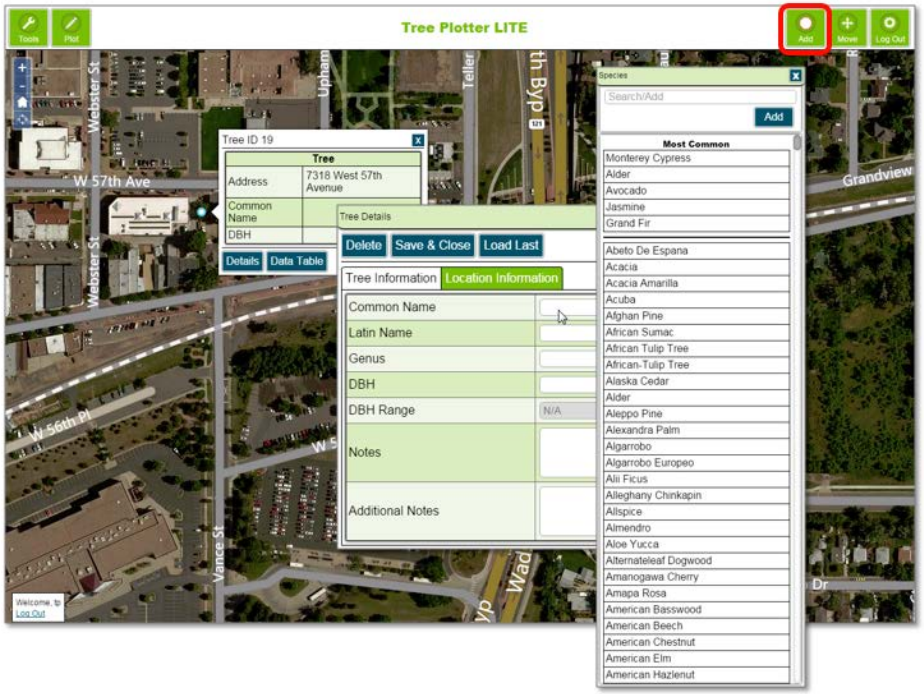
Tree Plotter LITE©

Tree Plotter LITE© is Plan-It Geo's free web-based tree inventory software that allows users to map and track trees online and then export the data into a local desktop application. In the free version, anyone can map and inventory new, existing, or proposed trees without a GPS! A tree's X/Y location is created when you map it using one of the tree template features.

Launch Plotter LITE

Plotter vs. Plotter LITE

Tree Plotter



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OVERVIEW

BACKGROUND

ASSESS

PLAN

MANAGE

TAKE HOME

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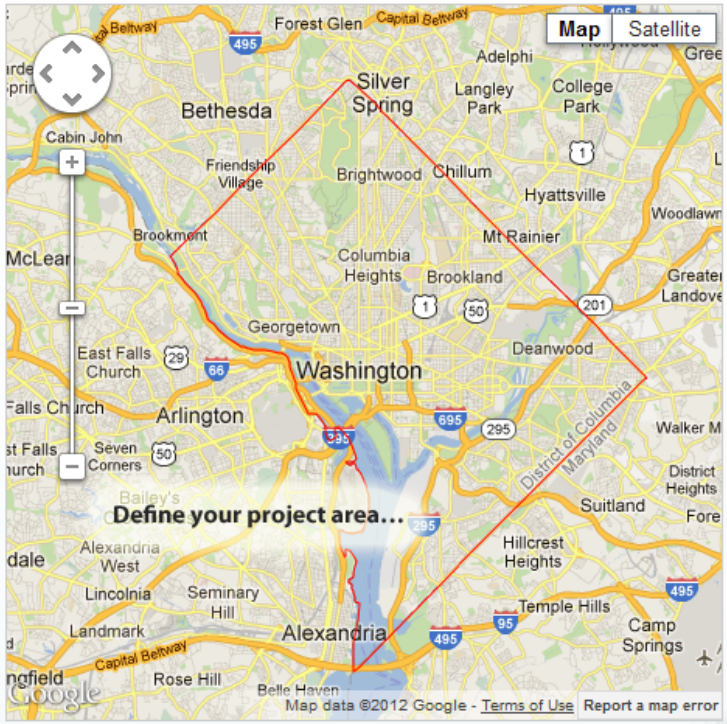

- With i-Tree Canopy, you review Google Maps aerial photography at random points to conduct a cover assessment within a defined project area.
- You draw your project area boundaries right onto Google Maps or you load an ESRI polygon shapefile in *latitude / longitude coordinates*.
- i-Tree Canopy randomly generates sample points and zooms to each one so you can choose from your pre-defined list of cover types for that spot.
- 500-1000 survey points are suggested; the more points you complete, the better your cover estimate for your study area.
- If estimating tree cover, tree benefits can also be estimated.
- Recommended web browsers: Mozilla Firefox or Google Chrome
- Learn how i-Tree Canopy works.

i-Tree Canopy v6.1

Estimate tree cover and tree benefits for a given area with a random sampling process that lets you easily classify ground cover types.

Start using i-Tree Canopy:

Step 1 Load ESRI Shapefile ? **or** Define Project Area › ?

Step 2 Configure and Begin Your Survey › ?

Been here before?

Already started an i-Tree Canopy survey?
Load it here and resume your work.

Load Previous i-Tree Canopy Survey ?

Want to compare a completed i-Tree Canopy project to Google Earth historical imagery?

Load Previous i-Tree Canopy Project for Change Survey ?

Would you like to learn more?

Video Learning Resources | Try Our Sample Project ›

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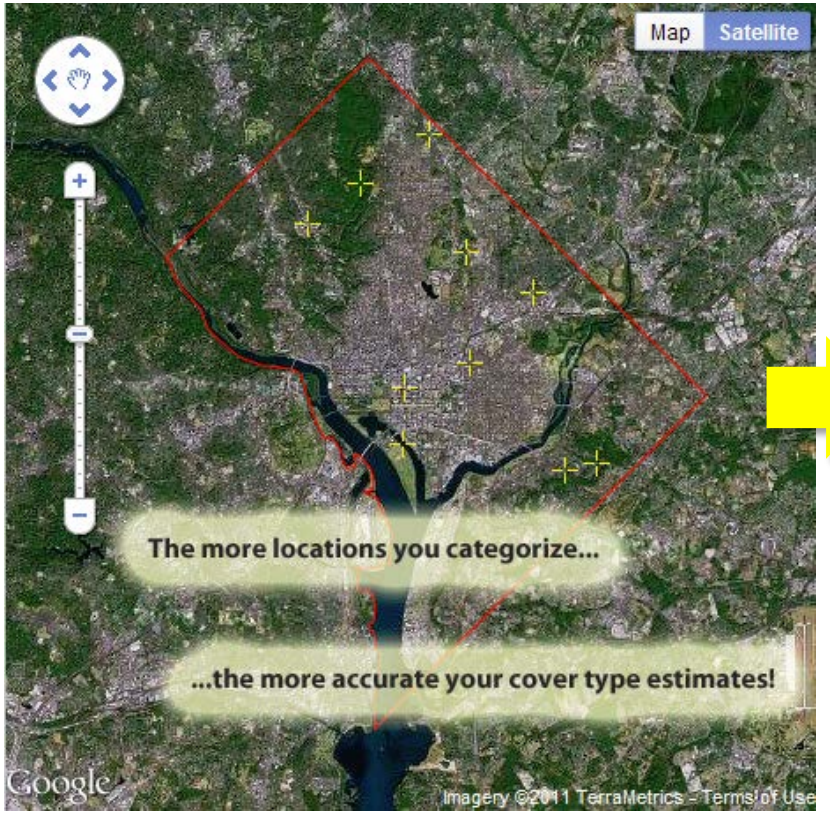

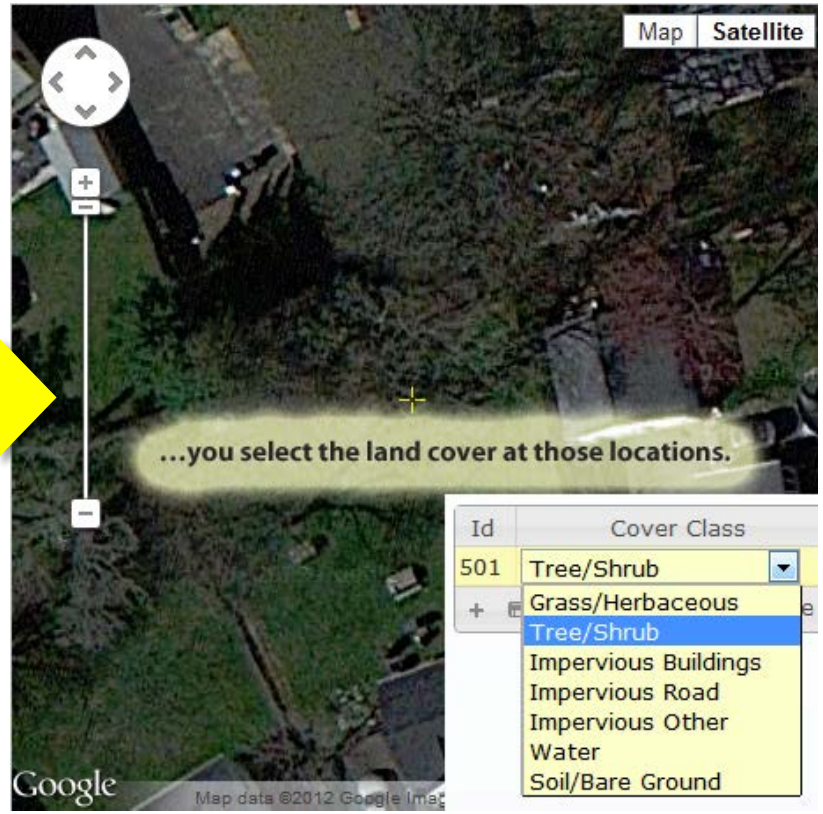

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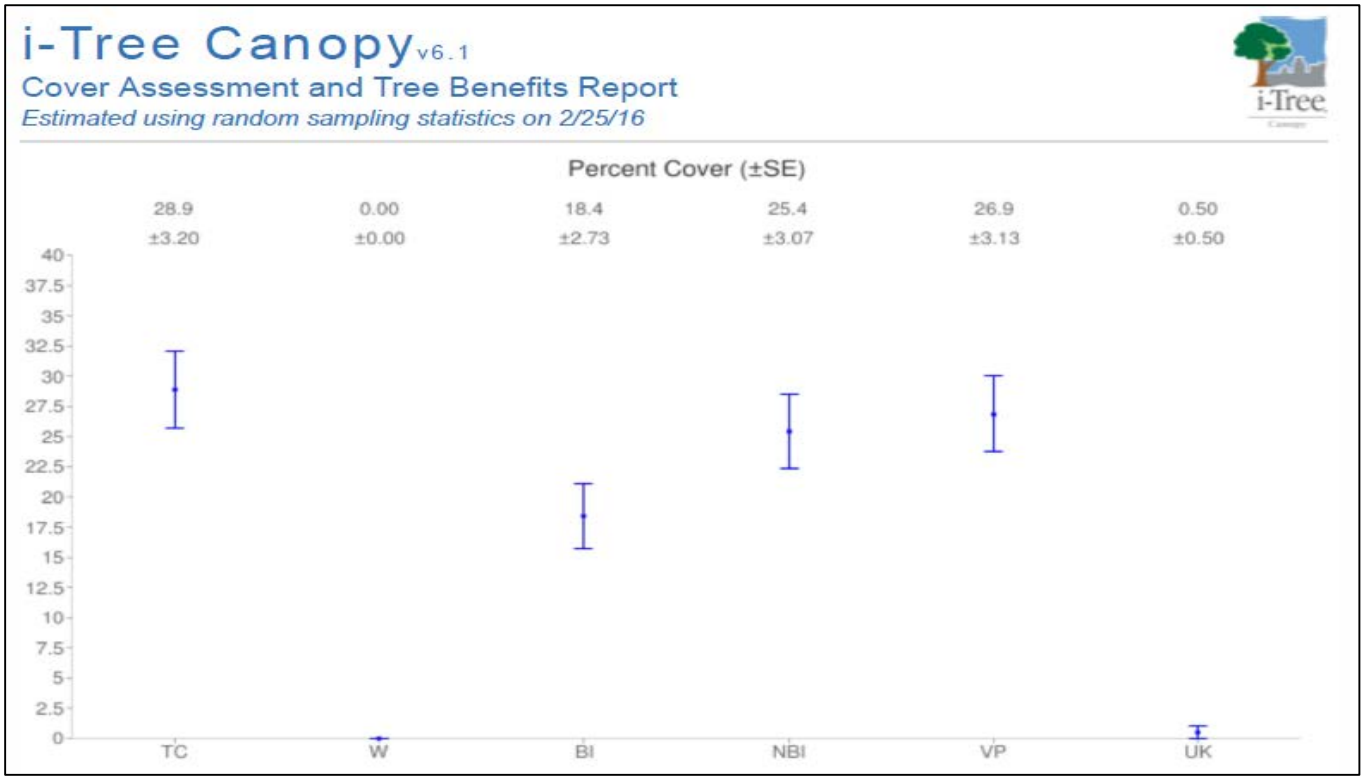


Tree Benefit Estimates

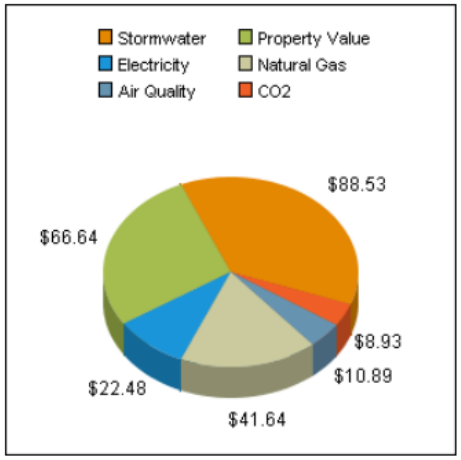
Abbr.	Benefit Description	Value	±SE	Amount	±SE
CO	Carbon Monoxide removed annually	$63.12	±6.99	95.01 lb	±10.52
NO2	Nitrogen Dioxide removed annually	$82.38	±9.12	736.24 lb	±81.54
O3	Ozone removed annually	$3,040.87	±336.79	2.03 T	±0.23
PM2.5	Particulate Matter less than 2.5 microns removed annually	$8,555.16	±947.51	270.23 lb	±29.93
SO2	Sulfur Dioxide removed annually	$3.99	±0.44	91.62 lb	±10.15
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$3,150.76	±348.96	1,008.84 lb	±111.73
CO2seq	Carbon Dioxide sequestered annually in trees	$20,856.51	±2,309.92	576.43 T	±63.84
CO2stor	Carbon Dioxide stored in trees (Note: this benefit is not an annual rate)	$474,573.35	±52,560.48	13,114.66 T	±1,452.49

URBAN FOREST ASSESSMENT

National Tree Benefit Calculator

Beta

Overal Benefits | Storm Water | Property Value | Energy | Air Quality | CO2 | About the Model



Breakdown of your tree's benefits
Click on one of the tabs above for more detail

This **24 inch White oak** provides overall benefits of: $239 every year.

While some functional benefits of trees are well documented, others are difficult to quantify (e.g., human social and communal health). Trees' specific geography, climate, and interactions with humans and infrastructure is highly variable and makes precise calculations that much more difficult. Given these complexities, the results presented here should be considered initial approximations—a general accounting of the benefits produced by urban street-side plantings.

Benefits of trees do not account for the costs associated with trees' long-term care and maintenance.

If this tree is cared for and grows to 29 inches, it will provide $291 in annual benefits.

White oak
Quercus alba

Casey Trees WASHINGTON DC

The National Tree Benefit Calculator was conceived and developed by Casey Trees and Davey Tree Expert Co.

DAVEY

URBAN FOREST PLANNING

OVERVIEW

BACKGROUND

ASSESS

PLAN

MANAGE

TAKE HOME

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Woody Plants Database

HORT/LA 49

Home | Search Species | Special Collections | Course Plant Walks | Help

Search Species

Botanical Name

Common Name

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Ornamental Characteristics

Size

- Tree > 30 feet
- Tree < 30 feet
- Shrub > 8 feet
- Shrub 4 to 8 feet
- Shrub < 4 feet
- Groundcover
- Vine

Leaves

- Deciduous
- Evergreen
- Either

Other

Bare Root Transplanting

- Easy

Environmental Characteristics

Light

- Full sun
- Part shade
- Shade

Hardy To Zone

Any

Soil Ph

- Requires acid (pH 5.0 to 7.0)
- Can tolerate acid to neutral soil (pH 5.0 to 7.4)
- Can tolerate acid to alkaline soil (pH 5.0 to 8.0)
- Any

Salt Tolerance

- Tolerates salt spray
- Tolerates salty soil

Urban Horticulture Institute

Horticulture Section
School of Integrative Plant Science
Cornell University

URBAN FOREST PLANNING

OVERVIEW
BACKGROUND
ASSESS
PLAN
MANAGE
TAKE HOME

Urban Forest Ecosystems Institute

Skip to content

Search by Name
Search Trees by Characteristics
Search Help
About SelecTree
Right Tree Right Place
Utility Precautions
Browse securely

SelecTree: Search Trees by Characteristics

Tree Name

Tree Name Enter a tree name

Planting near power lines? See Utility Precautions.

Tree Characteristics

Max Height (ft)
Growth Rate
Tree Shape
Habit
Bark Color
Bark Texture
Armament
Branch Strength

Juniperus virginiana 'Elegantissima'

Utility friendly tree. Branches don't droop and resist breakage...

Photo by W. Mark and J. Reimer

Urban and Community Forestry

CAL POLY SAN LUIS OBISPO

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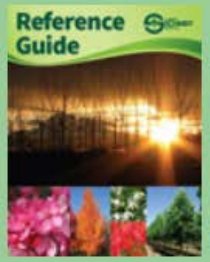
Select the right trees...



Right Tree, Right Place

Our Reference Guide is a great place to start looking for the right tree for the right place. Because of regional and local variables, choosing the best trees for your site can be challenging. Dozens of online resources present tree selection, planting and care guidelines. Some of our favorite regional and national sites are listed below.

National and International

UtiliTrees™
Our list recommends small stature, street tough and adaptable trees that are a perfect fit for under utility wires.

U.S. National Arboretum Introductions
Fact Sheets for trees developed at USNA and introduced to the nursery trade include Gold Medal and All America Selection winners.

Recommended Urban Trees
Site Assessment and Tree Selection for Stress Tolerance at Cornell University reveals that many trees developed at J. Frank Schmidt & Son

URBAN FOREST PLANNING

OVERVIEW

BACKGROUND

ASSESS

PLAN

MANAGE

TAKE HOME

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i-Tree Design v6.0*

i-Tree Design allows anyone to make a simple estimation of the benefits provided by individual trees. With inputs of location, species, tree size, and condition, users will receive an understanding of tree benefits related to greenhouse gas mitigation, air quality improvements, and stormwater interception. With the additional step of drawing a building footprint – and virtually "planting" or placing a tree – tree effects on building energy use can be evaluated.

Tree benefits are estimated for (a) the current year, (b) a user-specified forecast year sometime in the future, (c) the projected total benefits across that future timespan, and (d) the total benefits provided to date (based on estimated tree age). Multiple trees and buildings can be added to compare benefits or to provide a full accounting of a property's trees.

This tool is intended as a simple and accessible starting point for understanding the value of individual trees or a small population of trees to a community. For more detailed information on urban and community forest assessments, please explore more of the i-Tree website. To learn more about the i-Tree Design model, click here.

i-Tree Design

Enter a street address below to get started:

Go!

-or-

Load Previously Saved Project

Breakdown of your tree's benefits

URBAN FOREST PLANNING

i-Tree Design v6.0

35 Alexander Ct, Christiansburg, VA 24073, USA

Start Over
Save Progress
About

Get started with these easy steps:

1. Draw Structures ?
2. Place Trees ?

Describe your tree:

- Tree species: Redbud, Eastern
- Tree diameter: 5 Inches
  or circumference: 15.7
- Tree condition: Excellent
- Tree exposure to sunlight: Full sun

Tree benefit zones:

- The colored zones surrounding the structure, which appear as you describe your tree, illustrate the relative monetary value of energy savings that the tree would provide in each zone.
- Hover over each zone to see that energy benefit information displayed below the map.

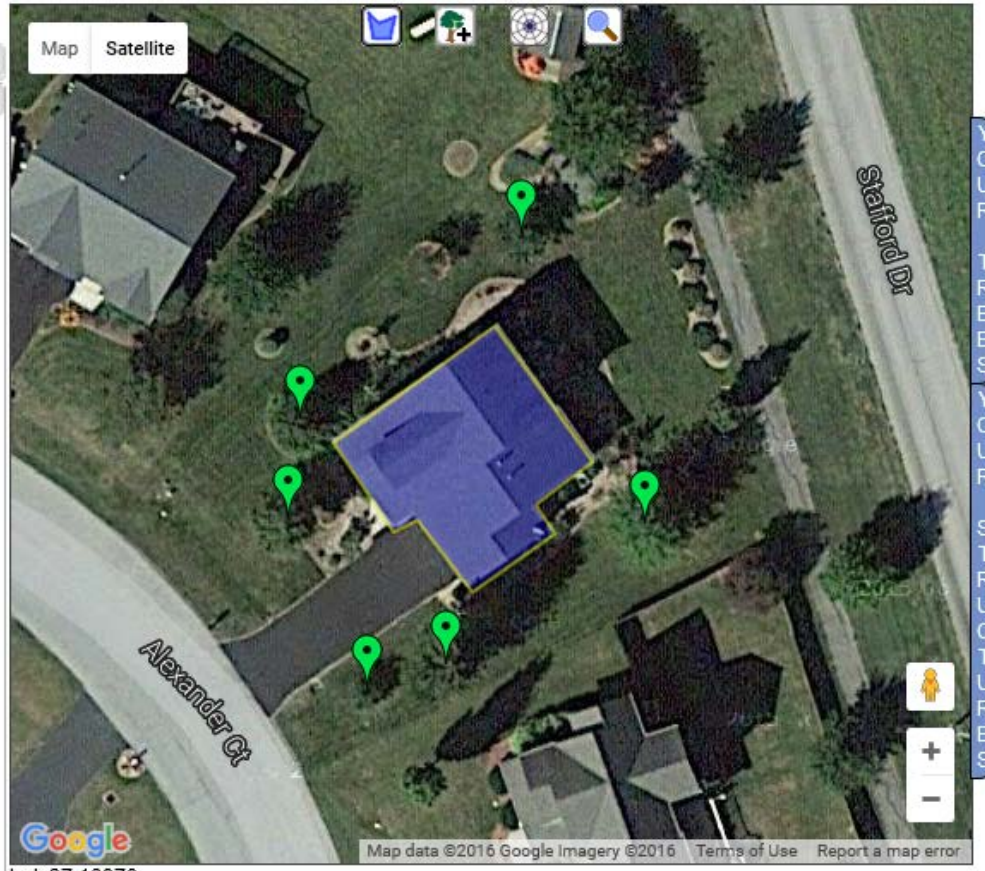
To place a tree:

- Drag this icon to the location on the map where you would like to place your tree.
- Repeat to place additional trees.
- Hover over any tree you have placed on the map to display its benefits.

Model the tree(s) future crown growth over time:

Model Crown Growth

3. Estimate Benefits ?



Lat: 37.16970
Lng: -80.43838

URBAN FOREST PLANNING

i-Tree Design v6.0

35 Alexander Ct, Christiansburg, VA 24073, USA

Start Over
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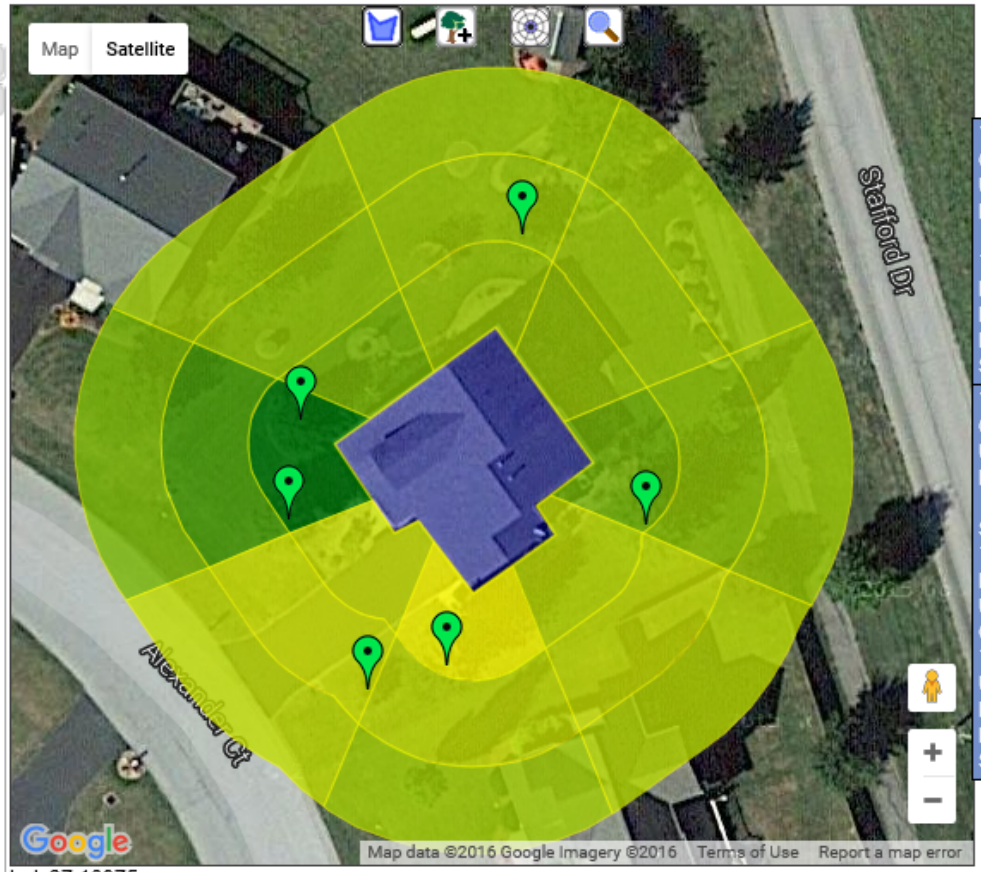


Lat: 37.16975
Lng: -80.43801

Less desirable — More desirable

Preferred planting zones to maximize tree benefits are shown around the structure.

URBAN FOREST PLANNING

OVERVIEW
BACKGROUND
ASSESS
PLAN
MANAGE
TAKE HOME

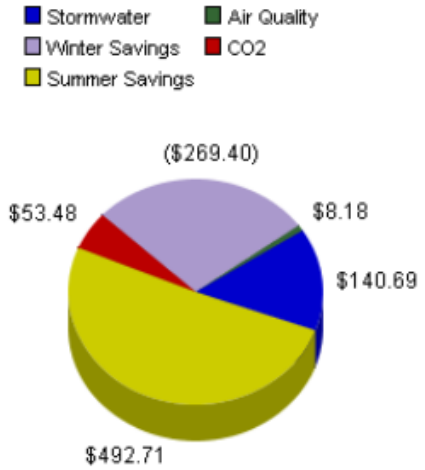
Start Over
Return to Setup
View Report
Print
Save Result
About

i-Tree Design v6.0 35 Alexander Ct, Christiansburg, VA 24073, USA

Display results for: All Trees

Overall Benefits | Stormwater | Energy | Air Quality | Carbon Dioxide

Current Year (2016) | Future Year (2036) | Total (2016-2036) | Total to Date



Breakdown of tree benefits

Click on one of the tabs above for more detail

To date, these trees have provided overall benefits of $426.

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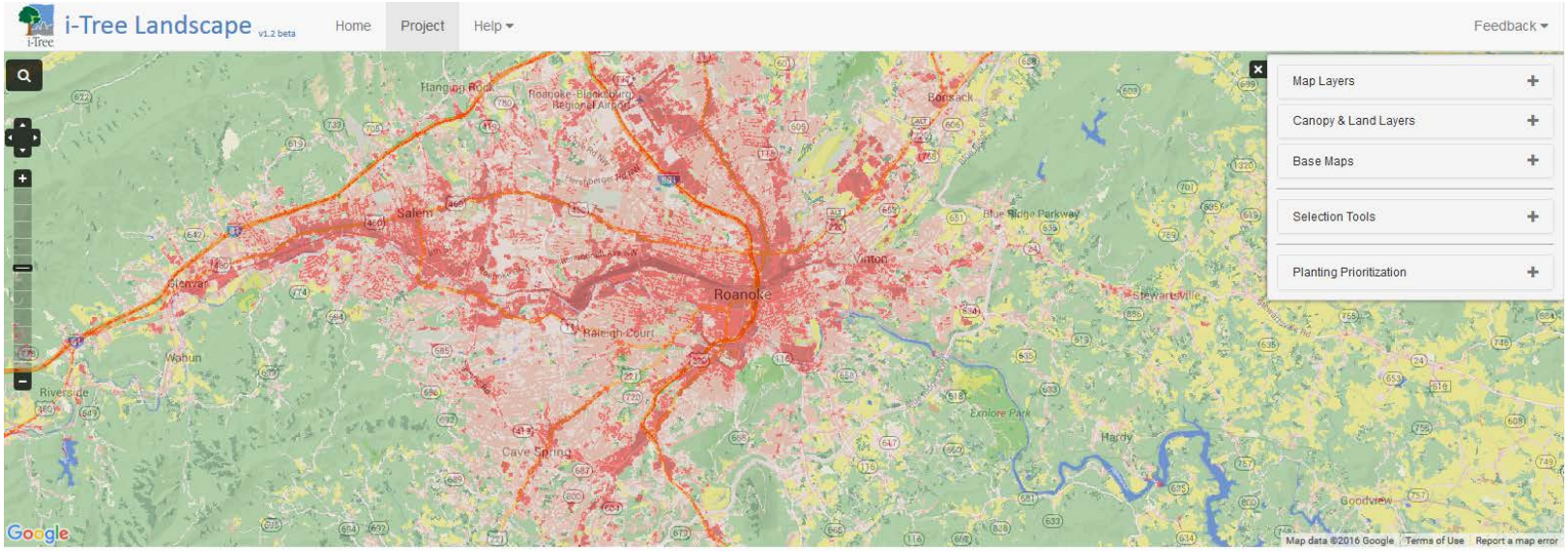
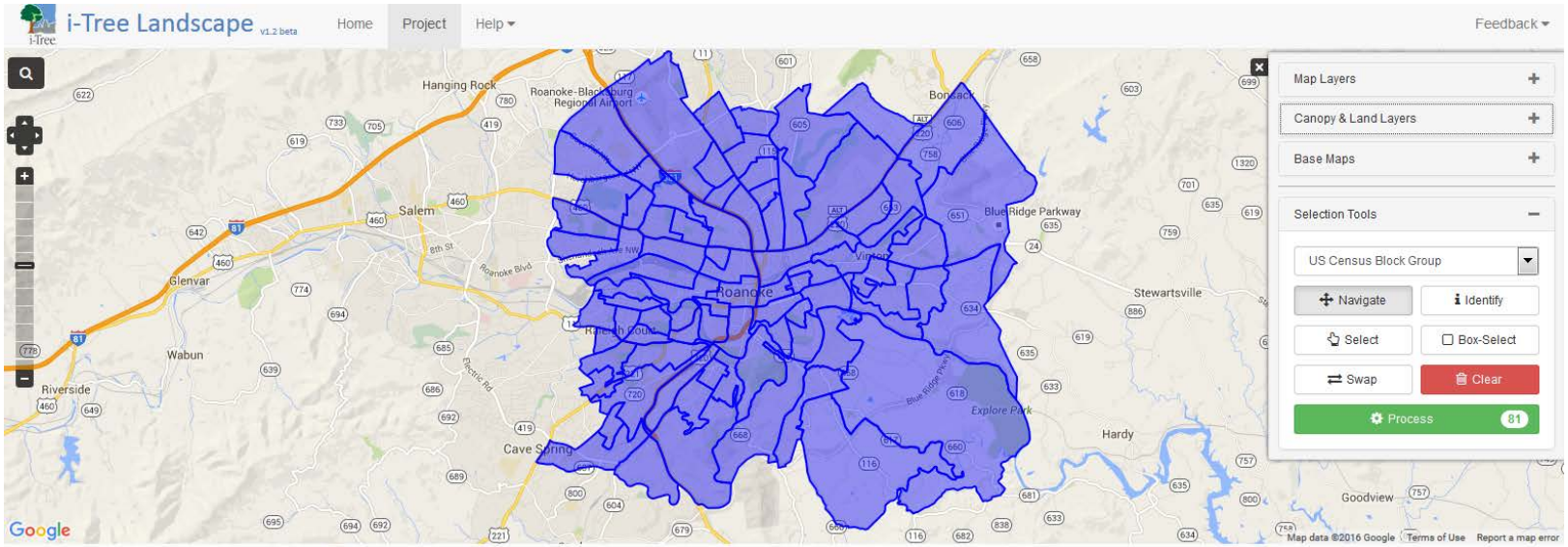
Benefits of trees do not account for the costs associated with trees' long-term care and maintenance.

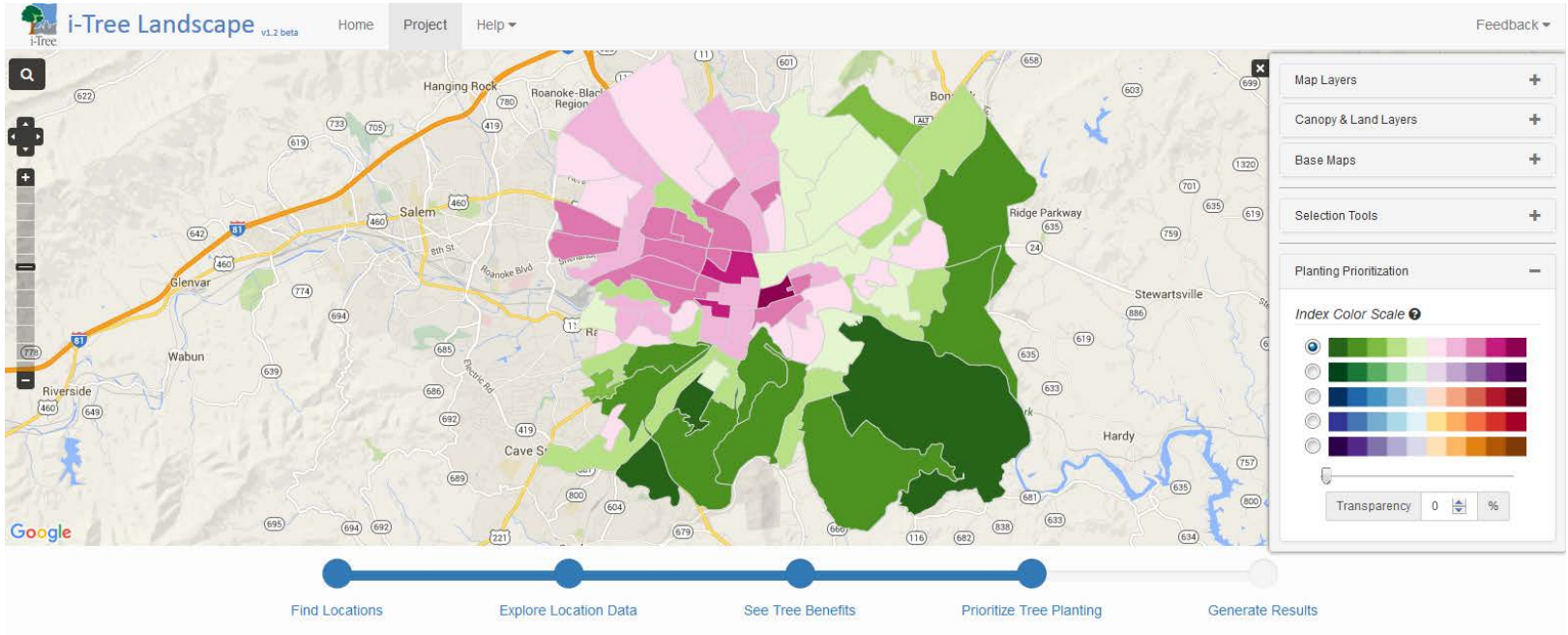
URBAN FOREST PLANNING

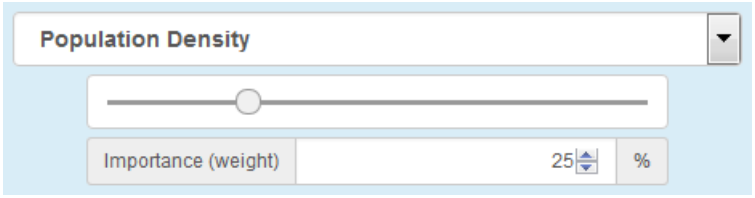


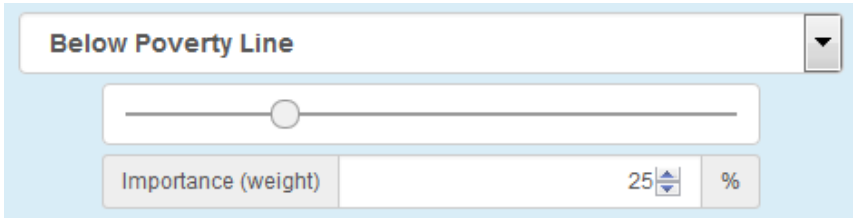


Find Locations | Explore Location Data | See Tree Benefits | Prioritize Tree Planting | Generate Results

URBAN FOREST PLANNING







URBAN FOREST MANAGEMENT

View in iTunes

Free

Category: Reference
Updated: Nov 25, 2015
Version: 2.1.8
Size: 14.2 MB
Language: English
Seller: Michael Whitt
© 2012 Virginia Tech University (Department of Forest Resources and Environmental Conservation)
Rated 4+

Compatibility: Requires iOS 6.0 or later. Compatible with iPhone, iPad, and iPod touch.

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

All Versions:
★★★ 27 Ratings

More iPhone Apps by Michael Whitt

Description

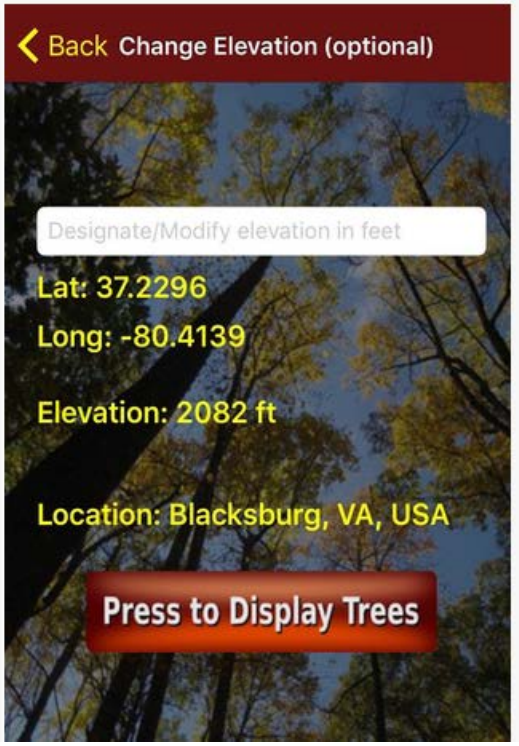
Virginia Tech Tree Identification brings the award winning Virginia Tech digital dendrology material to your iPhone. It contains fact sheets for 969 woody plants from all over North America with an in-depth description, range map and thousands of color images of leaves, flowers, fruit, twigs, bark and form.

vTree Support ...More

What's New in Version 2.1.8

Updates that allow a user to sort species by common or latin name.

iPhone Screenshot



URBAN FOREST MANAGEMENT

View in iTunes

Free

Category: Education
Updated: Jun 05, 2015
Version: 1.07
Size: 87.9 MB
Language: English
Seller: Peter Belhumeur
© 2015 Columbia University, University of Maryland, and the Smithsonian Institution
Rated 4+

Compatibility: Requires iOS 5.1.1 or later. Compatible with iPhone, iPad, and iPod touch.

Customer Ratings

Current Version:
★★ 92 Ratings

All Versions:
★★½ 894 Ratings

More iPhone Apps by Columbia University, University of Maryland, and Smithsonian Institution

Description

Leafsnap is the first in a series of electronic field guides being developed by researchers from Columbia University, the University of Maryland, and the Smithsonian Institution. This free mobile app uses visual recognition software to help identify tree species from photographs of their leaves.

Columbia University, University of Maryland, and Smithsonian Institution Web Site ▸ Leafsnap Support ▸ ...More

What's New in Version 1.07

– Expanded species coverage to Eastern Canada, with 36 new species
– Fixed minor bugs

iPhone Screenshot

URBAN FOREST MANAGEMENT

Description

Identify and Report Invasive Plants, Insects and Plant Pathogens in the Mid-Atlantic States

The Mid-Atlantic Early Detection Network (MAEDN) App brings the power of EDDMapS to your smartphone. Now you

Charles T. Bargeron Web Site ▸ Mid-Atlantic Early Detection Network Support ▸ ...More

What's New in Version 4.2

-minor bug fixes

View in iTunes

This app is designed for both iPhone and iPad

Free

Category: Education
Updated: Jan 20, 2016
Version: 4.2
Size: 457 MB
Language: English
Seller: Charles T. Bargeron © UGA Center for Invasive Species and Ecosystem Health
Rated 4+

Compatibility: Requires iOS 8.0 or later. Compatible with iPhone, iPad, and iPod touch.

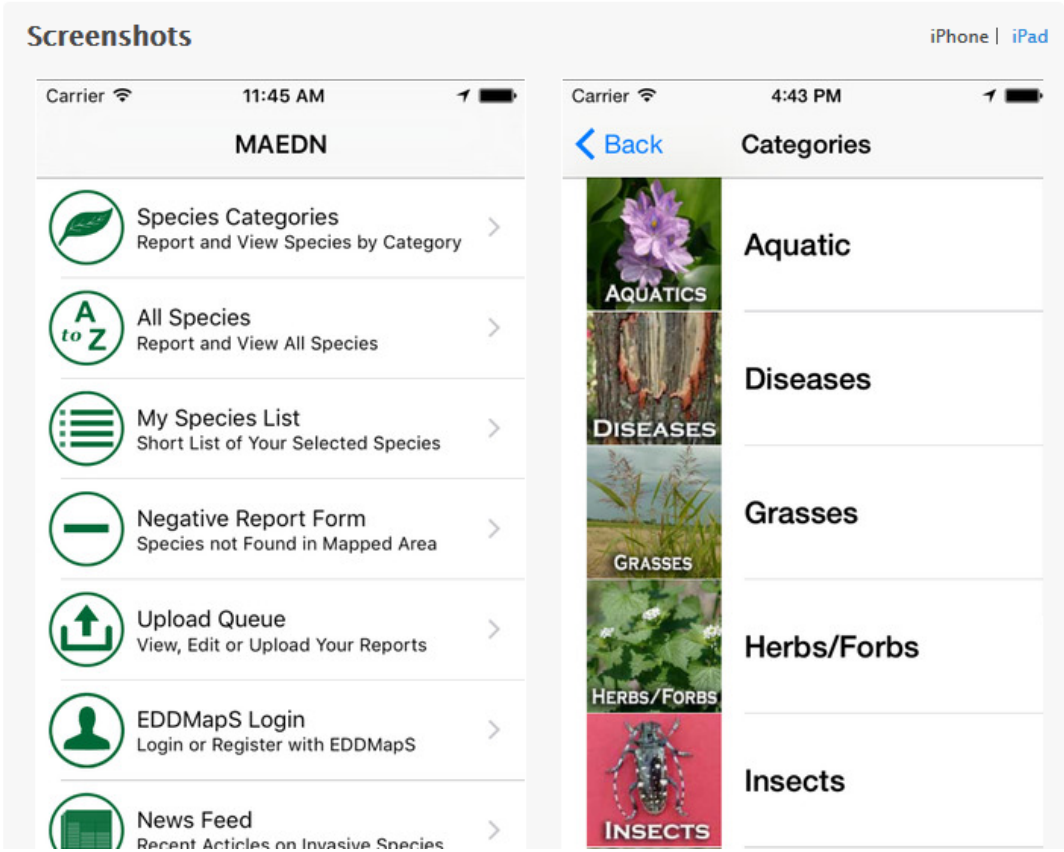
Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

More by Charles T. Bargeron

Screenshots

iPhone | iPad



URBAN FOREST MANAGEMENT

View in iTunes

This app is designed for both iPhone and iPad

$1.99

Category: Reference
Updated: Aug 20, 2015
Version: 1.5.5
Size: 249 MB
Language: English
Seller: Purdue University
© Purdue University
Rated 4+

Compatibility: Requires iOS 8.4 or later. Compatible with iPhone, iPad, and iPod touch.

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

All Versions:
★★★★½ 20 Ratings

More by Purdue University

Description

The Purdue Tree Doctor app has been developed by experts at Purdue University to help people better identify and manage tree problems caused by a variety of factors, including insects and diseases. Landscape professionals, arborists, and garden center personnel can use this app to improve communication with their customers.

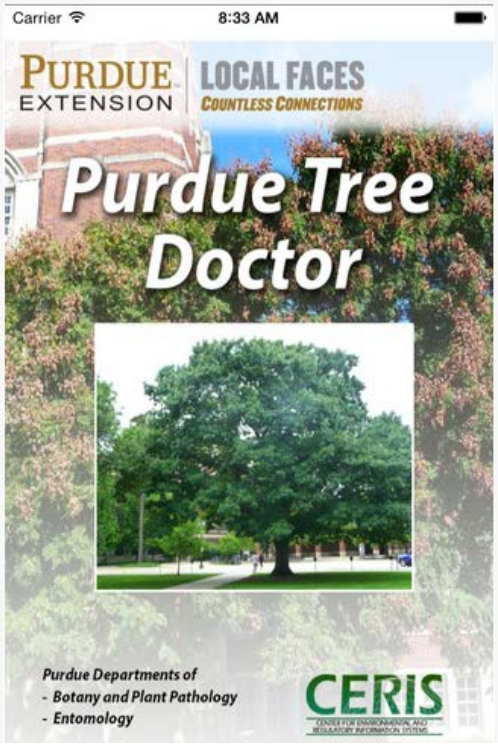
Purdue Tree Doctor Support ...More

What's New in Version 1.5.5

-App now works natively with iPad.
-Includes August 2015 content updates.

Screenshots

iPhone | iPad



URBAN FOREST MANAGEMENT

View in iTunes

This app is designed for both iPhone and iPad

Free

Category: Productivity
Updated: Nov 02, 2014
Version: 1.1
Size: 19.3 MB
Language: English
Seller: Texas A&M Forest Service
© Texas A&M Forest Service
Rated 4+

Compatibility: Requires iOS 7.1 or later. Compatible with iPhone, iPad, and iPod touch.

Customer Ratings

We have not received enough ratings to display an average for the current version of this application.

More by Texas A&M Forest Service (TFS)

Tree Trails

Description

The Level 1 Tree Risk Assessment app helps perform a limited visual tree assessment. It maps those trees with obvious defects that have a Probable or Imminent likelihood of failure and identifies treatment. Designed for pre-and post-storm use this app can store tree assessments locally, export them via email or can be connected to

Tree Risk Assessment – Level 1 Support ...More

What's New in Version 1.1

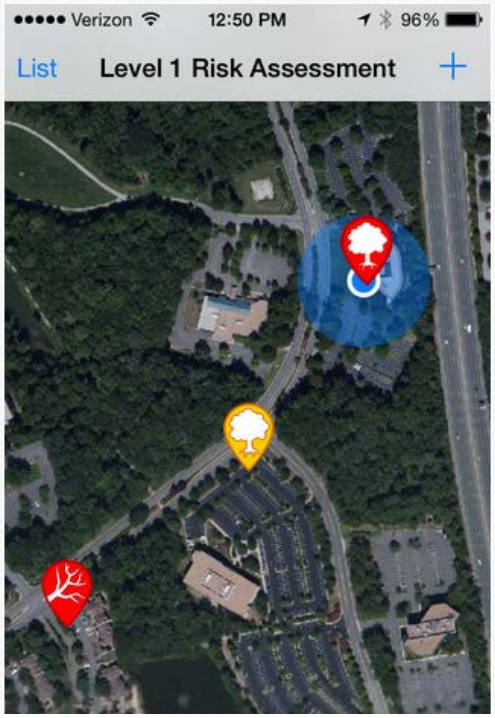
Bugfixes:

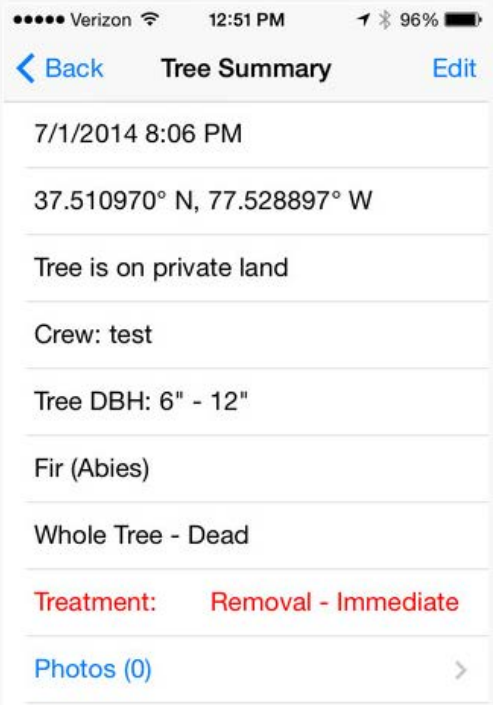
- tree assessments properly sort by timestamp in offline workflow

...More

Screenshots

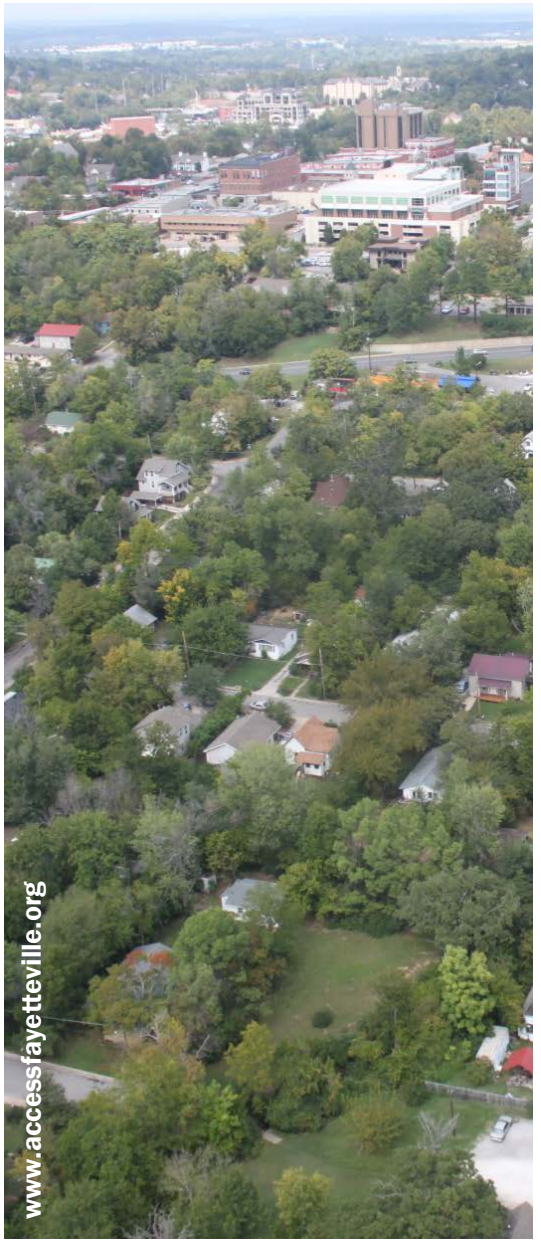
iPhone | iPad





TAKE HOME MESSAGES

- Technology is an increasingly important tool in urban forestry analysis, decision-making and communication
- Technology is critical for urban forest assessment, planning, and management
- i-Tree Tools is a suite of free mobile, desktop, and web-based applications that are great for urban forest assessment and planning
- Web-based and mobile apps are increasingly available for a diversity of field applications



QUESTIONS & COMMENTS

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Horticulture Dayz!

March 7, 2016

Front Royal, VA

VirginiaTech
College of Natural Resources and Environment

Virginia Cooperative Extension
Virginia Tech • Virginia State University