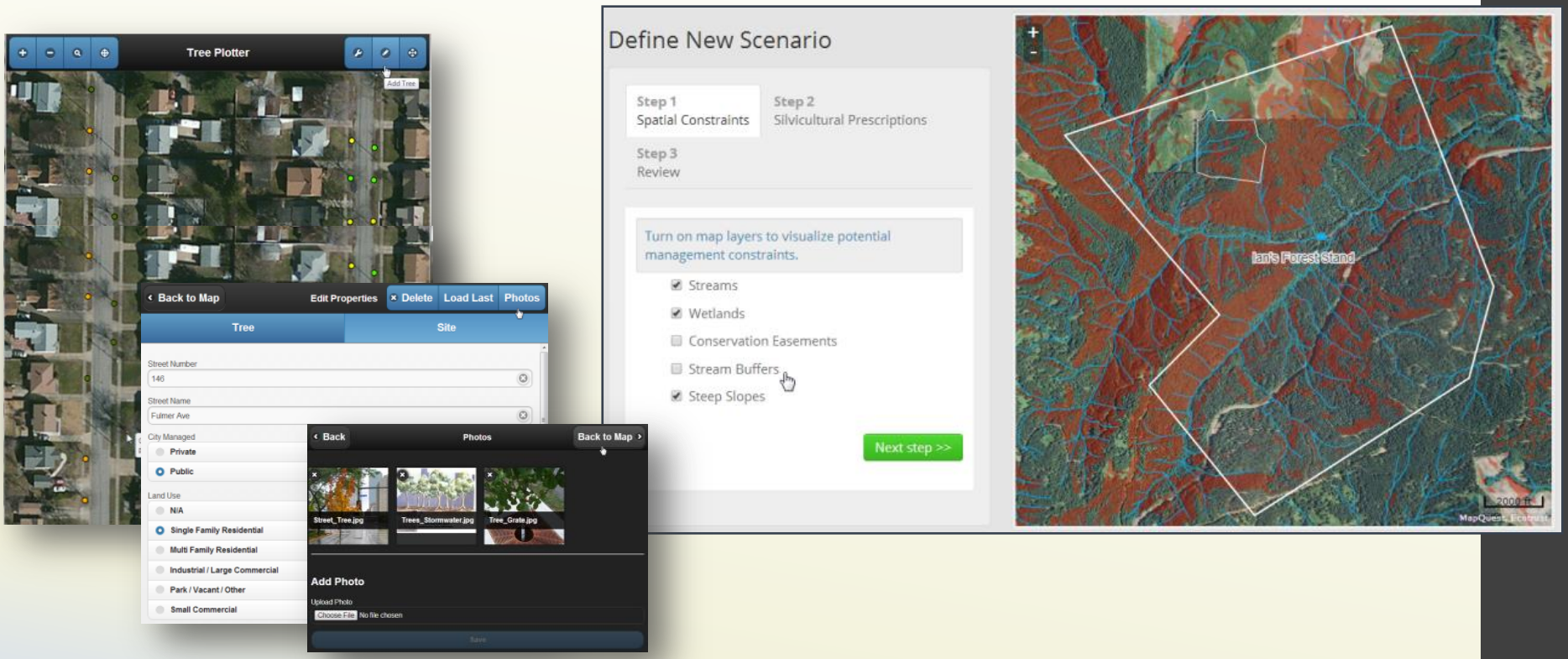
COMPARING COMMUNITY FORESTRY TECHNOLOGIES FOR CITIZEN SCIENCE & CROWD-SOURCING

CUFC11 | OCTOBER 2014



Presented by:

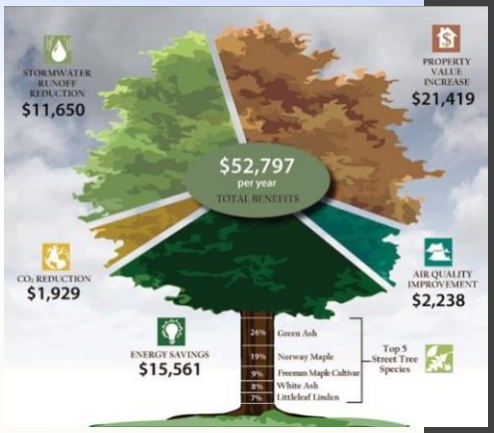
Ian Hanou, plan-it GEO LLC

AGENDA

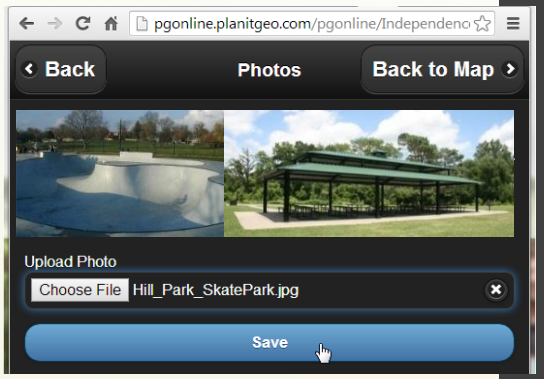
- **Plan-It Geo:** about us
- **Intro:** key terms & what new tools/apps mean to you
- **Tree Tools:** apps, inventory, work orders, outreach
- **Canopy Tools:** landscape-scale tools/apps
- **Recap:** discussion, Q&A

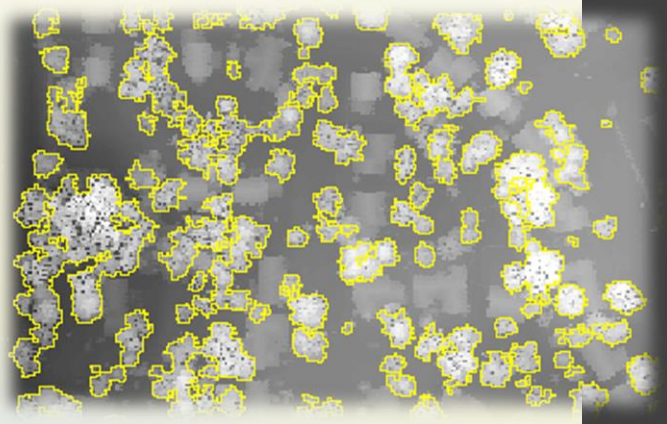
OUR SERVICES & MARKETS

Credit: WI DNR



- GIS Analysis and Remote Sensing
- Urban Tree Canopy (UTC) Assessment
- Software Application Development
  - ***Urban Forest Cloud***
  - 20+ software clients | 80+ UF projects
- Tree Inventory | Risk Assessment
- Ecosystem Services Analysis
- Training, Workshops, Spatial Surveys



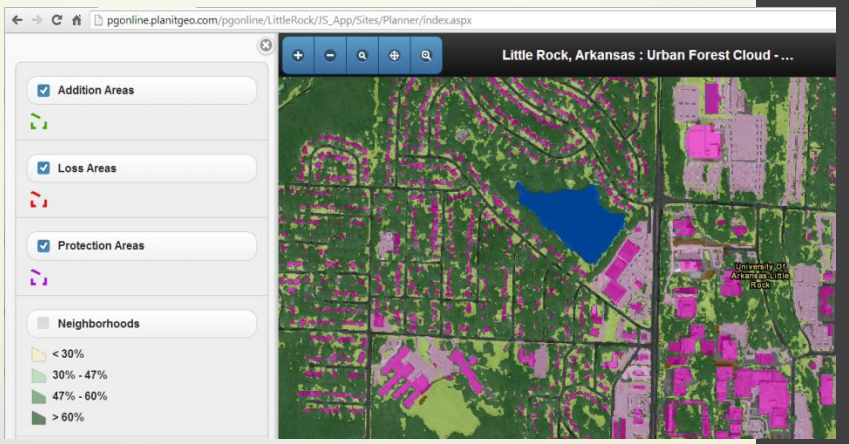


GOALS FOR TODAY …

- Introduce technologies offering efficiencies to enhance urban and community forest management & outreach
- Gain an understanding of the possibilities of crowdsourcing and citizen-science tools
- Discuss uses of these tools/apps

USES OF TECHNOLOGY APPLICATIONS

- Collect data, monitor, site/plan review
  - Mobile, desktop, real-time, dashboards
  - By staff, consultants, and/or volunteers
- Education, Engagement and Awareness
- Scenarios and Visualization
  - Ecosystem services
  - Management/planning
  - Landscape / site-specific scale
- Spatial surveys
  - Stakeholder input
- And many more …



WHAT DOES "THE CLOUD" MEAN FOR U&CF?

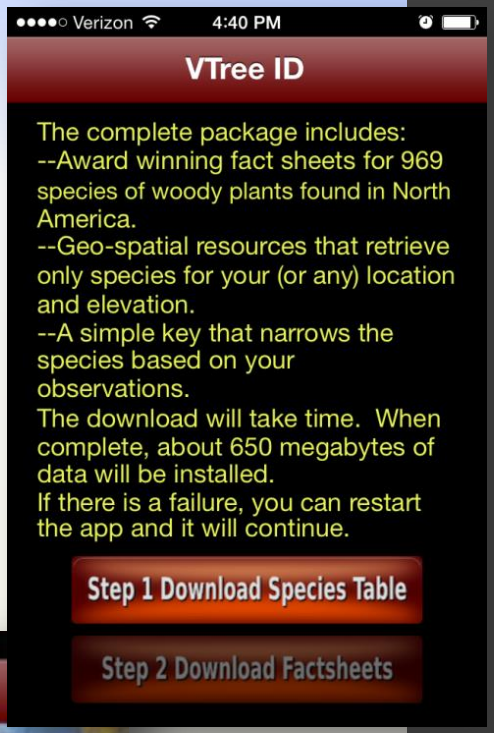
- **Accessibility:** your tree data anytime, anywhere (when online)
- **Data Inputs:** from multiple sources (depts. or citizens)
- **Tell and Share:** your story more readily cost-effectively
- **"Hosted Solutions":** no other GIS/GPS soft-/hardware needed
- **Just Think:** *of the possibilities …*
  - Inter-departmental "feeds" for plan review and permitting
  - Service request "feeds" from the public
  - Real-time quality control checks and Level of Service dashboard
  - Budget preparation support: tell (show!) your story, and your woes
  - Stakeholder input, volunteerism, and citizen science
  - Customer service: show residents what else is on your plate

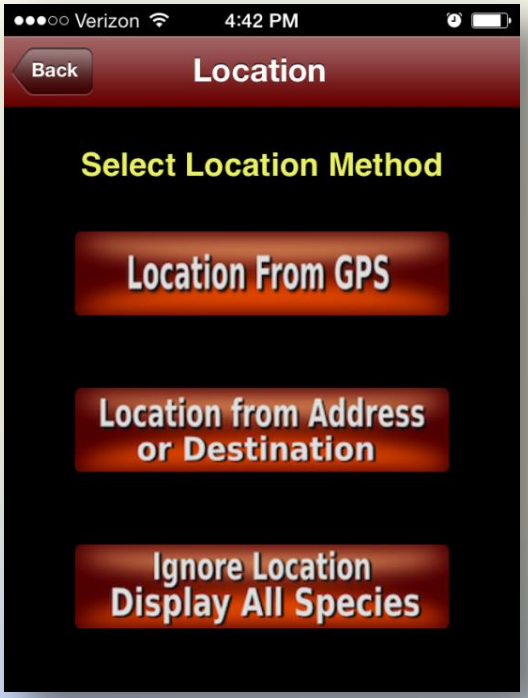
vTREE (VIRGINIA TECH)

http://dendro.cnre.vt.edu/dendrology/main.htm

Contact: Dr. Eric Wiseman, pwiseman@vt.edu

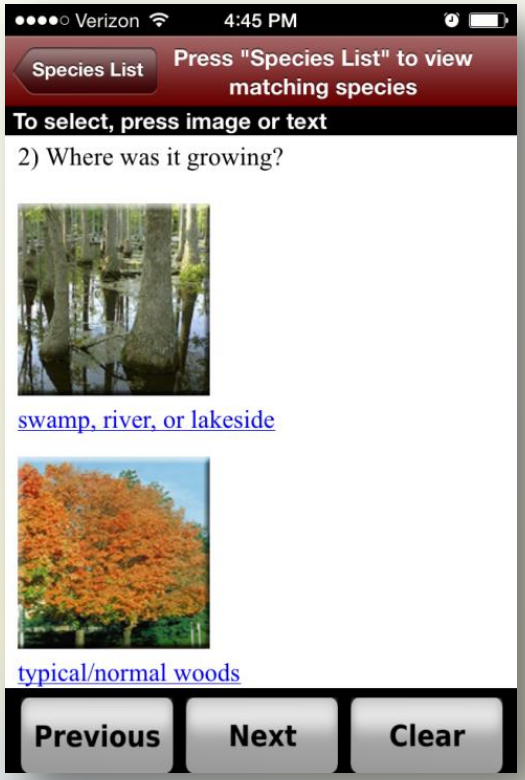
- Free native app (iOS and Android)
- Simple workflow
- Identify and learn about nearly 1,000 tree species

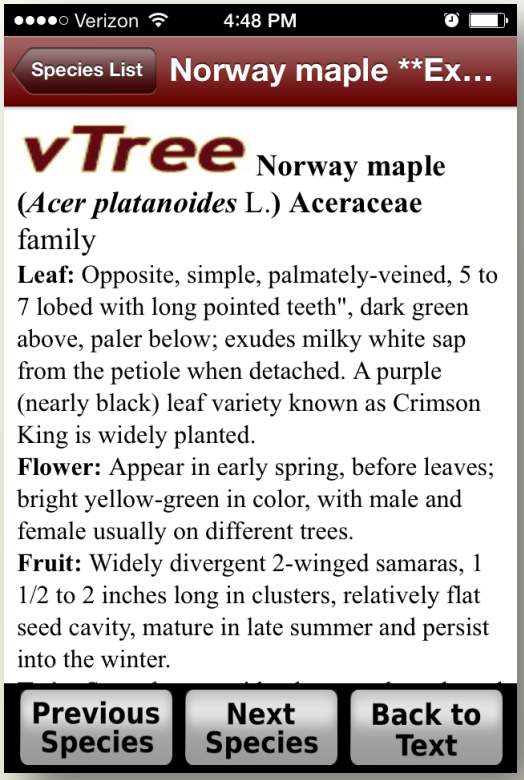




vTREE (VIRGINIA TECH)

- Great search function and field key
- Tons of photos, phenology information and more





ONE MILLION TREES.CA: MISSISSAUGA, ONTARIO

onemilliontreesmississauga ABOUT COUNT MY TREES PLANTING PROGRAMS PLANTING TIPS EVENTS CONTACT US

top5planters

LARGE ORGANIZATION

City of Mississauga	52796
Credit Valley Conservation	17844
Toronto and Region Conservation Authority	15239
Evergreen	3454
Scouts Canada	1600

SMALL ORGANIZATION

Credit River Anglers Association	10324
Art of Living	2355
Ecosource	1190
Sierra Club	1120
Peel Environmental Youth Alliance	610

SCHOOL

St. Marcellinus Catholic Secondary School	978
Olive Grove School	692
Mississauga Secondary School	500
Port Credit Secondary School	364
Turner Fenton Secondary School	300

BUSINESS

UPS	1930
Bosch	1130
Air Canada	1130
Mary Kay	1130
Ontario Natural Food Co-op	1130

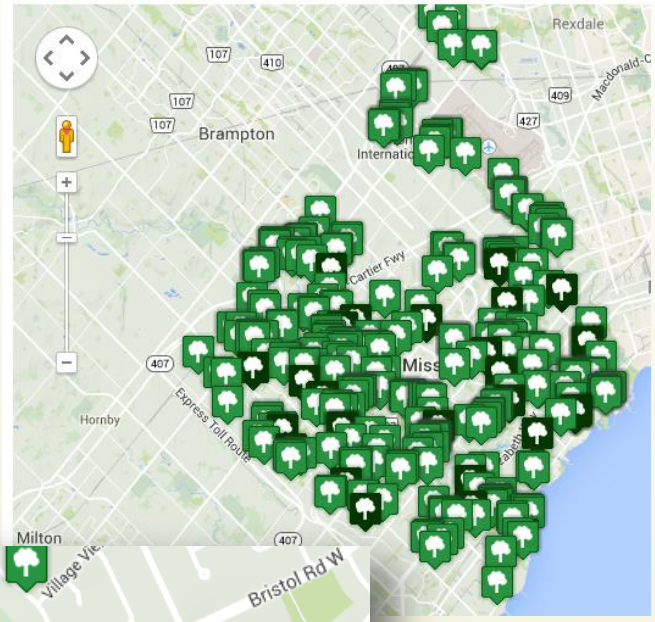
INDIVIDUALS

Sean Stuckless	67
Barbara Maj	28
Michael & Patricia Page	25
Muzna Khan	18
Robin Daddar	14

ONE MILLION TREES.CA: MISSISSAUGA, ONTARIO

onthemap

Please Note: This map does not reflect all planting locations.



TREE PLANTING FORM

If you are a landscaping company, please ensure that the homeowner or landowner do not plan to count these trees towards our one million goal.

Your Name

Your Email

Have you planted on behalf of an organization? No Yes

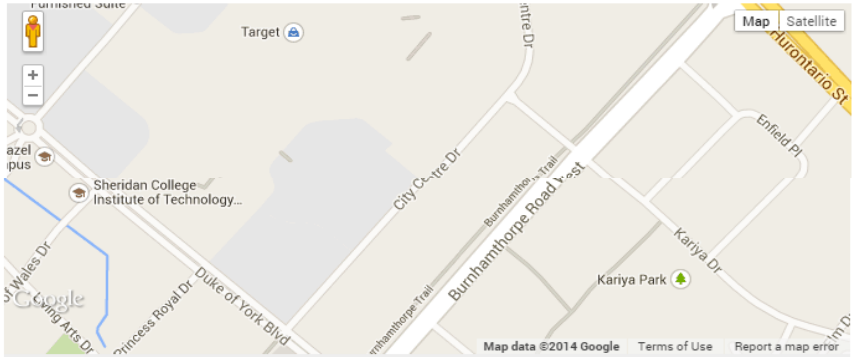
Number of trees planted

Tree Species Unknown

Tree Size Seedling

Date of planting

Nearest Address:



You can relocate the marker by dragging it to a new position.

Upload Photos

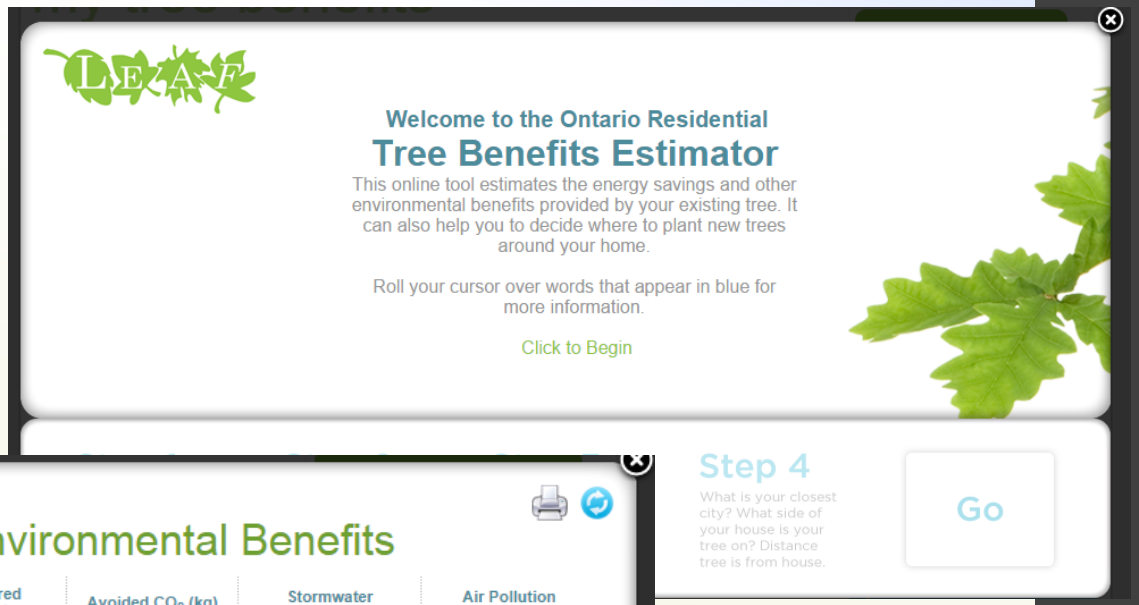
Max size for photo upload is 3M

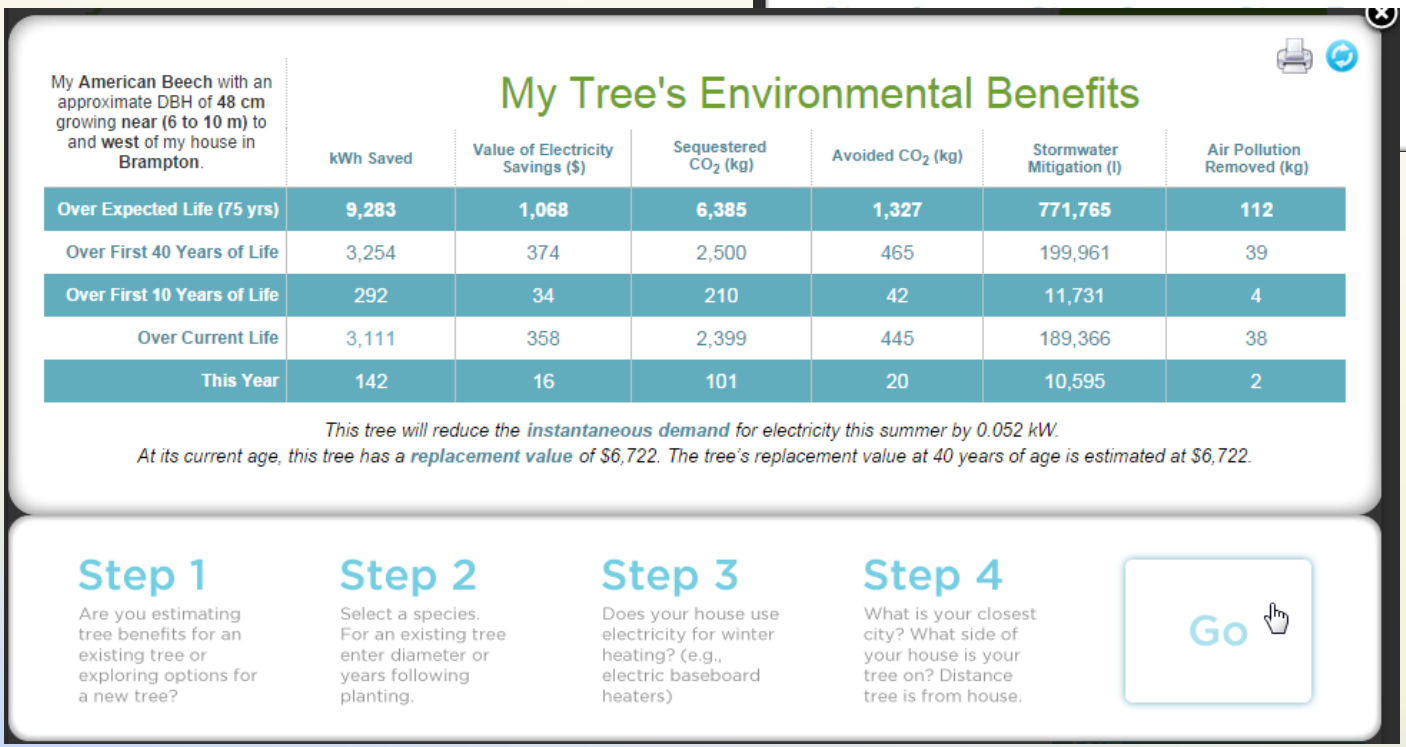
Submit

Please do not show my planting location on the map.

ONE MILLION TREES.CA: MISSISSAUGA, ONTARIO

http://www.yourleaf.org/estimator





My **American Beech** with an approximate DBH of **48 cm** growing **near (6 to 10 m)** to and **west** of my house in **Brampton**.

My Tree's Environmental Benefits

	kWh Saved	Value of Electricity Savings ($)	Sequestered CO_2 (kg)	Avoided CO_2 (kg)	Stormwater Mitigation (l)	Air Pollution Removed (kg)
Over Expected Life (75 yrs)	**9,283**	**1,068**	**6,385**	**1,327**	**771,765**	**112**
Over First 40 Years of Life	3,254	374	2,500	465	199,961	39
Over First 10 Years of Life	292	34	210	42	11,731	4
Over Current Life	3,111	358	2,399	445	189,366	38
This Year	142	16	101	20	10,595	2

*This tree will reduce the **instantaneous demand** for electricity this summer by 0.052 kW.*
*At its current age, this tree has a **replacement value** of $6,722. The tree's replacement value at 40 years of age is estimated at $6,722.*

Step 1
Are you estimating tree benefits for an existing tree or exploring options for a new tree?

Step 2
Select a species. For an existing tree enter diameter or years following planting.

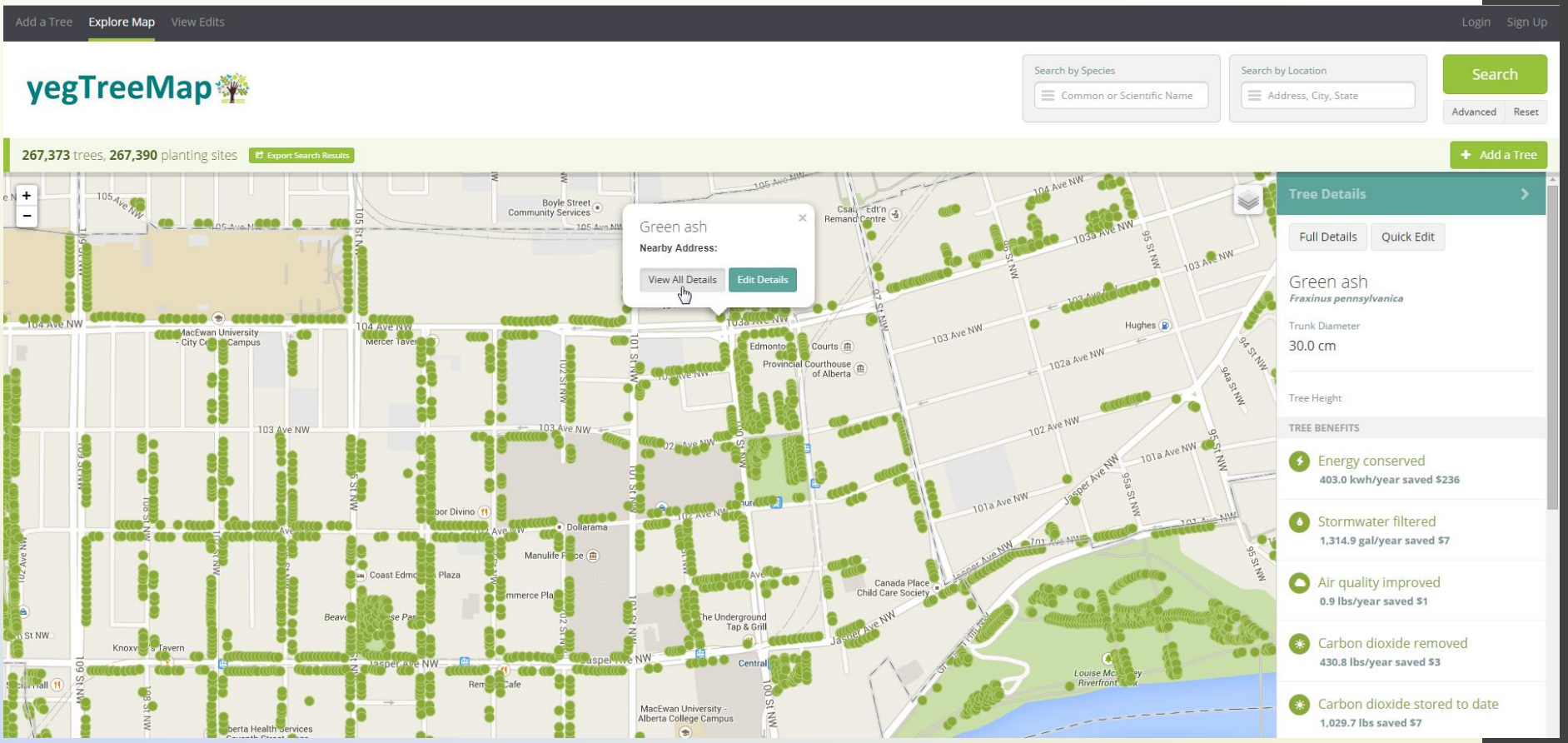
Step 3
Does your house use electricity for winter heating? (e.g., electric baseboard heaters)

Step 4
What is your closest city? What side of your house is your tree on? Distance tree is from house.

Go

YEG TREE MAP: EDMONTON, ALBERTA

- Map and explore tree data
- Add and edit trees online
- Track stewardship activities
- Add photos and leave comments
- View eco benefits calculated using i-Tree Streets



YEG TREE MAP: EDMONTON, ALBERTA

Add Photo

Green ash

Edit Delete

Latest Update

CityofEdmonton set species to Green ash [Fraxinus pennsylvanica] on Dec. 21, 2013

75% Complete

- Add a photo

Recent Edits

CityofEdmonton

Dec. 21, 2013 (9 months, 1 week ago)

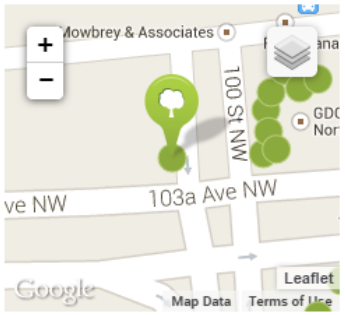
- set species to Green ash [Fraxinus pennsylvanica]
- created a tree
- made the tree editable
- set Owner to City of Edmonton Parks
- set diameter to 30.0 centimeters

Tree Information

Tree Number	**106101**
Common Name	Green ash
Scientific Name	*Fraxinus pennsylvanica*
Trunk Diameter	30.0 cm
Tree Height	
Canopy Height	
Date Planted	
Date Removed	
Assessment	
Storm Damage	
Local Project	
Pests and Diseases	
Owner	City of Edmonton Parks
Steward	City of Edmonton

Tree Stewardship

No entries yet!



i-TREE UPDATES: WHAT'S NEW?

Who are i-Tree tools for?

- Citizens, managers, decision-makers, landscape architects, etc.

http://www.itreetools.org/

What's New?

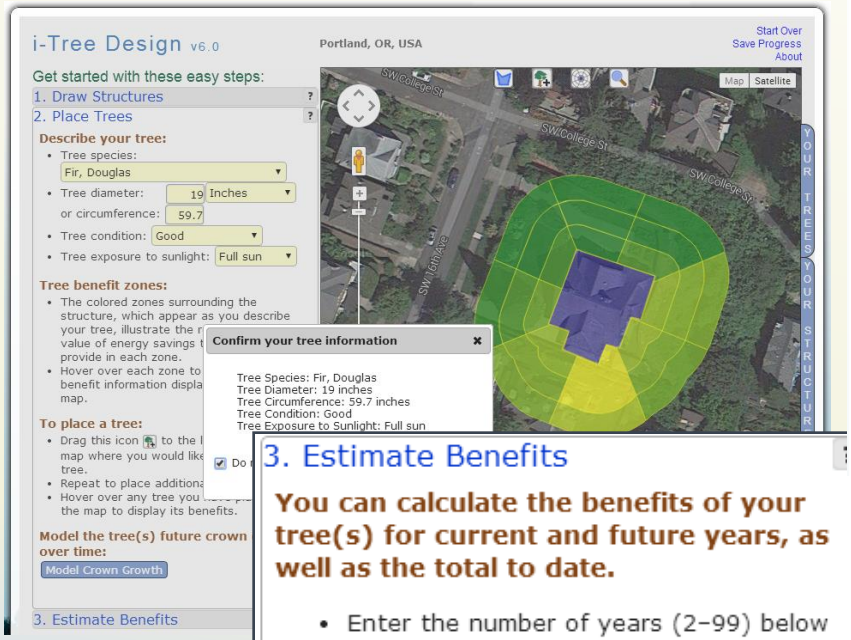
- i-Tree Design
- i-Tree Canopy
- New video learning and promotional marketing materials

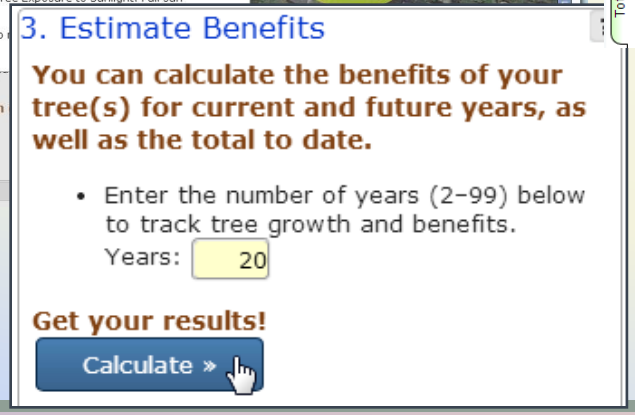
http://www.itreetools.org/news/whats_new.php

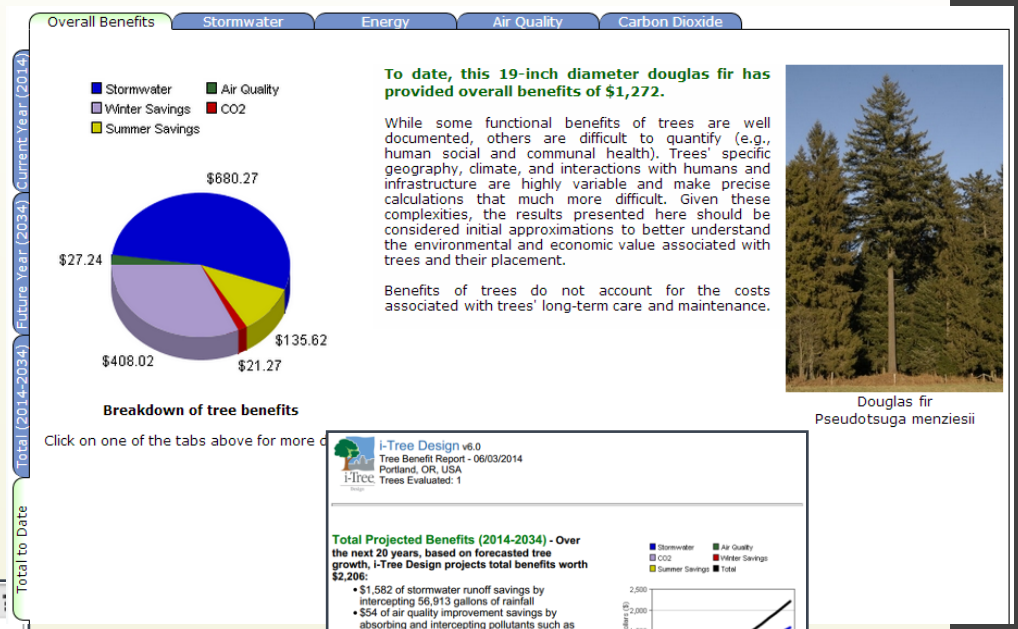
**** Not intended to be a "comprehensive" update***

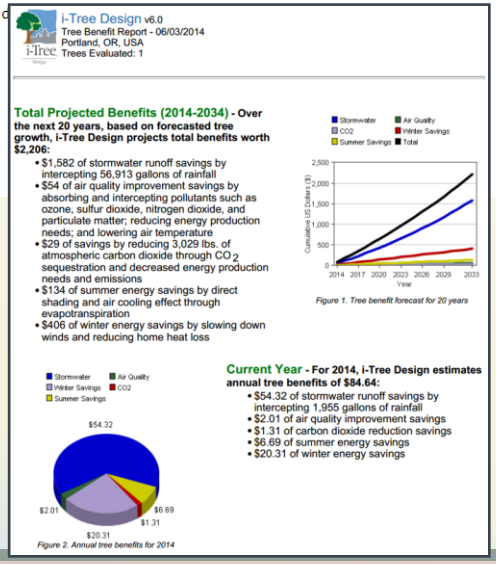
i-TREE UPDATES: i-DESIGN

- i-Design now allows the user to:
  - Enter multiple trees around a building
  - Forecast cumulative, lifetime (not just annual) benefits
  - Visualize tree growth
  - Export summary reports









i-TREE UPDATES: i-CANOPY

- i-Canopy now includes ecosystem benefits

Cover Class	Description	Abbr.	Points	% Cover
Tree	Tree, non-shrub	T	22	22.0 ±4.14
Non-Tree	All other surfaces	NT	78	78.0 ±4.14

Tree Benefit Estimates

Abbr.	Benefit Description	Value	±SE	Amount	±SE
CO	Carbon Monoxide removed annually	$2.19	±0.41	3.30 lb	±0.62
NO2	Nitrogen Dioxide removed annually	$13.50	±2.54	66.26 lb	±12.48
O3	Ozone removed annually	$221.37	±41.68	198.18 lb	±37.32
PM2.5	Particulate Matter less than 2.5 microns removed annually	$85.50	±16.10	4.85 lb	±0.91
SO2	Sulfur Dioxide removed annually	$0.88	±0.17	9.45 lb	±1.78
PM10*	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	$246.69	±46.45	78.99 lb	±14.87
CO2seq	Carbon Dioxide sequestered annually in trees	$358.96	±67.59	18.54 T	±3.49
CO2stor	Carbon Dioxide stored in trees (Note: this benefit is not an annual rate)	$10,888.33	±2,050.20	562.32 T	±105.88

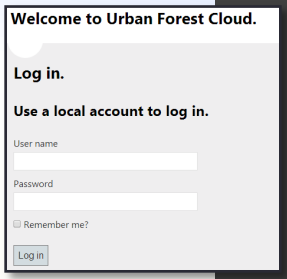
i-Tree Canopy Annual Tree Benefit Estimates based on these values in lbs/acre/yr and $/T/yr: CO 0.872 @ $1,333.50 | NO2 17.526 @ $408.89 | O3 52.423 @ $2,241.87 | PM2.5 1.282 @ $35,407.17 | SO2 2.500 @ $187.19 | PM10 20.894 @ $6,268.44 | CO2seq 9,807.385 @ $19.43 | CO2stor is a total biomass amount of 297,489.961 @ $19.43*
Note: Standard errors of removal amounts and benefits were calculated based on standard errors of sampled and classified points.

i-TREE VIDEO LEARNING AND MKTG MATERIALS

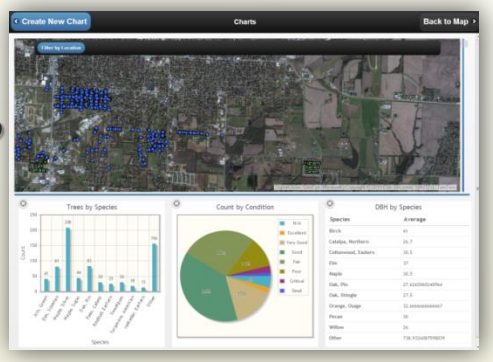
- Video Learning
  - http:// www.itreetools.org/resources/videos.php
  - Varying lengths covering Eco, Streets, Design, Canopy, Hydro, Species, and mobile data collection.
- Promotional marketing materials
  - http://www.itreetools.org/resources/why.php
  - Factsheets and templates
  - Guides and manuals

PLAN-IT GEO APPLICATIONS OVERVIEW

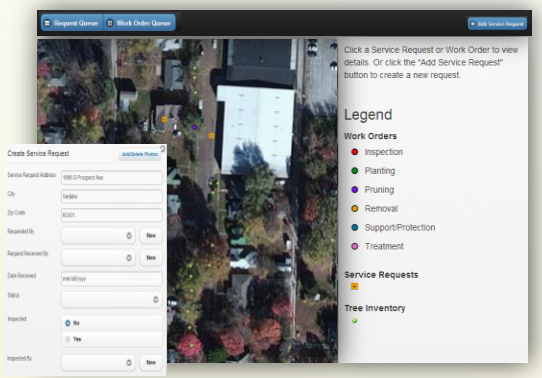
- Web-browser based for tablets or desktop use
- No GIS or GPS software needed; complete hosted solution
- Real-time, multi-user data entry on-the-cloud
- Subscription-based apps & a platform for custom projects



Tree Plotter®



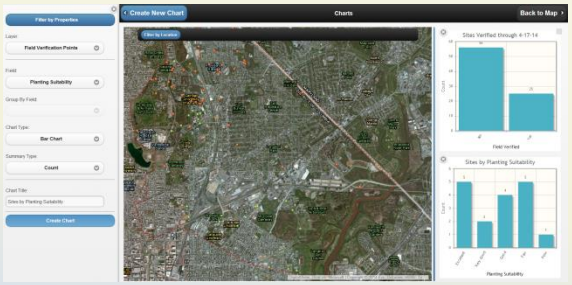
Work Order Management®



Tree Dashboard

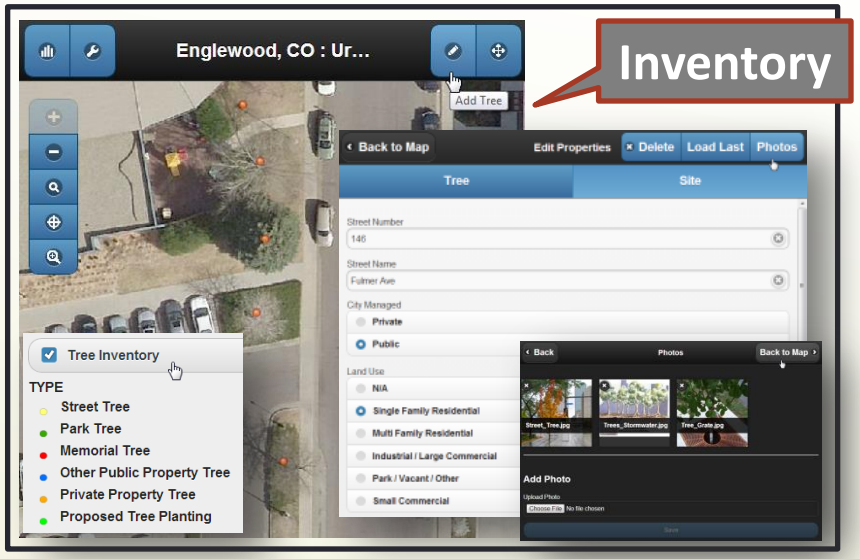
Canopy Planner®

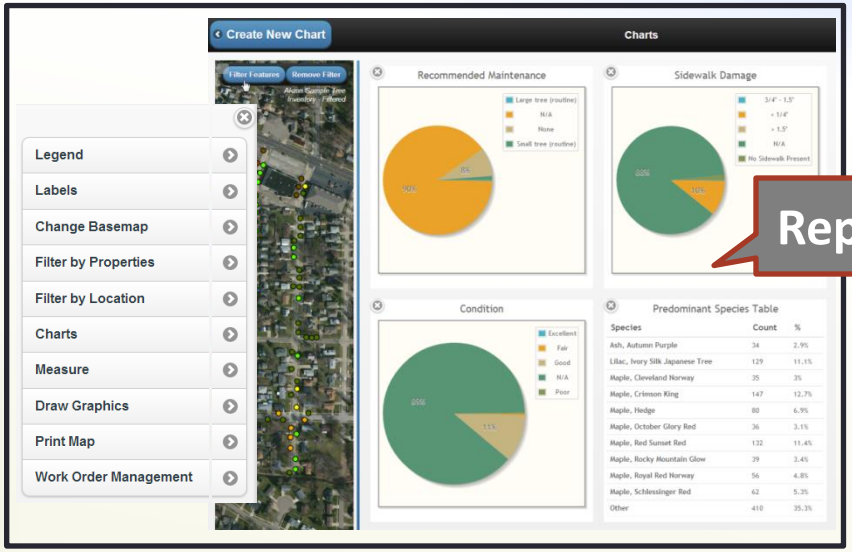
Open Spatial Surveys

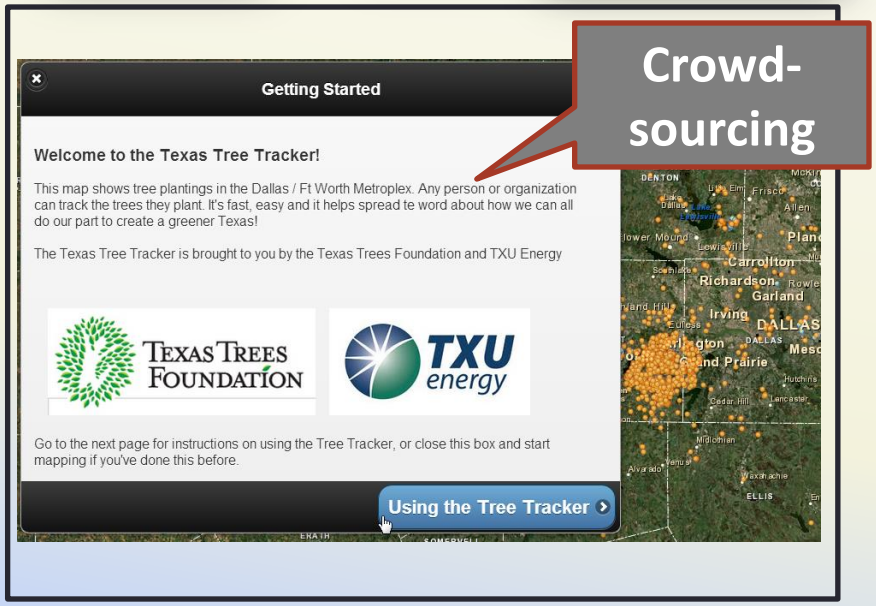


Park Amenities®

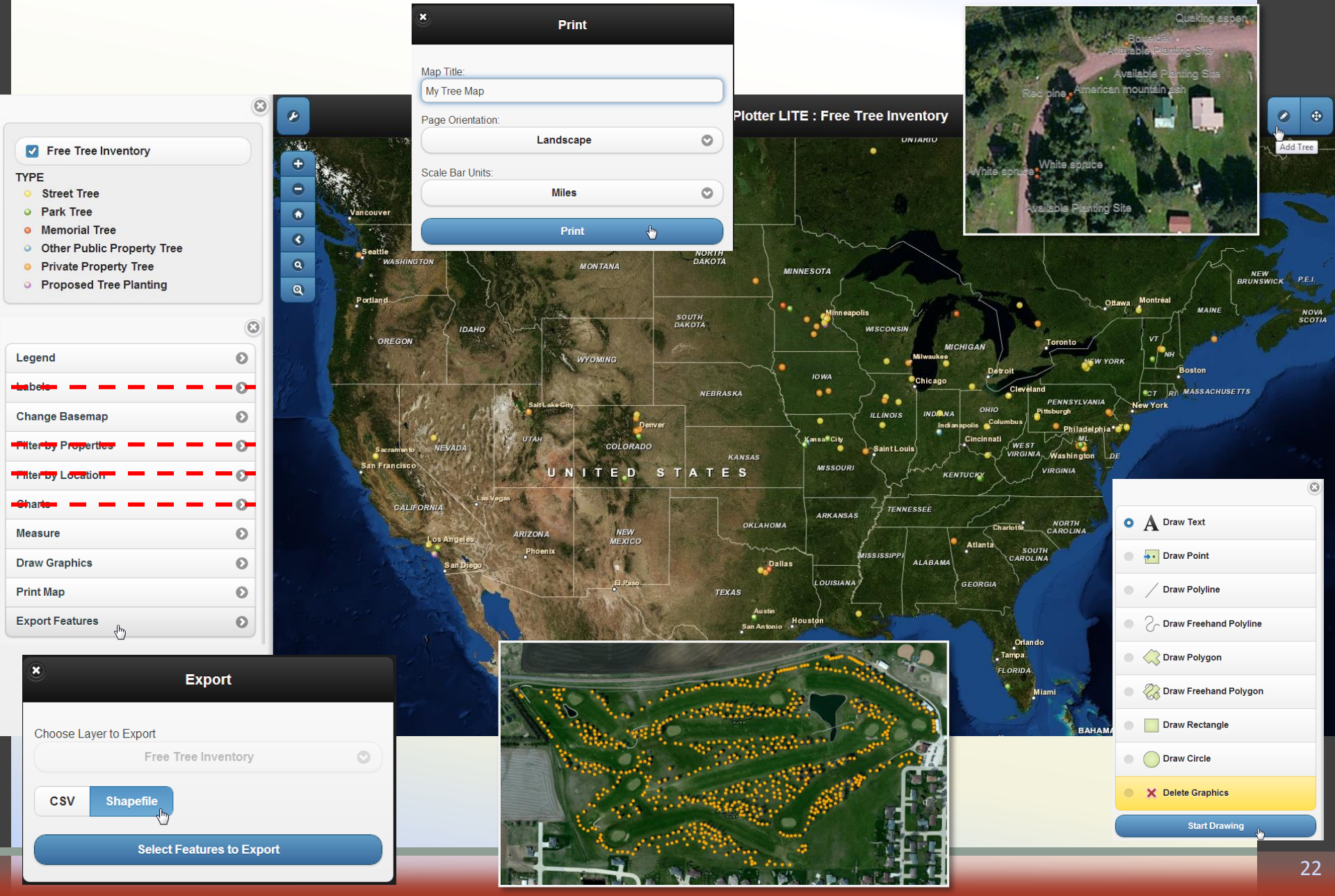
URBAN FOREST CLOUD: TREE PLOTTER APP



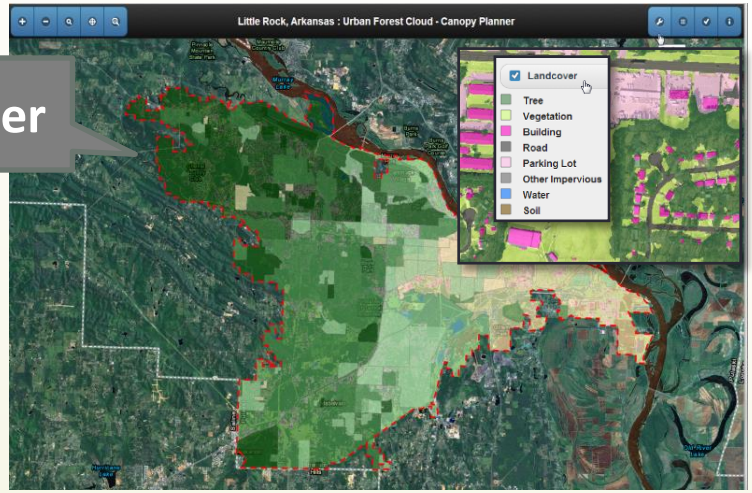




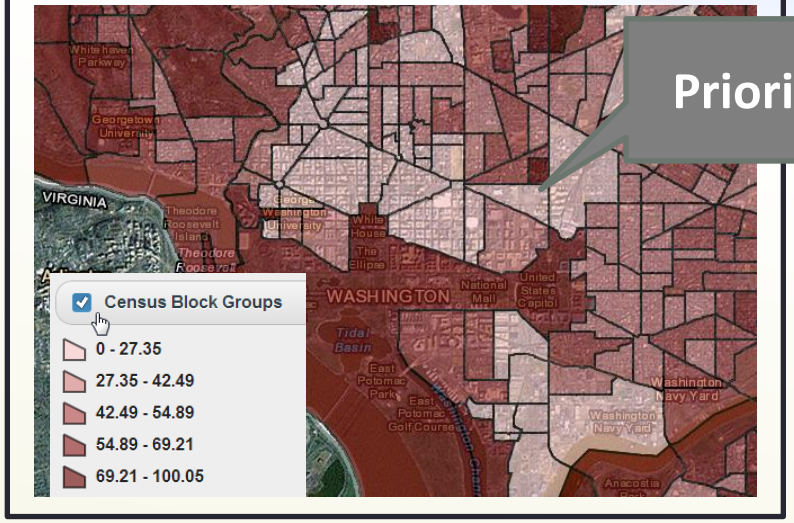
PLOTTER “LITE” (FREE VERSION)



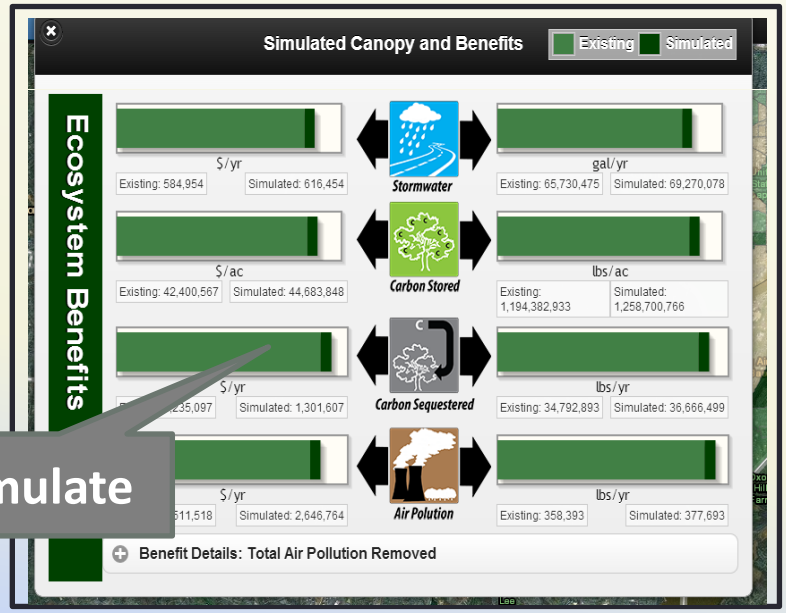
CANOPY PLANNER: LANDSCAPE-SCALE ANALYSIS



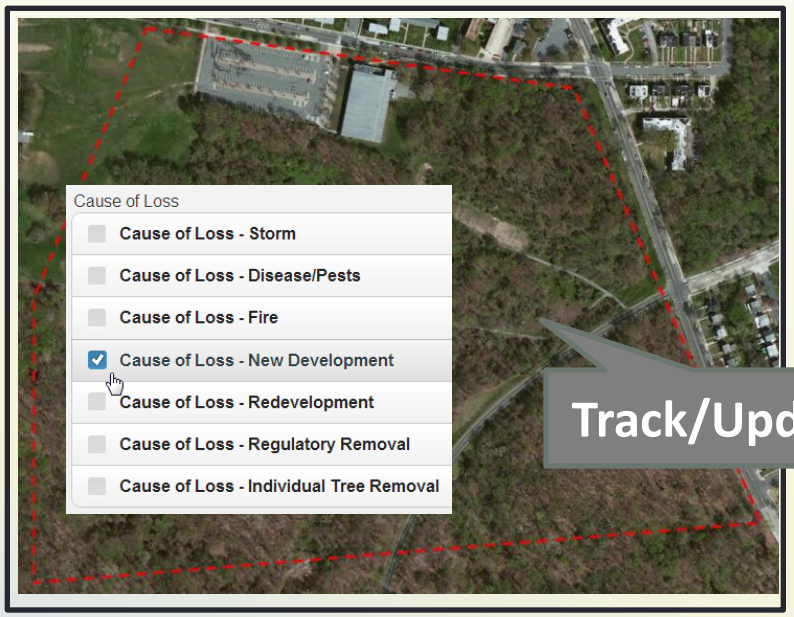
Viewer



Prioritize

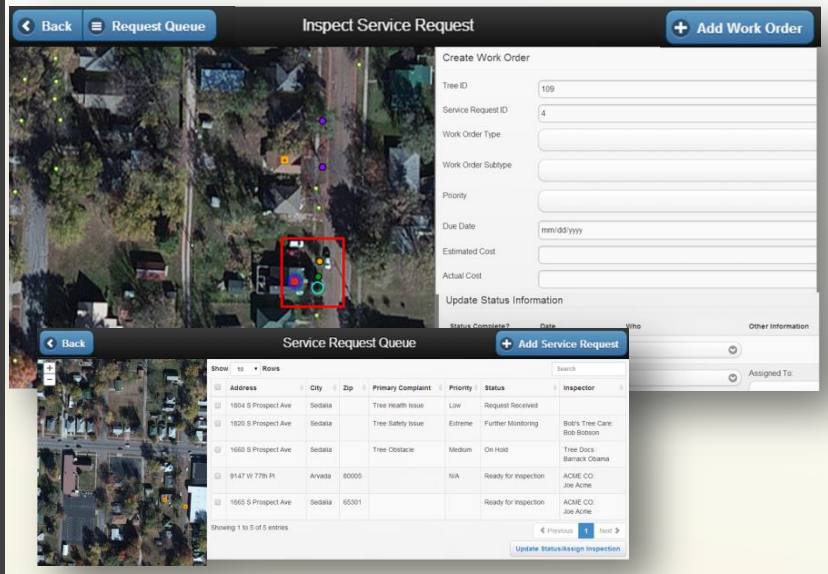


Simulate



Track/Update

ONLINE SERVICE REQUEST & WORK ORDERS



A companion "app" to Tree Plotter

General Public

Enter a Service Request

Managers / Inspectors

Contractors

Conduct work, update data in the app

Review, enter, track, edit, and audit work

TREE PLOTTER: "EAB STORY MAP"

An Inventory of Trees in the Tennyson Park HOA

Explore the community's trees and learn about emerald ash borer (EAB) in this story map

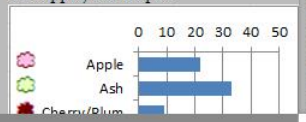
http://pgmobile.planitgeo.com/TennysonPark/EAB/

plan-it GEO

1 Trees by Species

Welcome to an interactive "story map" of trees in the Tennyson Park HOA in Arvada, Colorado. Explore the inventory data by clicking a tree to view information such as species, diameter at breast height (DBH), condition, maintenance needs and observations.

A total of 250 trees were inventoried in street planters, front yards (for interior homes), and community greenspaces. The most common trees in Tennyson Park are linden and pine followed by ash, honey locust, spruce, crabapple, and maple.



2 Ash Trees

3 Ash Trees by Condition

4 Maintenance Needs of Trees

5 Recommendations Report

LEGEND ▲

Trees by Species

- Linden / Basswood
- Pine
- Ash
- Honeylocust
- Spruce
- Maple
- Apple
- Hawthorrn
- Cherry / Plum
- Pear
- Oak
- Fir
- Sycamore
- Zelkova

Tree_Inventory

Species Common Name	White Ash
Diameter at Breast Height	7.0
Condition	Poor
Maintenance	
Pest Problem	Yes
Poor Location	
Poor Root System	No
Property Address #	6360
Street Name	Tennyson St
Growspace	Exterior Landscape

Zoom to

DigitalGlobe, Microsoft, USGS
POWERED BY esri

TREE PLOTTER: "EAB STORY MAP"

An Inventory of Trees in the Tennyson Park HOA

Explore the community's trees and learn about emerald ash borer (EAB) in this story map

http://pgmobile.planitgeo.com/TennysonPark/EAB/

1 Trees by Species

2 Ash Trees

Emerald Ash Borer (EAB) is an exotic beetle that has decimated populations of ash trees in urban ares across the eastern United States, killing tens of millions of ash trees in the past 12 years or more.

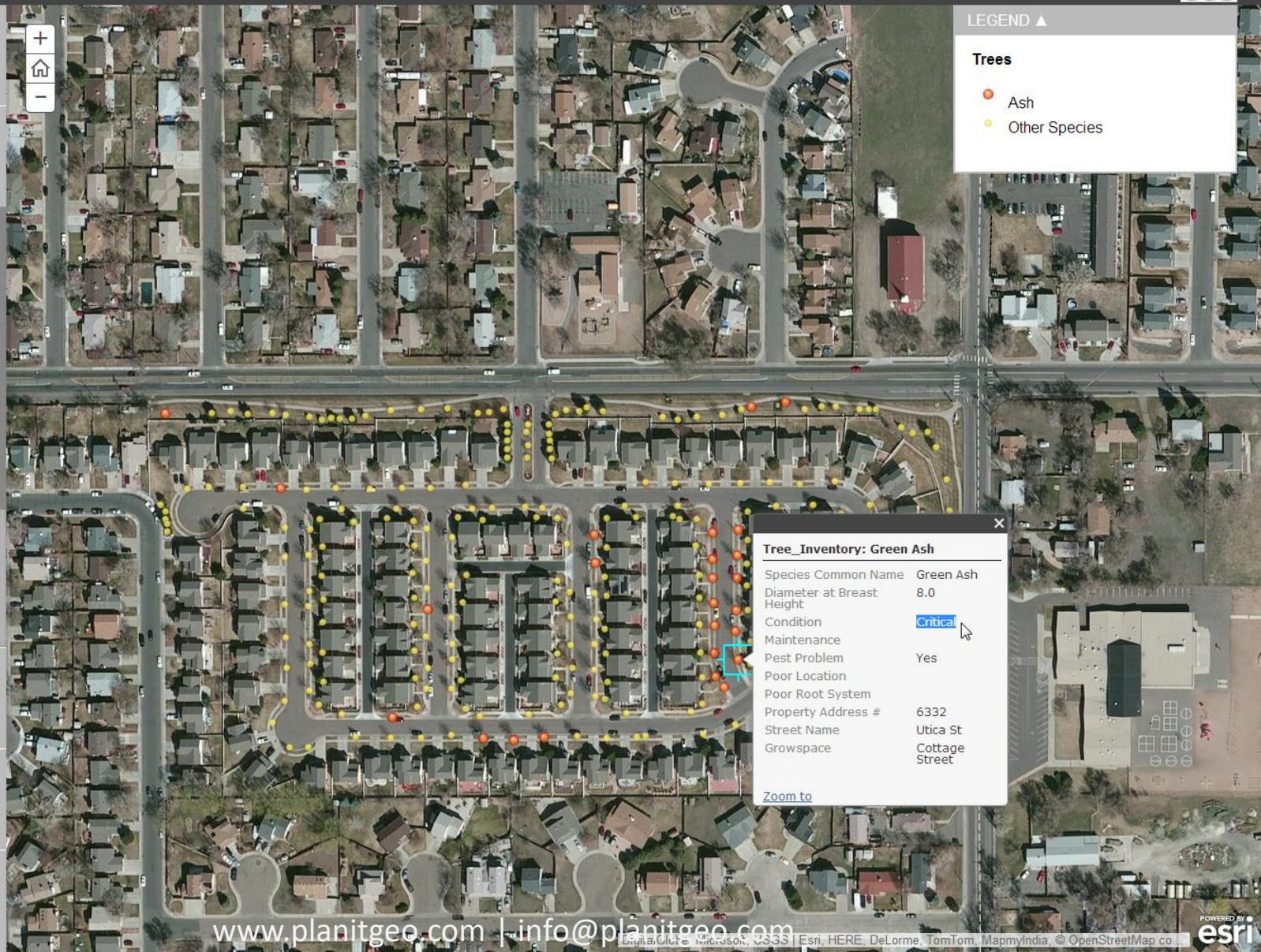
In many urban areas including Arvada, Colorado, ash trees make up a significant percentage of the urban forest. The Colorado Department of Agriculture estimates that 15% of all trees in Colorado urban areas are ash, with an estimated 1.45 million ash trees in Denver metro alone.

In September 2013, it was announced that EAB had been found in Boulder, Colorado. An early stage of planning to manage this infestation involves mapping and inventorying ash trees, the presence or extent of EAB infestation, and the quality of the

3 Ash Trees by Condition

4 Maintenance Needs of Trees

5 Recommendations Report



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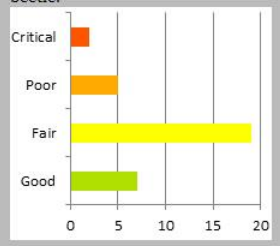
The majority of ash trees in Tennyson Park are in Fair condition (19 out of 33). No signs of EAB were detected in Tennyson Park, though many ash trees are infested with the less destructive lilac ash borer beetle.



4 Maintenance Needs of Trees

5 Recommendations Report

LEGEND ▲

Ash Trees by Condition

- Excellent (0 trees)
- Very Good (0 trees)
- Good (7 trees)
- Fair (19 trees)
- Poor (5 trees)
- Critical (2 trees)
- Dead (0 trees)

Tree_Inventory: Green Ash

Species Common Name	Green Ash
Diameter at Breast Height	8.0
Condition	Fair
Maintenance	
Pest Problem	Yes
Poor Location	
Poor Root System	
Property Address #	4588
Street Name	W 63rd Dr
Growspace	Exterior Street

Zoom to

DigitalGlobe, Microsoft, USGS | Esri, HERE, DeLorme, TomTom, MapmyIndia, © OpenStreetMap co...

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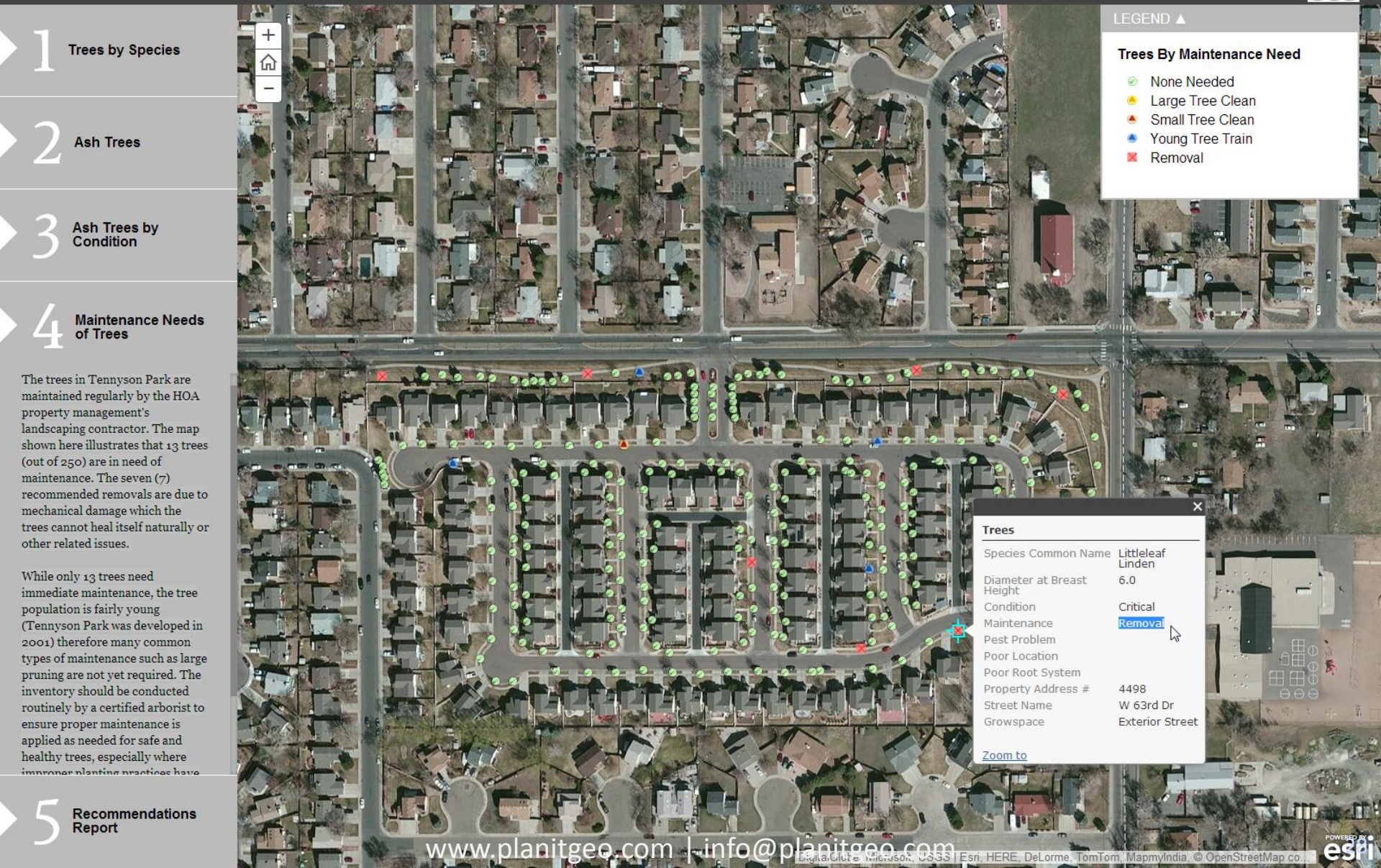

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Plan-It Geo provided a draft recommendations report summarizing the methods and findings of the inventory followed by general recommendations. The legend in this map shows trees by some of common observations made - poor root system, poor placement, and pest problems. The report can be found HERE .

LEGEND

Trees with Pest Problems
Yes

Trees with Poor Root Systems
Yes

Trees Planted in a Poor Location
Yes

Other Trees

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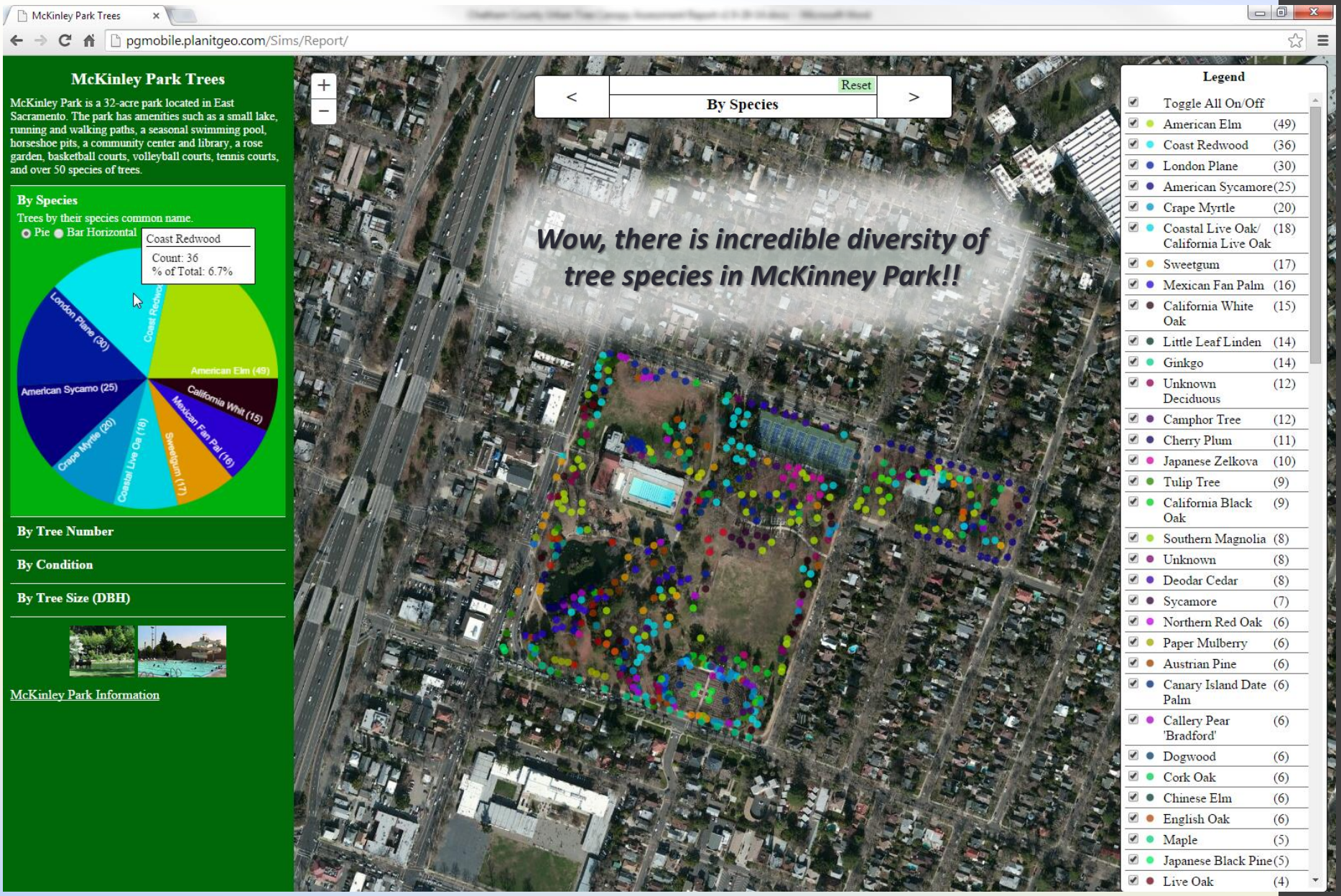
PARK TREE INVENTORY: WEB-BASED REPORTING



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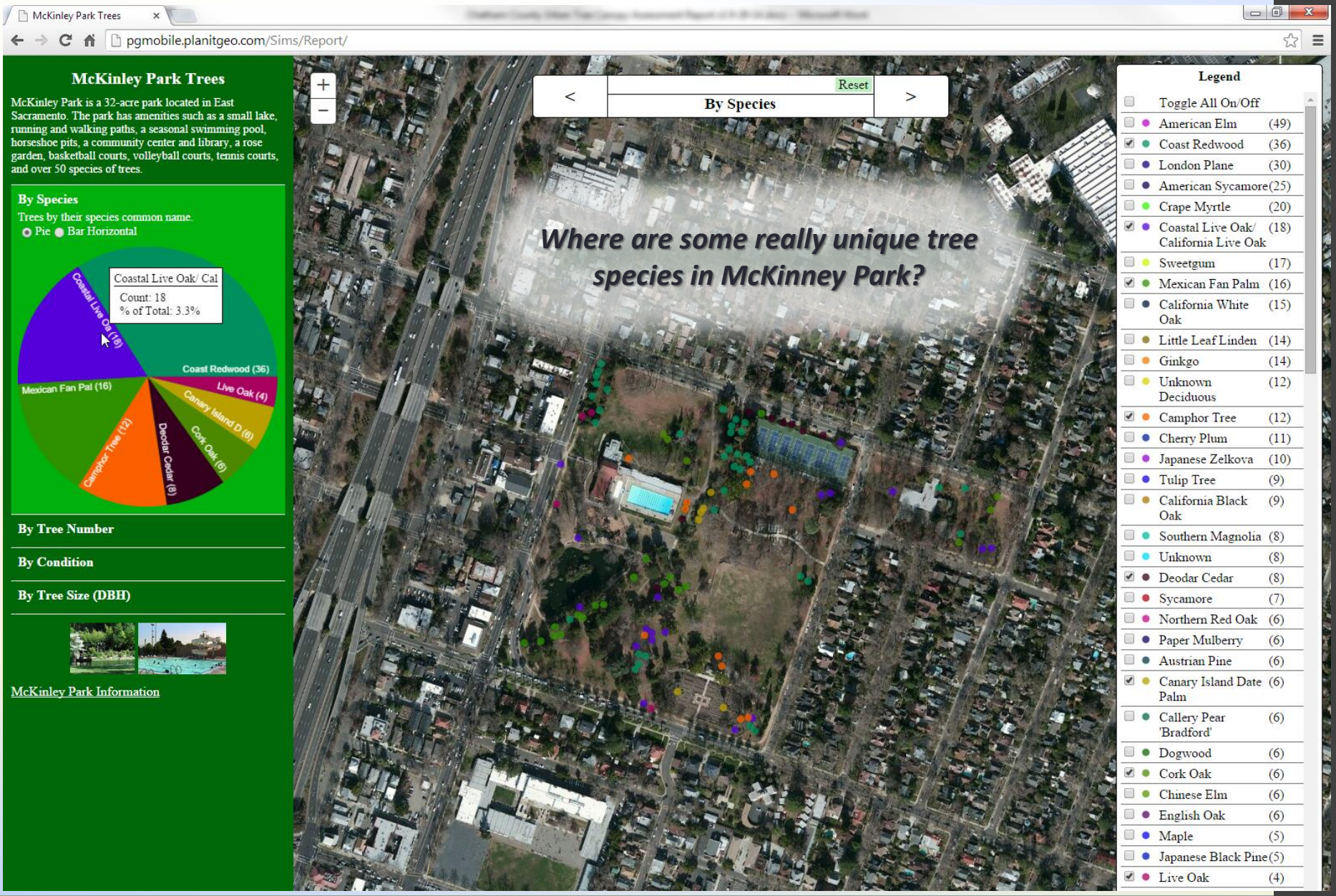
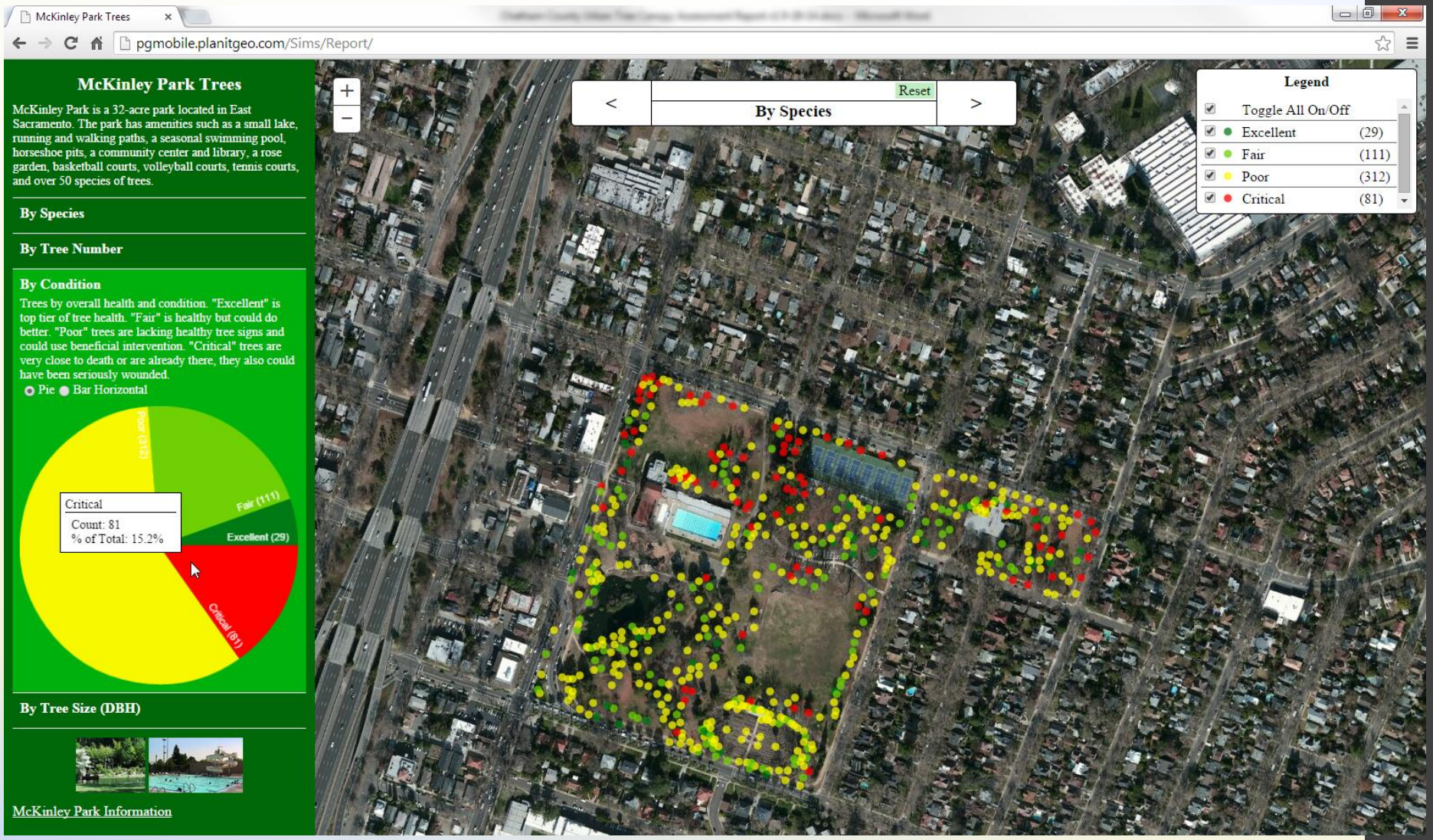


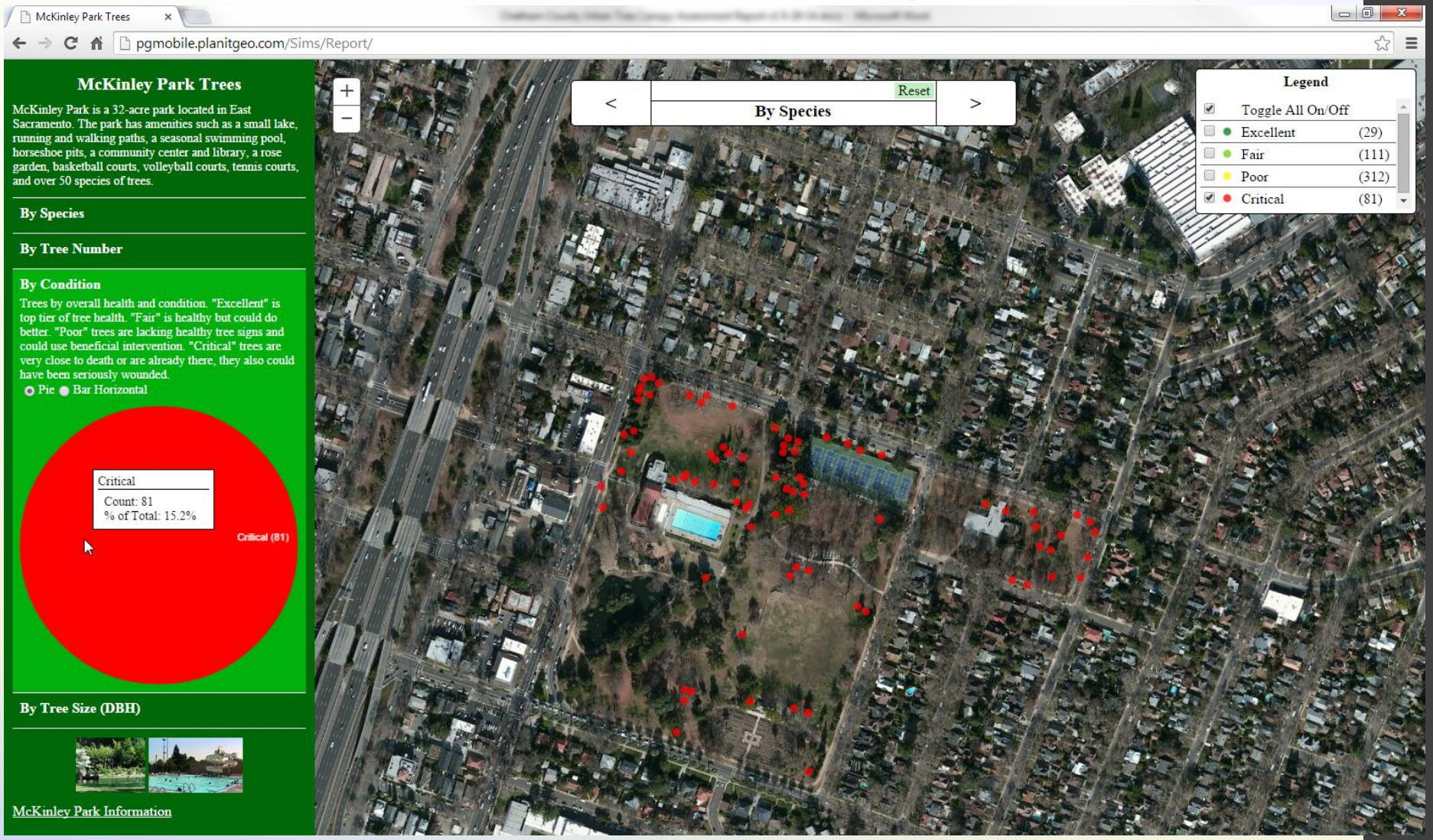
PARK TREE INVENTORY: WEB-BASED REPORTING

What's the Condition of trees in McKinley Park, and how many??



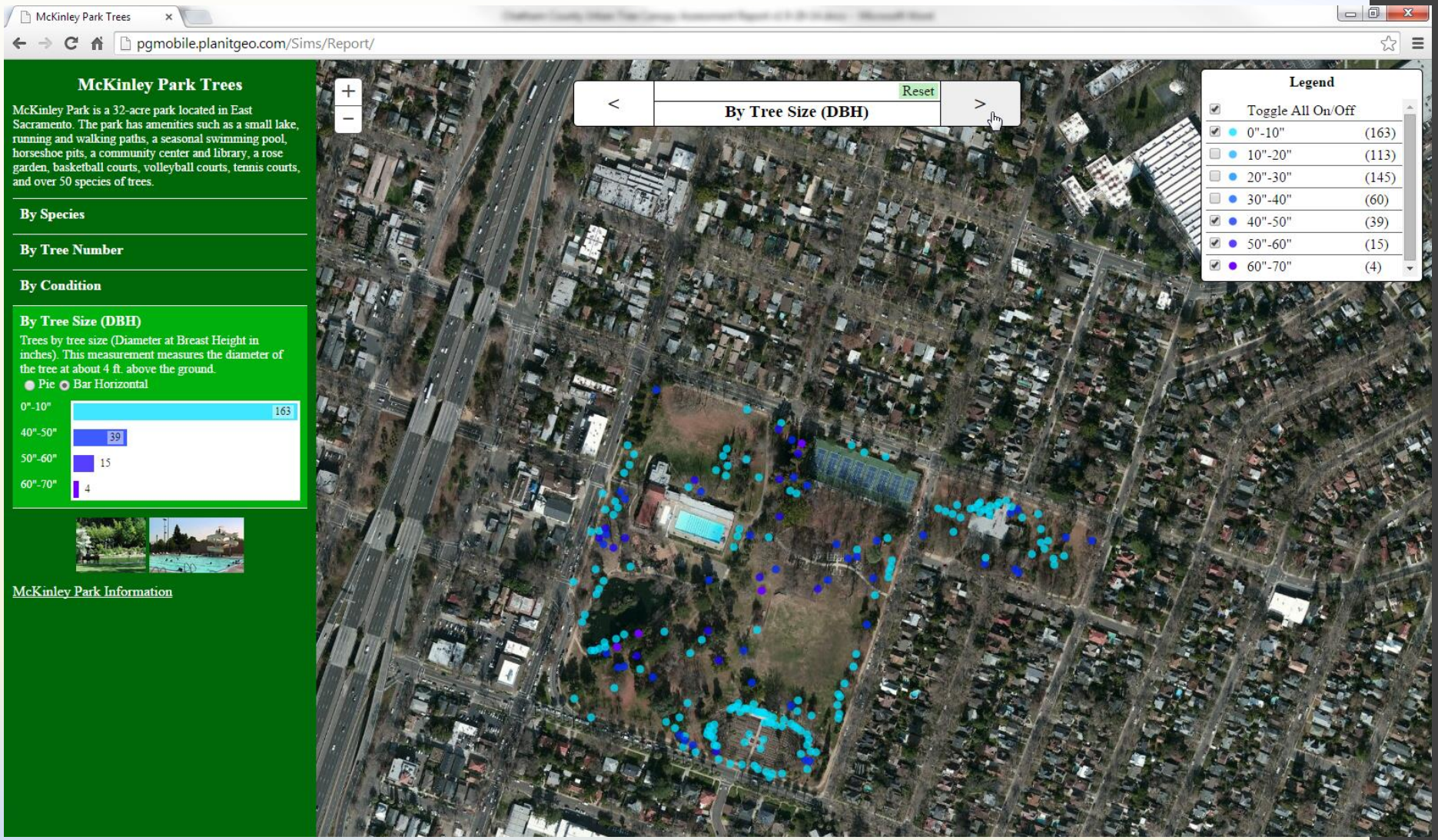
PARK TREE INVENTORY: WEB-BASED REPORTING

Where are there trees in Critical Condition in McKinley Park, and how many??



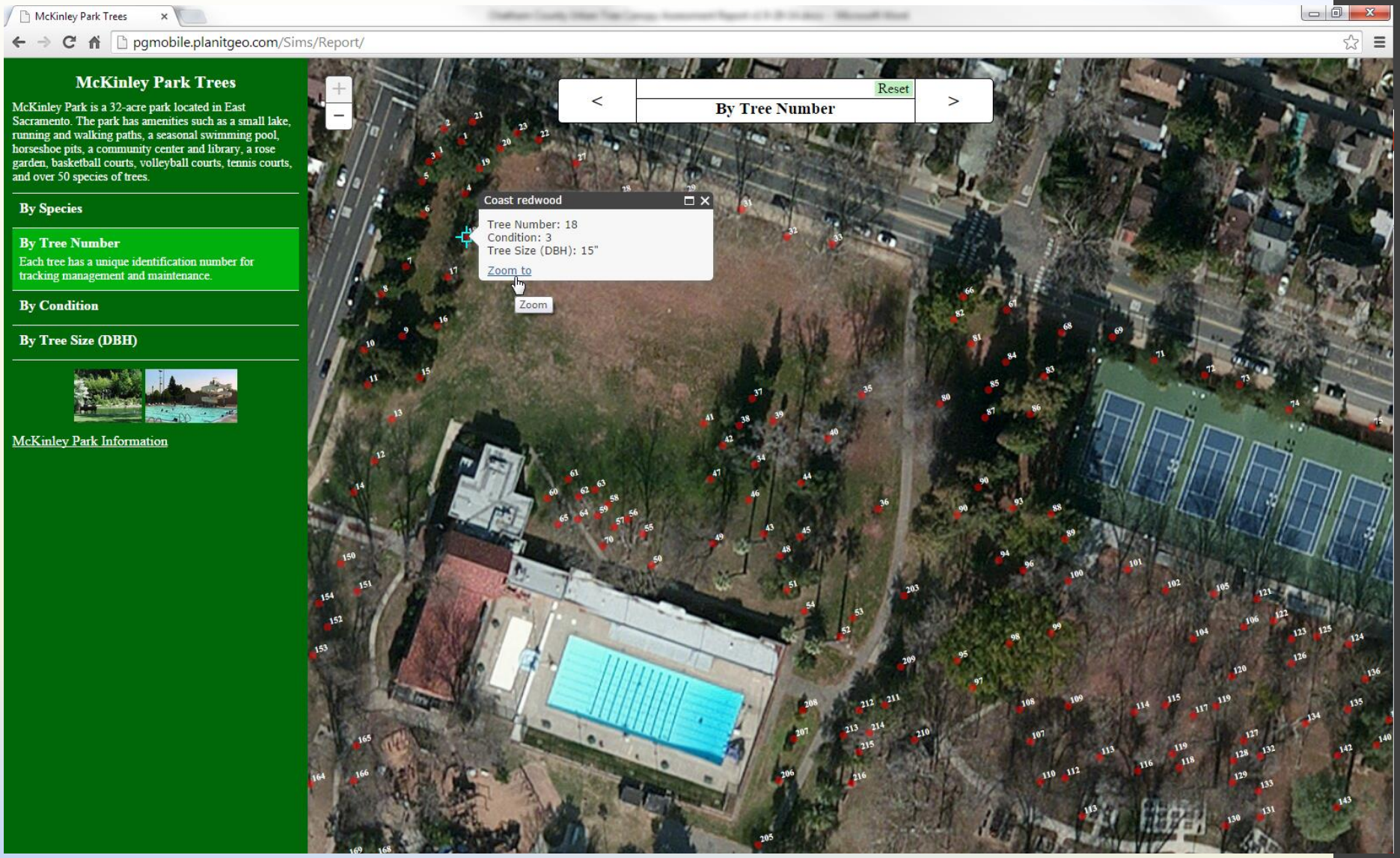
PARK TREE INVENTORY: WEB-BASED REPORTING

Where are the smallest and largest trees in McKinley Park??



PARK TREE INVENTORY: WEB-BASED REPORTING

Track trees by their ID number. Click on a tree to learn more.

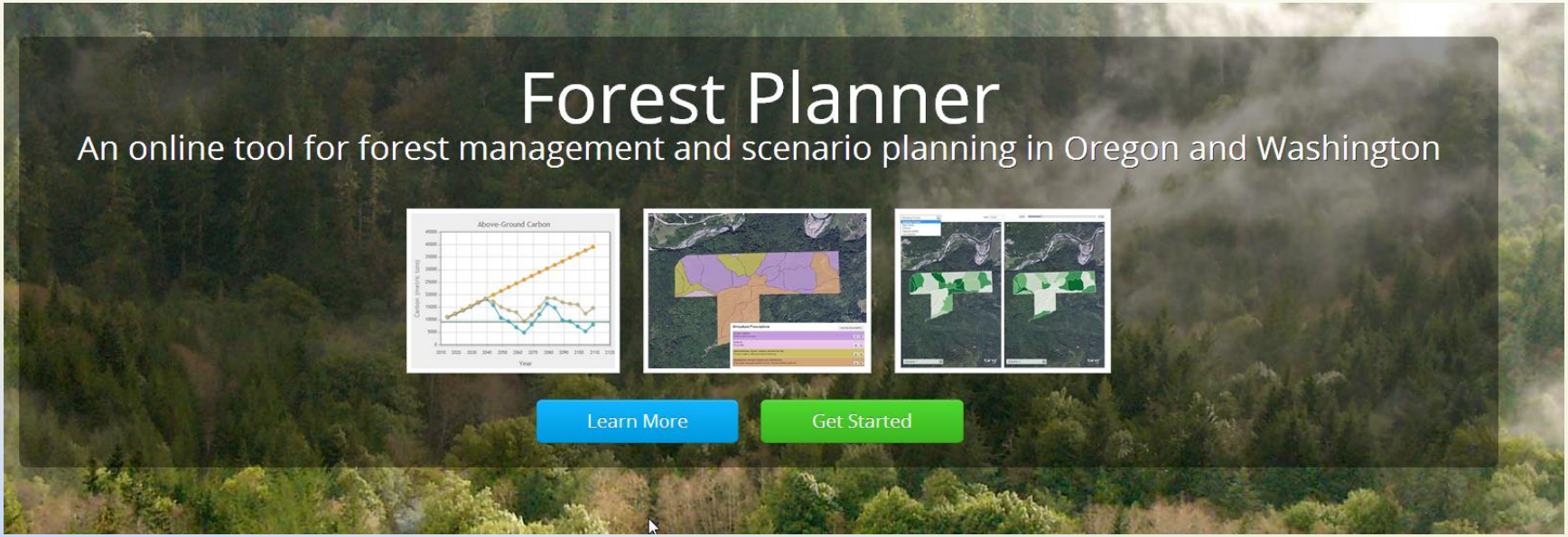


14

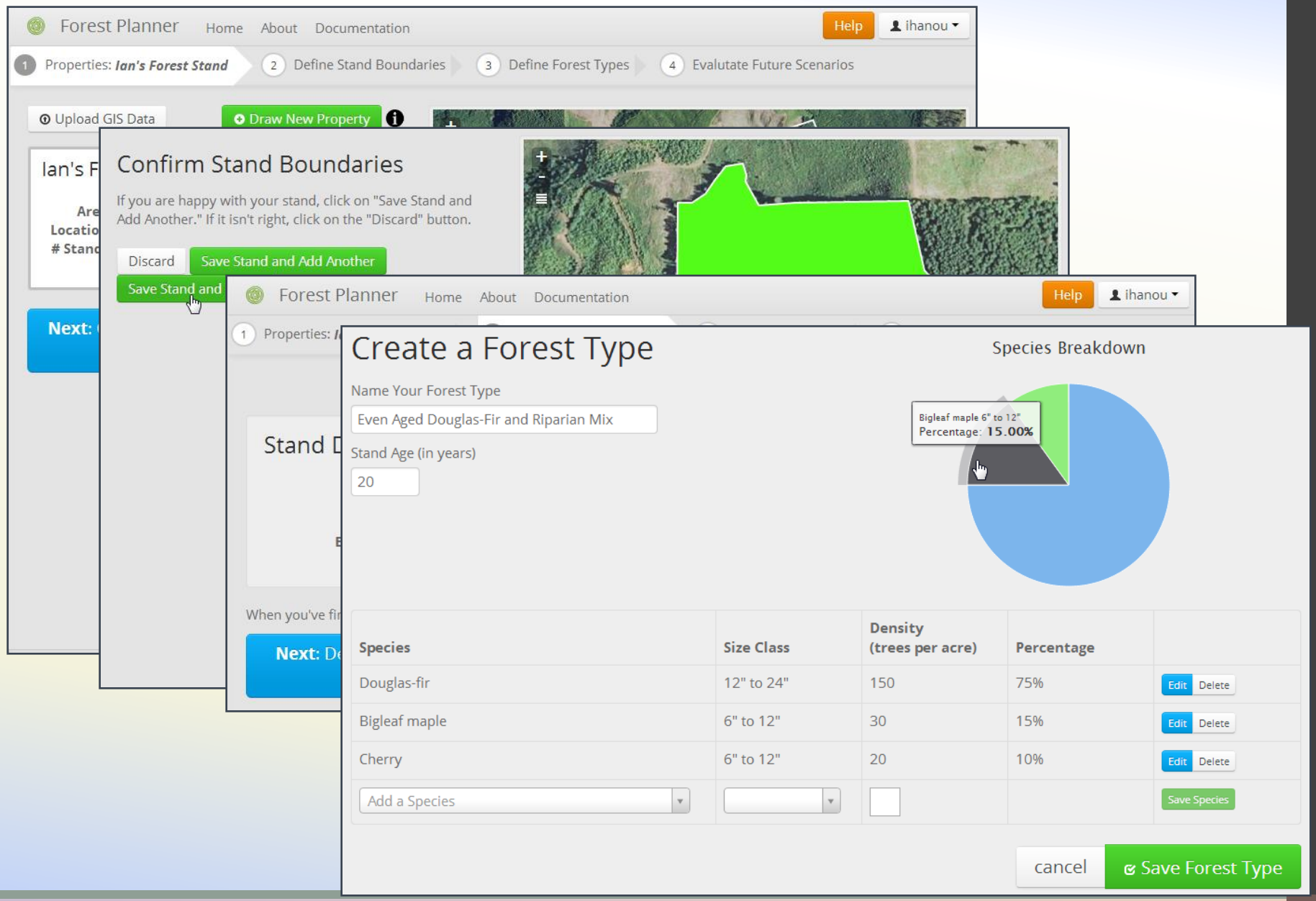
FOREST PLANNER (ECOTRUST)

http://forestplanner.ecotrust.org

- Visualize harvest schemes that deliver different returns — timber yields and ecosystem services such as carbon storage/sequestration and habitat
- Step-by-step examples on next slides
- Videos at http://vimeo.com/m/ecotrust



14 FOREST PLANNER (ECOTRUST)



14

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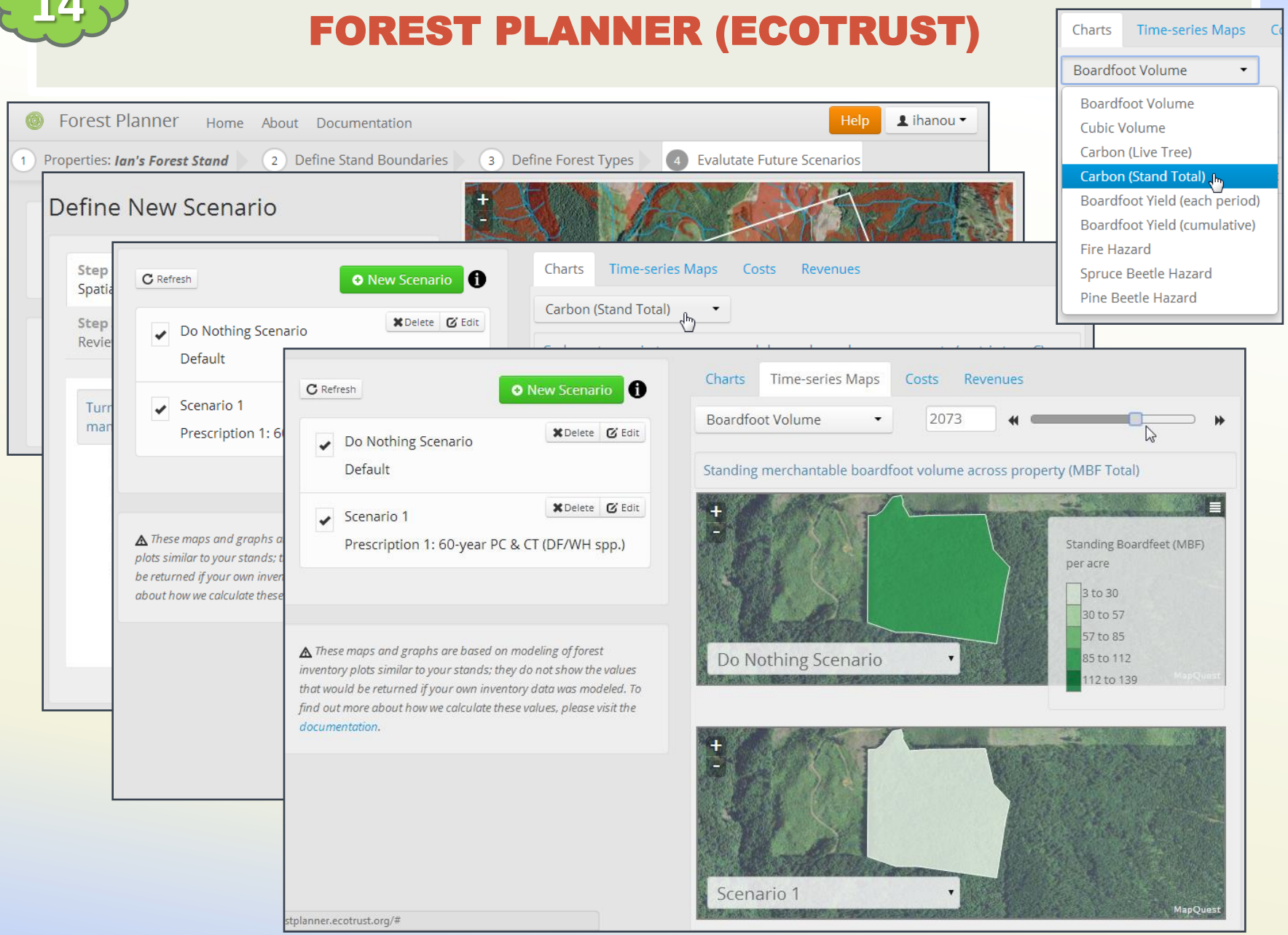

THANK YOU - CONTACT US

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