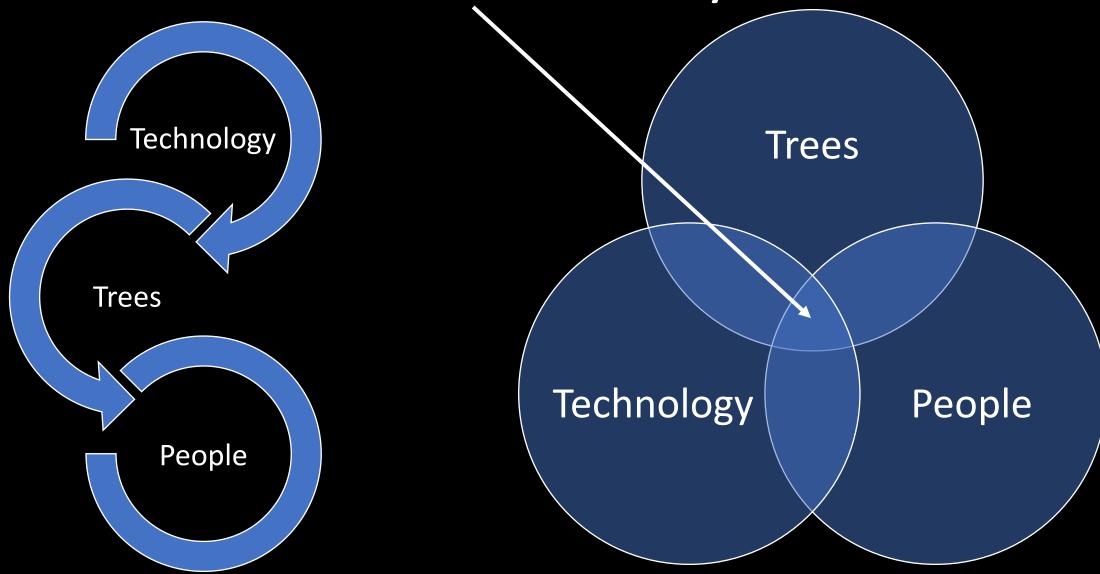
## Trees, People, & Technology

Josh Behounek
Davey Resource Group

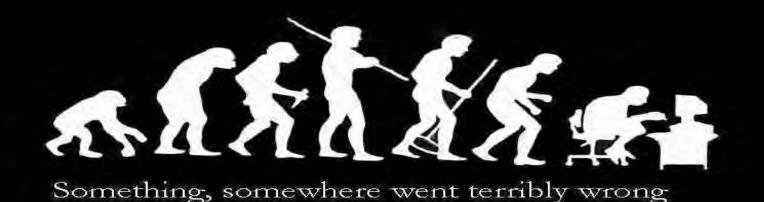
Josh.Behounek@davey.com

573-673-7530

IntersecTREEnality



# Technology won't replace arborists but arborists who use technology will replace arborist who do not.



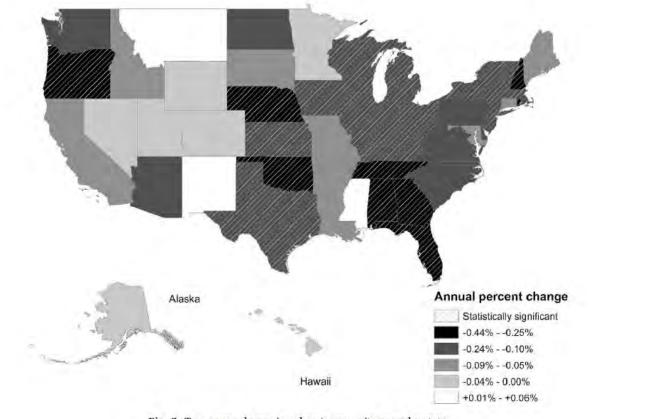


Fig. 2. Tree cover change in urban/community areas by state

# Canopy on the Decline Nationally

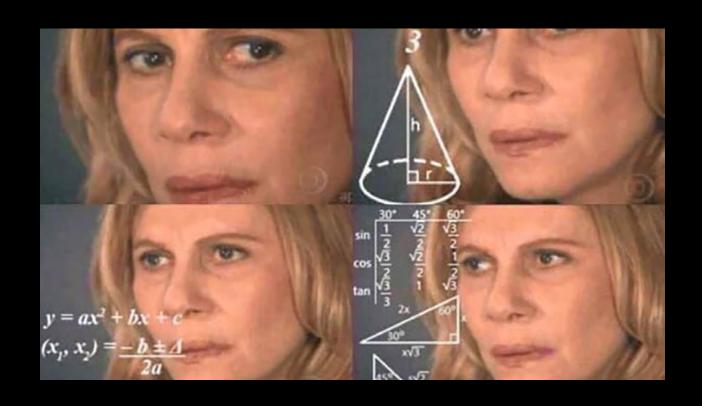
#### 2009 - 2014

US -0.7% decline @ -174,940 acres/year

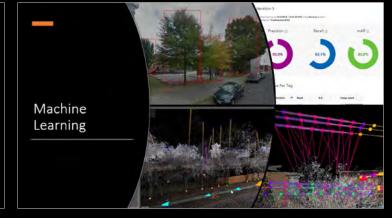
Michigan - 1.0% decline @ -7,230 acres/year

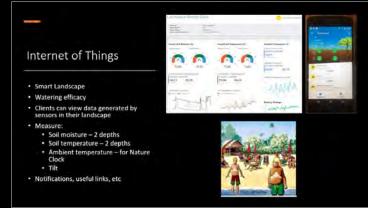
## Types of Urban Forestry Technology

- Top Down Forests
  - Urban Tree Canopy Analysis
  - LiDAR
  - Drones
- Bottom Up Forests
  - Tree Inventory Software
  - i-Tree (Eco, myTree)
- Individual Trees
  - Internet of Things
  - NatureScore
  - Ground Penetrating Radar



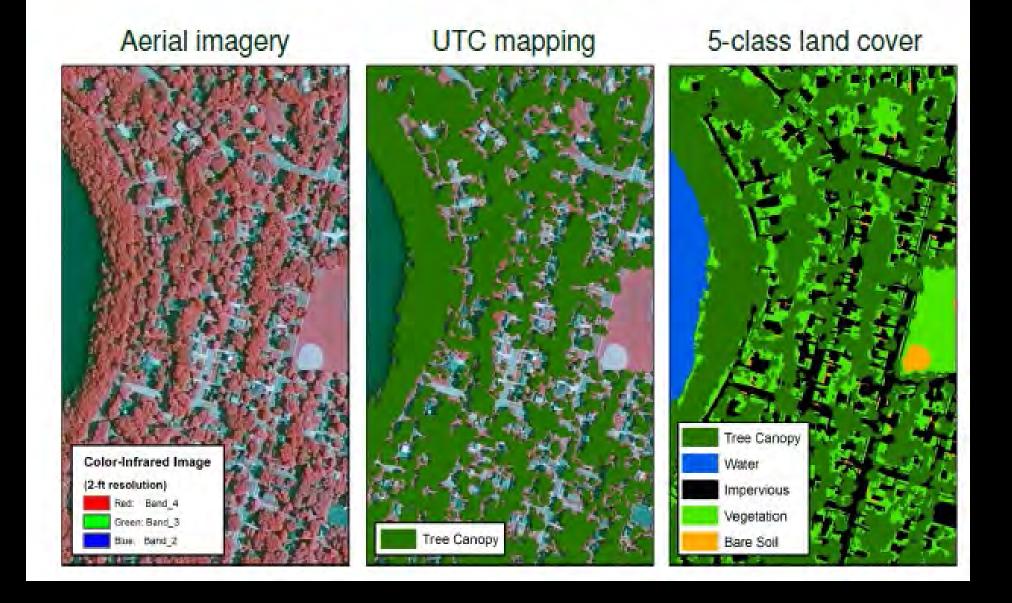




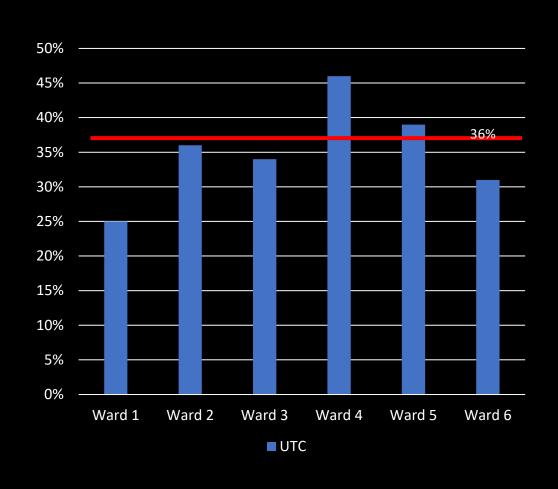


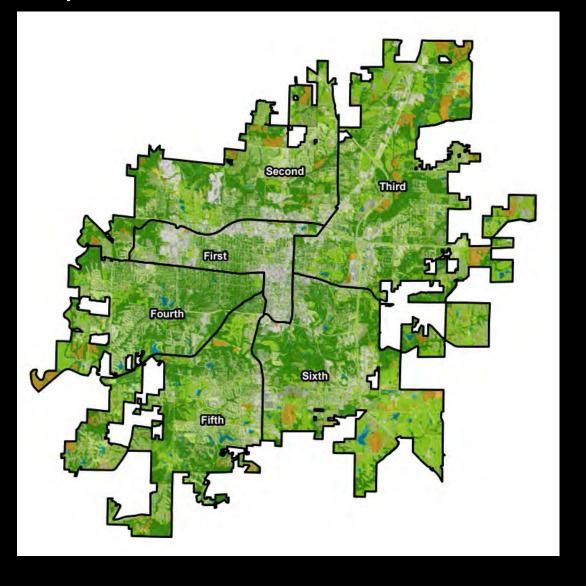


## Imagery & Classification Results

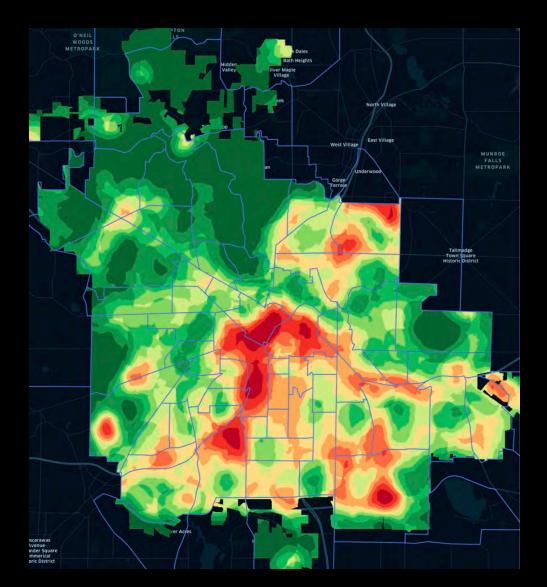


## Urban Tree Canopy (UTC)

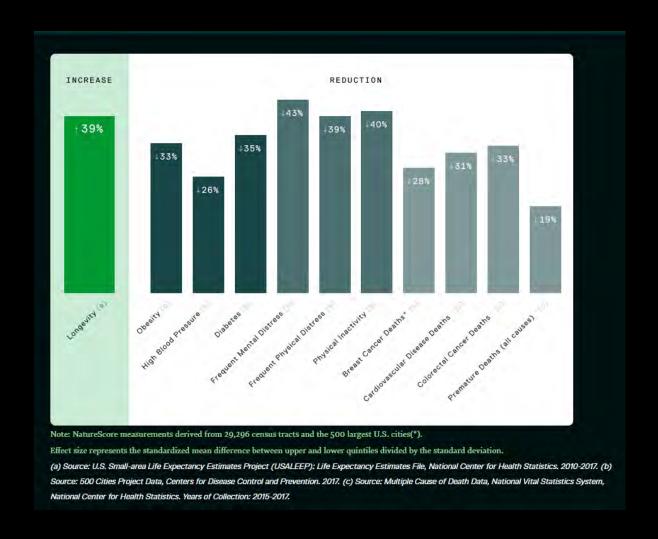


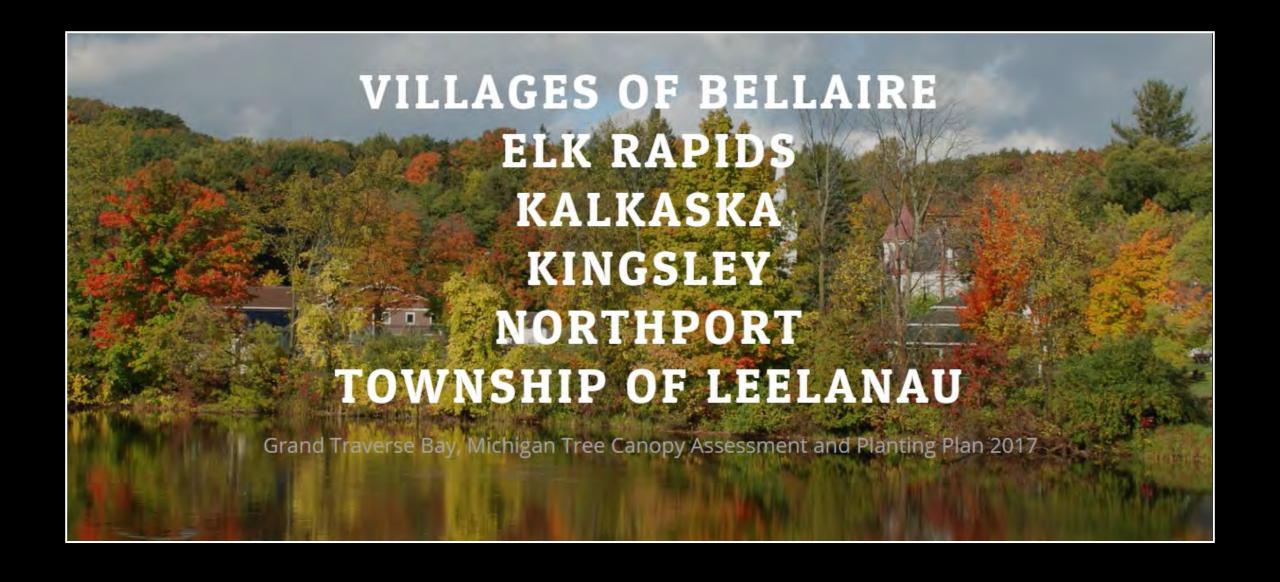


## Heatmap

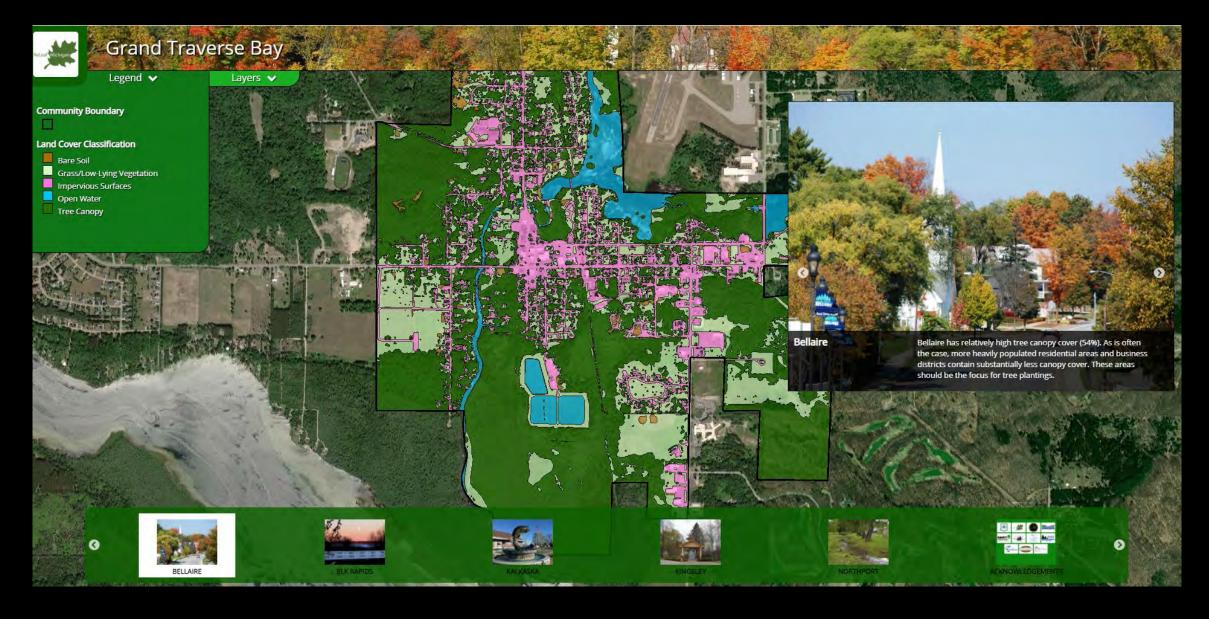


## NatureScore<sup>TM</sup>





## Story Map – Priority Planting



## Story Map – Priority Planting



## sUAS Benefits

#### **Key Client Benefits:**

- Decreased Cost unmanned aircraft can be deployed rapidly and gather data in hours
- Faster Data Delivery current data acquired, processed and delivered in a matter of days
- •Improve Safety supplement ground inspections over hazardous terrain and limit employee exposure to dangerous equipment/chemicals
- •Improve Deliverable- higher resolution imagery compared to other traditional methods







With drones, you can avoid hazardous man-hours, save costs, and minimize downtime for inspections without sacrificing data quality or safety.



## Herbicide Application

#### DJI MG-1P (spray drone)

#### **Current DRG Services**

TGR (Tree Growth Regulator)
Invasive Species
Substation Spraying
IVM (Integrated Vegetation Management)

#### State Certifications/ Licenses (Crewmembers)

State Pesticide Applicator's License State Pesticide Aerial Applicator License

#### FAA Certificates/Exemptions (Operations)

Aerial Applicator Certification (Part 137) Process & Waivers

2-969 – Pre-application

2-970 – Formal Application

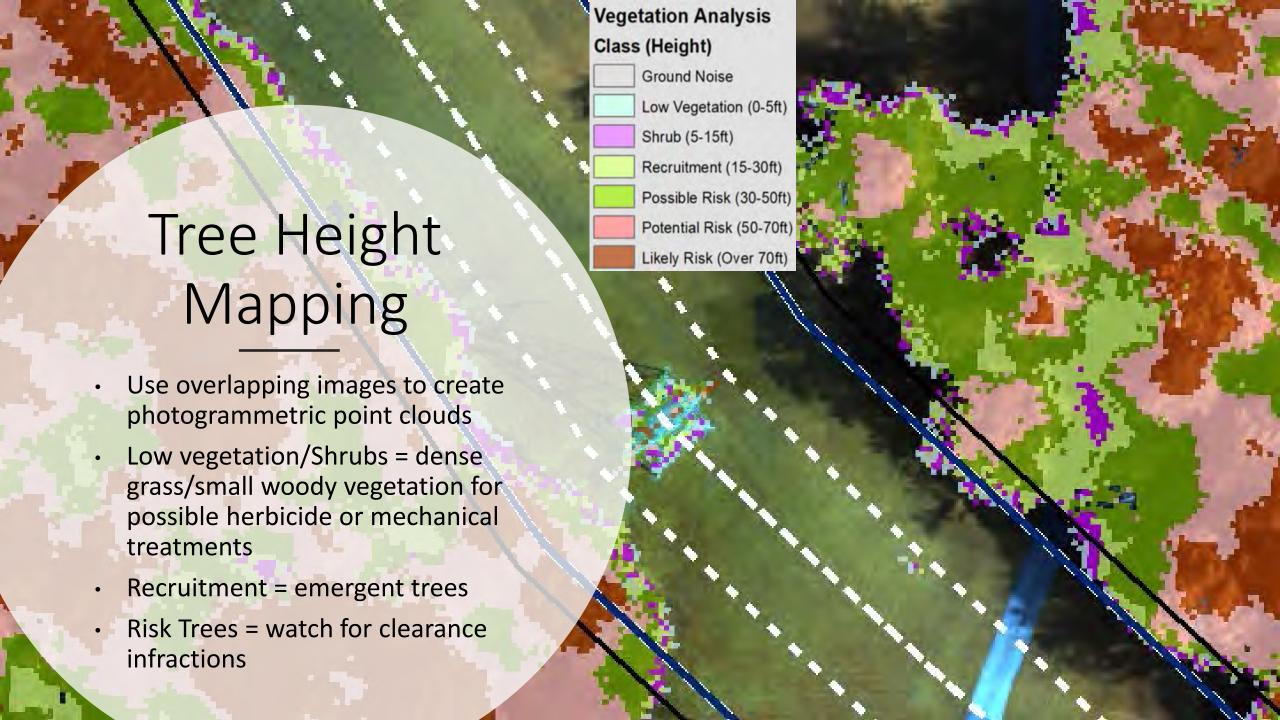
2-971 – Document Compliance

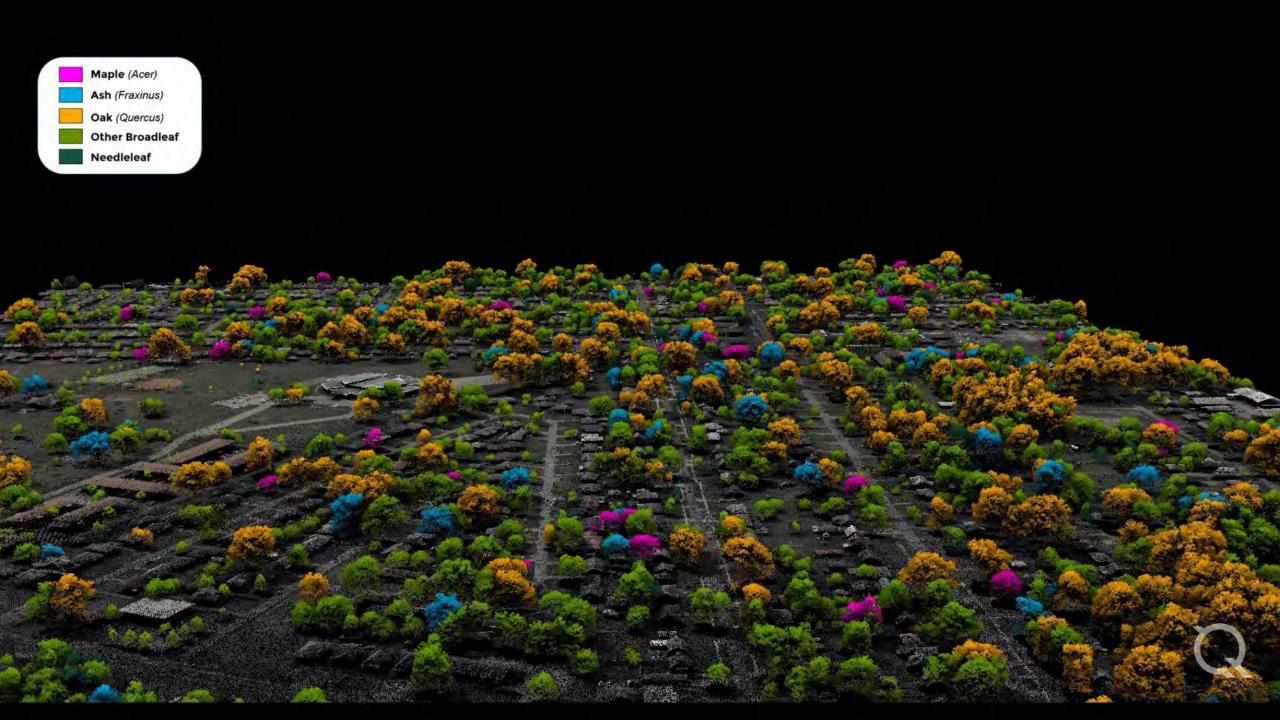
2-972 – Demonstration and Inspection

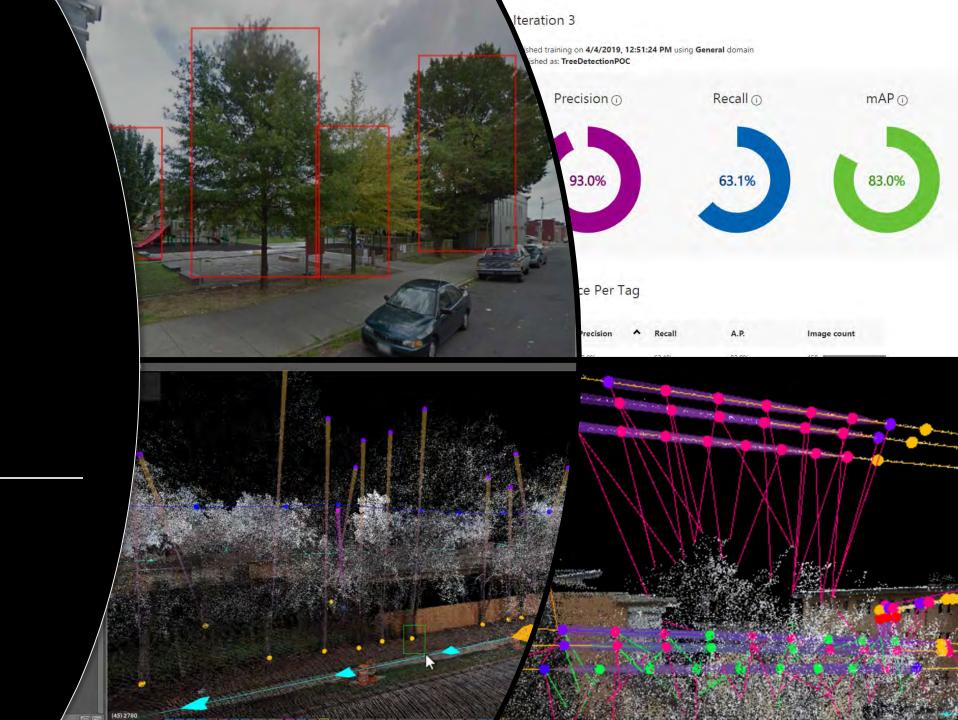
2-938 – Certification

44807 Exemption for Drone Spray Operations

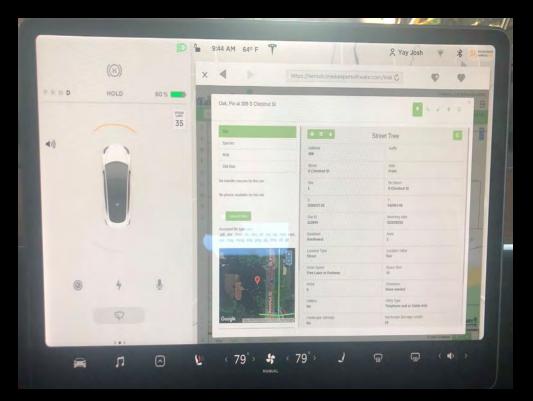
## Aerial Assessment of Plant Health MAP PAGE LEGEND **Foliar Condition** NOTES Dead/Dying Station Number **Resource Group** Golden-cheeked Warbler Habitat 100ft off Right-of-Way DATE CREATED: 10/2/2020 Projection: WGS 1984 UTM Zone 14N Imagery Source: Acquired September 2020 via UAV OF 12 Good

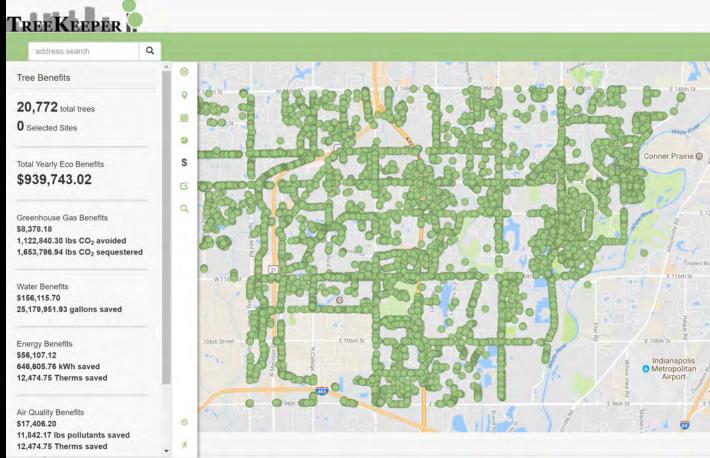






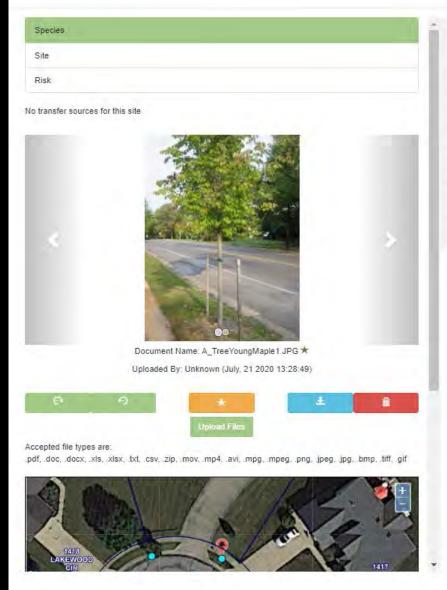
Machine Learning





## TreeKeeper 8 Tree Inventory Management Software

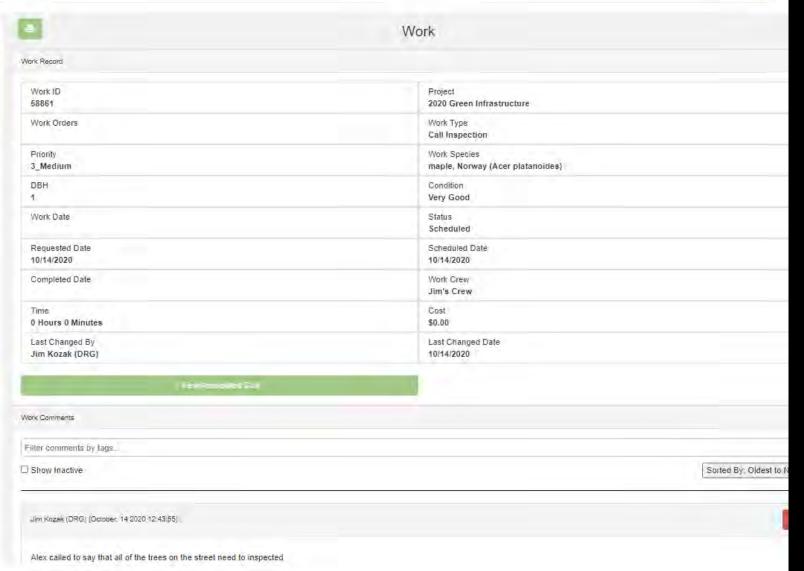




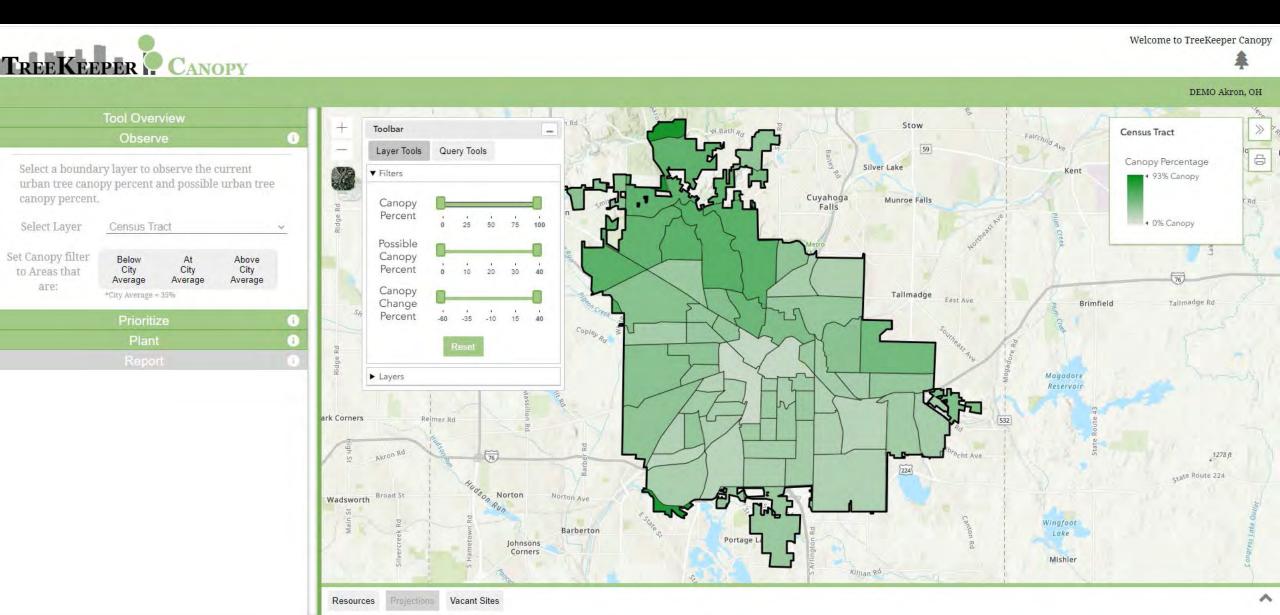
8 2 3	Street Trees	
Species W maple, Norway (Acer platanoides)	Cultivar	
Trunks 1	DBH 1	
Observations (None)	Condition Very Good	
Primary Maintenance General	Secondary Maintenance None	
Clearance None needed	Further Inspection No	

#### 3 Work Records





## Implementing your Tree Canopy Goal



Census Tract

Brimfield

Priority Analysis

◆ High Priority

◆ Low Priority

Tallmadge Rd

1278 ft

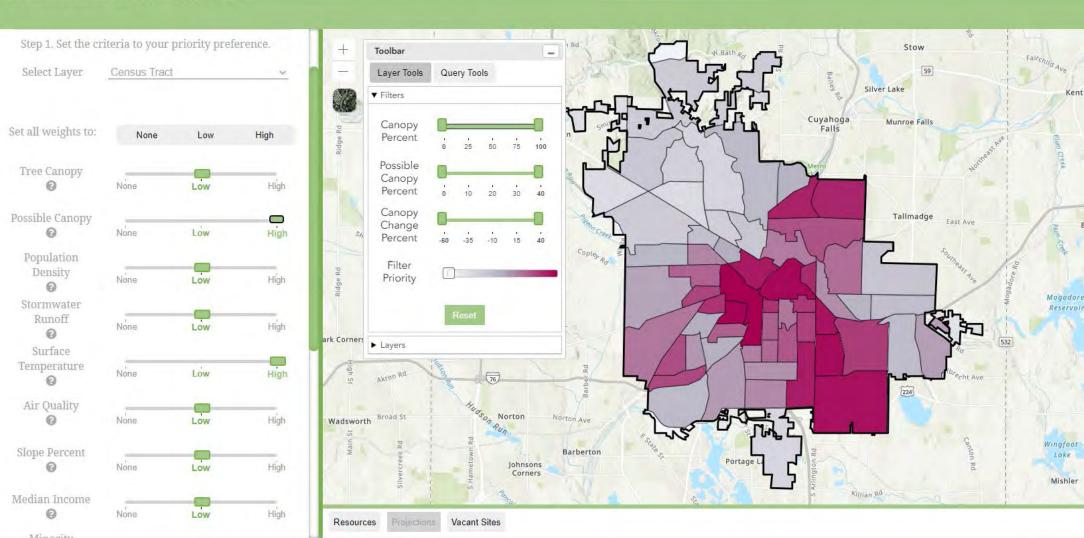
State Route 224

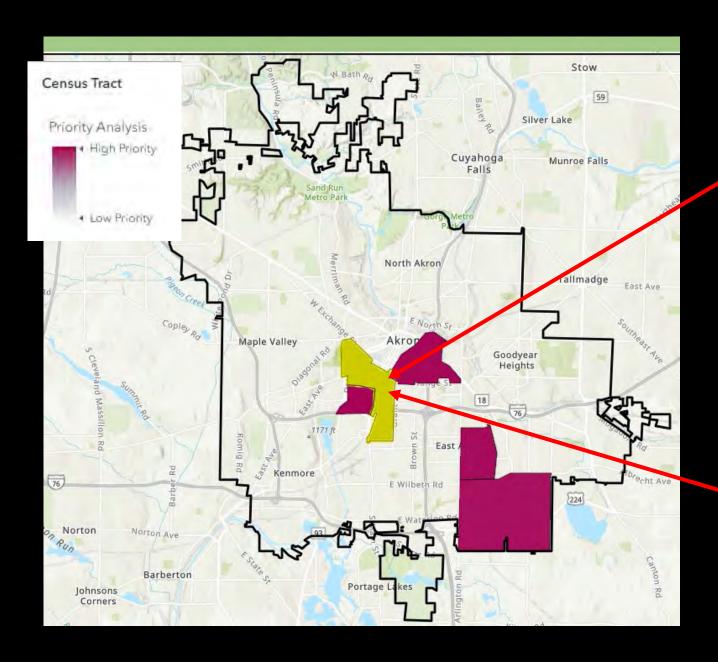
#### TREEKEEPER CANOPY

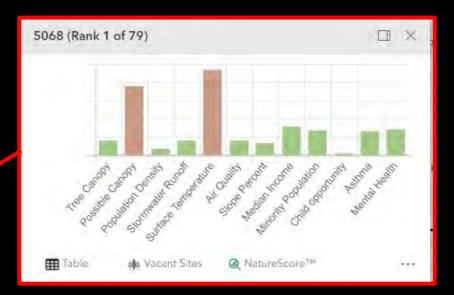


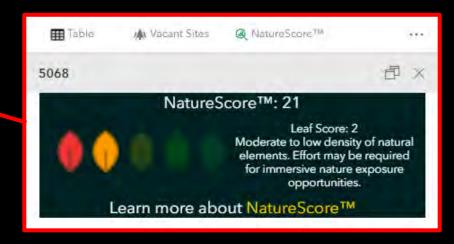
DEMO Akron, OH

다









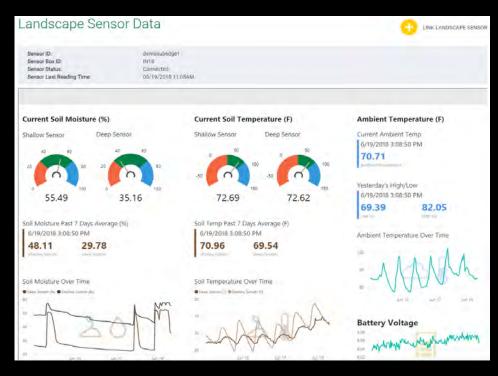


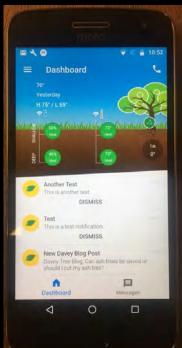
# Identifying Available Planting Sites

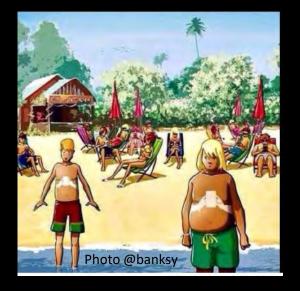
CSV	Select	ID =	Ward =	Address	Street #	Latitude +	Longitude
☑ Select All		60130	Ward 3	0	Bell St	41,08011135	-81.53572288
		60128	Ward 3	0	Bell St	41.08011883	-81,53584016
Copy Selected IDs		60135	Ward 3	508	Bell St	41,08031245	-81,5358316
		60136	Ward 3	504	Bell St	41,0804251	-81,53582996
Vacant Sites		50134	Ward 3	505	Rell St	41.08047289	-81.53571616
		60133	Ward 3	499	Bell St	41.08059093	-81,53571157
		60126	Ward 3	0	Bishop St	41,07966133	-81.53605729
		60125	Ward 3	0	Bell St	41.07974583	-81,53605749
		52431	Ward 3	187	W Exchange St	41.07980739	-81.52894687

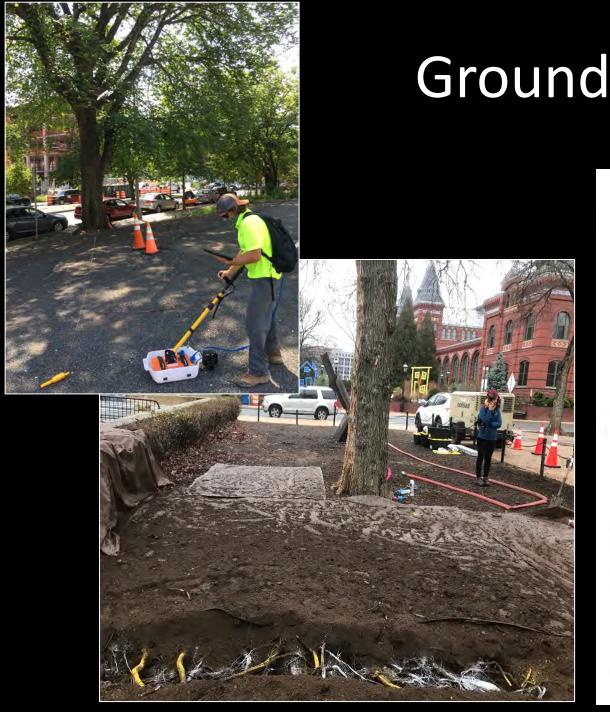
## Internet of Things

- Smart Landscape
- Watering efficacy
- Clients can view data generated by sensors in their landscape
- Measure:
  - Soil moisture 2 depths
  - Soil temperature 2 depths
  - Ambient temperature for Nature Clock
  - Tilt
- Notifications, useful links, etc

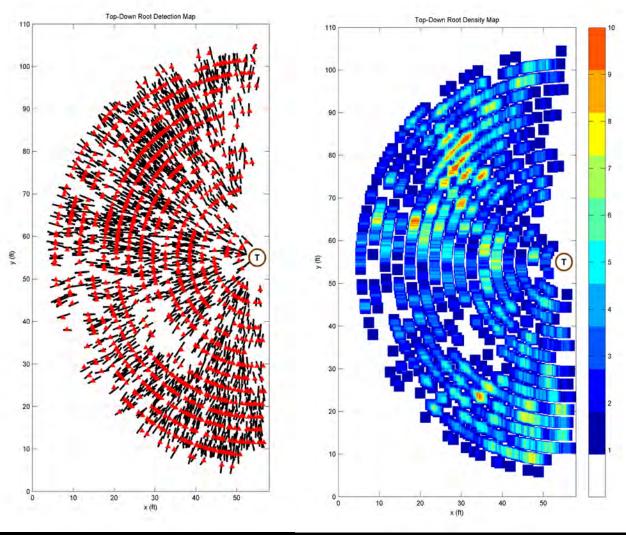




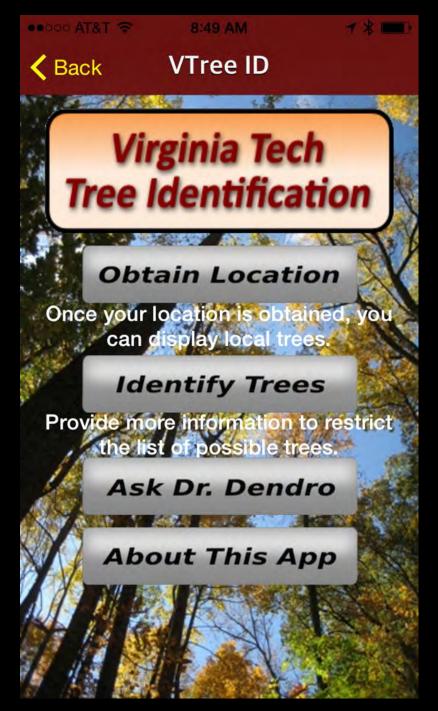


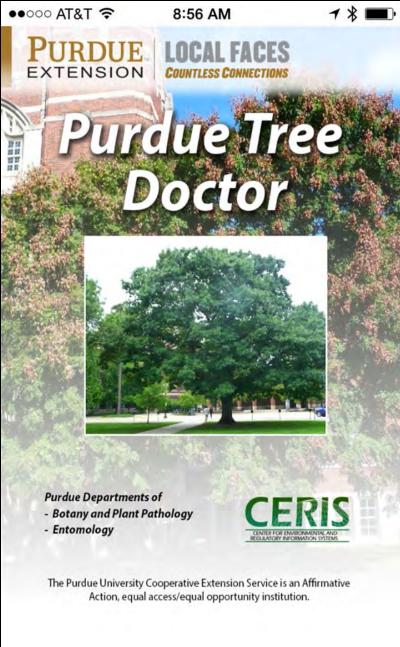


## **Ground Penetrating Radar**











#### Healthy Trees Healthy Cities

#### Tree Care

Nurture and care for your tree by watering, mulching, weeding, staking and creating tree beds

#### Pruning

Keep trees healthy and strong with hygienic and structural pruning

#### Health Check

Ensure your tree lives a long, healthy life with regular check ups

#### Pest Detection

Protect your community's trees by reporting signs of pests/diseases

#### Add A Tree

Whether you are planting or adopting, add a tree for easier record keeping

#### Add A Photo

Take or select a photo of a tree or activity to keep up with progress







#### MyTree 2.5,16





0

#### Learn about benefits that trees provide!

Tell us a little bit about your tree and we'll estimate the amount of carbon dioxide and pollution it removes from the air, as well as the amount of stormwater it can help mitigate.

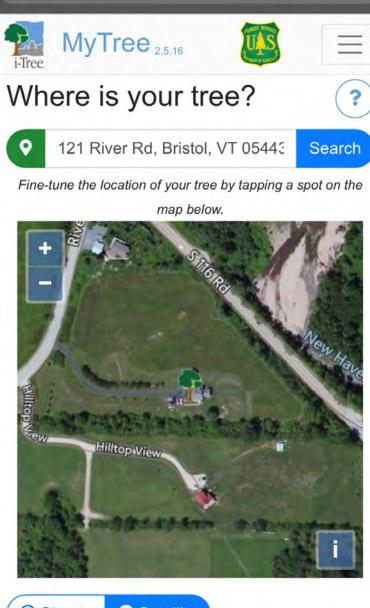
#### (b) Get Started

It's quick and easy!

Use of this tool indicates you accept our EULA.

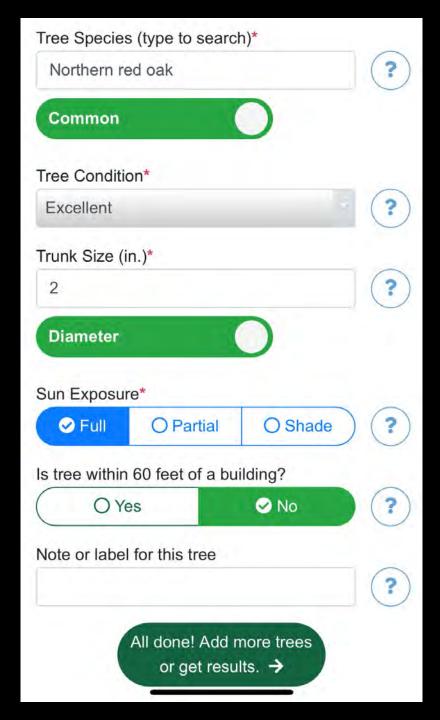


MyTree works in the US and Canada. Contact us with funding opportunities to enable it for your country.





Next, describe your tree →





\$0.51

48.25 lbs

Northern red oak, (Quercus rubra)

Serving Size: 2.00 in. diameter

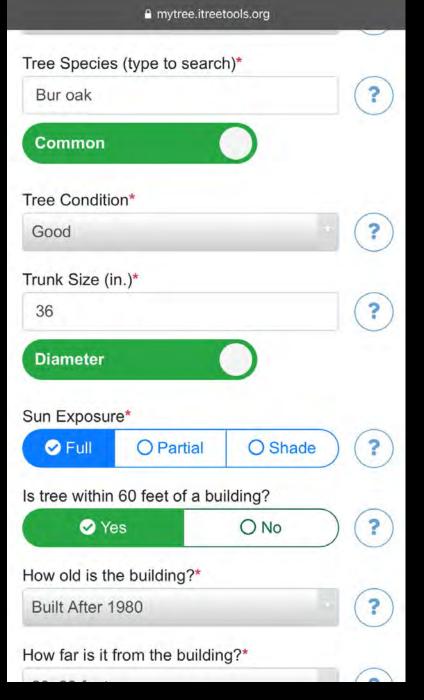
Condition: Excellent

CO<sub>2</sub> Stored To Date<sup>3</sup>

Lifetime CO<sub>2</sub> equivalent of carbon<sup>3</sup>

Total benefits for this year: \$0.22

Carbon Dioxide (CO <sub>2</sub> ) Sequestered	\$0.22
Annual CO <sub>2</sub> equivalent of carbon <sup>1</sup>	21.21 lbs
Storm Water Runoff Avoided	< \$0.10
Runoff Avoided	0.88 gal
Rainfall Intercepted	165.99 gal
Air Pollution Removed Each Year	\$0.00
Carbon Monoxide	< 0.1 oz
Ozone	1.23 oz
Nitrogen Dioxide	< 0.1 oz
Sulfur Dioxide	< 0.1 oz
PM <sub>2.5</sub>	< 0.1 oz



#### **MyTree Benefits**

mytree.itreetools.org

i.Tree

Bur oak, (Quercus macrocarpa)

Serving Size: 36.00 in. diameter

Condition: Good

Total benefits for this year:

Energy Usage Per Year<sup>2</sup>

Electricity Savings (A/C)

\$38.03

\$30.35

57.53 kWh

Total periodic for this year.	Ψ00.00
Carbon Dioxide (CO <sub>2</sub> ) Sequestered	\$7.47
Annual CO <sub>2</sub> equivalent of carbon <sup>1</sup>	708.14 lbs
Storm Water Runoff Avoided	\$0.20
Runoff Avoided	22.75 gal
Rainfall Intercepted	4,276.71 gal
Air Pollution Removed Each Year	\$0.00
Carbon Monoxide	0.19 oz
Ozone	34.81 oz
Nitrogen Dioxide	2.42 oz
Sulfur Dioxide	0.55 oz
PM <sub>2.5</sub>	0.8 oz

#### NORTH TERRACE TREE TRAIL, ADELAIDE







### Washington University Trees

TREES ABOUT OTHER RESOURCES ARBOR WALK

#### Arbor Walk

The WUSTL Arbor Walk is a self-guided tour highlighting 85 trees on campus which can be taken at any time during the year. The complete walk is about 3 hours long consists of around 9,800 Steps or 4.90 miles.

Guided tours are provided during the Fall and Spring seasons. Please check the <u>upcoming events section</u> of The Record for upcoming dates and times.



Urban Forestry Software Used for UMSL Tree Inventory & Analysis of Campus Trees

605 views • Feb 10 2010









## TREE TAGS









#### **URBAN FOREST** MASTER PLAN

Help Us Make Dallas A Greener, Shadier and Healthier City!



#### Dallas' Challenges



37% of Dallas' land is covered by impervious surfaces, such as buildings, roads and parking lots.



hotter! The effect of Dallas' urban heat sland on air temperature.





grade the American Lung Association gave Dallas for number of high ozone days from 2015-17.

#### **Benefits of Trees**



of water can be captured by one mature Dallas tree, helping to reduce flooding and improve water quality in Dallas lakes, rivers, and streams.



of tree canopy coverage in Dallas. Tree planting and preservation is 3.5 times as effective at lowering temperatures than other strategies.



of air pollution are removed every year by Dallas' urban trees.

The Texas Trees Foundation, City of Dallas and Davey Resource Group, Inc. are working together to develop Dallas' first Urban Forest Master Plan. The Plan will serve as a road map for us to proactively manage and grow the city's tree canopy.

#### The Urban Forest Master Plan will:

- Provide a shared vision for the future of Dallas' urban forest.
- Identify actions to ensure that trees are planted and preserved to maximize the benefits of Dallas' urban forest.
- Provide strategies for maintenance and long-term health monitoring of Dallas' urban forest.
- Develop clear goals and objectives to ensure Dallas has a resilient urban forest.

#### We Need Your Help

Throughout plan development, there will be opportunities for you to learn about Dallas' urban forest and to share ideas, thoughts and input on improving it. We encourage you to participate in these opportunitiesyour input is essential to building a sustainable and resilient urban forest in Dallas!

Plan updates and opportunities for input will be posted on the project website: www.texastrees.org/projects/dallas-urban-forest-master-plan/

climate energy<sub>lorax</sub> carbon urban savings mature heat equity life stormwater change aftercare mental



CHARLES C. MANN

# THE PROPHET

Two Groundbreaking Scientists and their Conflicting Visions of the Future of Our Planet

## Thanks

Josh Behounek

Josh.Behounek@davey.com

573-673-7530