

2020 i-Tree Academy Course Student Project Final Report

As part of the i-Tree Academy course, students will plan and complete a small i-Tree project. Conducting a project will provide practical experience, reinforce the training, and help share the value of i-Tree with communities or other individuals. The project could involve conducting an assessment which uses one or more i-tree tools in a community, or conducting a small i-tree training/workshop with others who are interested. Students will share a summary of their completed project with the class and with the community involved. Completing this summary form, will serve as a starting point for your project.

Student Name: Jennifer Rall

Employer or Organization: NC Forest Service/NC Dept. of Agriculture & Consumer Services

Email/Phone:

Project Title or Type: Training NCFS Field Staff in the Use of i-Tree Tools

Name of Community, Geographic Area and/or Tree Resource Involved: Snow Hill (Greene County), High Point (Guilford County), Zebulon (Wake County), Louisburg (Franklin County), Scotland Neck (Halifax County), Weaverville (Buncombe County)

Objective of Project – What Issue Will You Address: Pilot Project: Create an i-Tree tools practical or integrate into an existing practical for Ranger Training Chapter 10 (Urban Forestry).

Key i-Tree Tools to Be Used: Species, Design, Canopy

Brief Description of Project: Teach Assistant County Rangers who are in their training progression about the various i-Tree tools, how to use them, likely situations where i-Tree tools can be used and which tool(s) to use to achieve a desired goal.

Partners/Others Who Will Assist (If any): Ranger Training Coordinator, Assistant District Foresters, County Rangers

Proposed Time Line:

- April 13-17: Work with Ranger Training Coordinator, Assistant District Foresters and County Rangers to identify Assistant County Rangers who are in their training progression, have attended the Ranger Training Chapter 10 (Urban Forestry) course and are willing to participate in this pilot project.
- April 20-24: Contact Assistant County Rangers and provide details on pilot project; work with webmaster to create 2 training webinars; set dates/time for webinars.
- April 27-30: Conduct training webinars; obtain feedback from students; write summary report.
- May 1: Submit project summary report

Resources Needed: None

Describe End Products:

With the help of the Ranger Training Coordinator, eight individuals were selected from the current pool of Ranger Training students, based on those most likely to participate, have an interest in urban forestry, and having sufficient computer skills. Invitations to participate in this project were sent to all candidates with approval from the Assistant District Forester. Six individuals responded to the invitation.

The basis of the project was to incorporate teaching i-Tree Tools as part of the Ranger Training course that all newly hired Assistant County Rangers must complete. The students were selected because they had already attended the Urban Forestry portion of the Ranger Training program, and therefore were familiar with urban forestry topics and practicals. Using a currently used practical (Tree Selection), I incorporated utilizing i-Tree Species and i-Tree Design into the practical to demonstrate how species selection and placement can impact cooling costs. The second component was to create a new practical using i-Tree Canopy. The practicals are attached below.

A training webinar was conducted showing students how to access and utilize the tools. They were encouraged to play around with the tools and create their reports based on their selected locations. Students were asked to complete a feedback survey after completing their reports.

Based on survey responses, 40% of students equally ranked utilizing i-Tree Species in their interactions with homeowners as Likely or Very Likely, while 60% of students ranked using i-Tree Design as Very Likely. Forty percent of students ranked using i-Tree Canopy with communities as Very Likely. Sixty percent of students stated that i-Tree Tools would be Very Valuable in the service they provide to homeowners and communities. Students would Likely or Very Likely (40% each) recommend using i-Tree Tools to the communities or groups they assist. A majority of students (80%) would like to learn more about i-Tree Tools.

Overall, comments from students was positive. Many indicated they appreciated learning about this resource (having another “tool” in their toolbox) and that they would use the tools as they worked with homeowners and communities.

Next steps for this pilot project is to work with the Ranger Training Coordinator to determine the best way to integrate teaching i-Tree Tools into the Ranger Training course, and expanding training to all NCFS field staff.

Can We Use Your Project Work Time as Grant Match?:

The i-Tree Academy is supported by a grant from the U.S. Forest Service. Student time spent on completing these projects may be used to help match this grant (unless that time is paid for with federal funds, or used to match other federal funds).

Are you eligible to use your time as part of the match?

No

**Federally-funded position*

Are you willing to have us use your project time as part of the grant match?

No

(If yes, we will provide you with a form to track and value your project time).

i-Tree Academy Project

Ranger Training Practicals Utilizing i-Tree Tools

Incorporating i-Tree Tools into an existing practical

Practical #1: Tree Species Selection

Landowners often rely upon NCFS staff to provide tree planting species recommendations that match the landowner's site and objectives. They look to us as tree experts and expect to get good advice in a timely manner. However, the most suitable species will be different in a County in the mountains versus a County on the coast (plant hardiness). The choices will also be different depending on the space available, soil types and other environmental conditions.

The critical factors in plant species selection are the owner's objectives, Region and plant hardiness zone, the space available/limitations (above & below ground), sunlight exposure, soil type and pH and drainage.

Trees provide many environmental, economic and social benefits. These benefits should also be taken into account when selecting a tree species. Owner's objectives for shade could be translated into energy conservation benefits. Planting site location is just as crucial as species selection in meeting the owner's objective. Using i-Tree Tools to aid in site and species selection will help guide your recommendations.

Native species are the best options and NC has a wide variety to fit nearly every need. But, when native tree species don't meet the specific demands of a site, using tree selection tools and other resources should be used to find better tree species options (introduced, cultivar or varietal) that a landowner can consider. The goal is not to make every NCFS field staff person into an expert in urban tree selection, but to provide the tools necessary to service the requests of the public. This exercise will present you to those resources and their use. Additional helpful sites can be found in the reference list with the chapter.

- ❖ Identify the Hardiness Zone of a location.
 - www.plantmaps.com/interactive-north-carolina-usda-plant-zone-hardiness-map.php
- ❖ Use i-Tree Tools to calculate benefits
 - <https://species.itreetools.org/>
 - <https://design.itreetools.org/>
- ❖ There are two NC resources for your use.
 - NCSU Extension Plant Toolbox
 - https://plants.ces.ncsu.edu/find_a_plant/

- Using the Tool – The Whole Plant Traits and Cultural Conditions will be the primary search criteria you will use
 - Whole Plant Traits – Plant Type: Native, Tree, Shrub. Leaf Characteristics: Deciduous, Evergreen
- NCFS Urban & Community Forestry Intranet
 - FM&D/Urban Forestry/Specifications & BMPs
 - Tree Planting – Click to open and see the files
 - NCStreetTreeSuggestions -A short street tree list for North Carolina with lists of trees for small, medium and large street planting sites.
 - Street Tree Planting Site Standards
 - Street Tree Species – what to consider

Read each question carefully and follow the directions to work the programs and find the answer.

Question 1: Use i-Tree Tools

#1. A landowner along the coast wants to plant a native, broad spreading shade tree in the middle of the front yard of their house. Your inspection of the site reveals a 25 foot wide planting area between the house and the sidewalk along the street. There are no overhead obstacles. The soil is pH neutral, sandy and can be occasionally wet. **Using i-Tree Species and i-Tree Design, recommend a species and planting location to optimize shading and energy conservation benefits.**

Question 2: Use NCSU Extension Plant Toolbox

#2. A landowner wants to plant a dense and rounded form border screen between his property and the neighbor's property. He would like an evergreen and deciduous shrub in a space that is between 12-24 feet. Your examination of the site reveals it is an acidic loam soil, that is well drained and in partial shade. There are no overhead power lines will interfere. **Use Hardiness Zone 7a.**

Question 3: Use the NCFS Urban & Community Forestry Intranet

#3. A municipal public works manager would like three (3), pest free street tree species recommendations to be planted on a residential street between the street and sidewalk. The planting sites are 10 feet-wide and subject to heat off the street pavement and car traffic. There are no overhead obstacles. The soil is moderately compacted with neutral pH (pH: 6-8). **Use Hardiness Zone 8a.** The manager would also like to know what the spacing should be between trees.

Method for answering Question 1

Step 1:

1. Navigate to <https://species.itreetools.org/>. Click "Get Started".

2. Select Pitt County in the County/Division dropdown box. Select Greenville in the City dropdown box. Click “Next”.
3. Height Constraints – leave blank for this exercise. Click “Next”.
4. Under “Other Functions”, increase the “Building Energy Reduction” slider to 10. Click “Next”.
5. Save or Print report.
6. Choose 2-3 species for use in Step 2 (does not have to be native but cannot be invasive).

Step 2:

7. Navigate to <https://design.itreetools.org/>
8. Enter the following address into the search box, 2237 Penncross Drive, Greenville, NC, then click “Go!”. Click “Ok” when dialog box pops up.
9. Draw Structures: Click “Yes” to calculate cooling and heating impacts.
 - a. Click the polygon icon and draw polygon around structure.
 - b. House information: select post-1980 (heated and cooled boxes should already be checked). Click “Ok”.
10. Place Trees
 - a. Select one of the tree species from Step 1 from the dropdown box.
 - b. Input “3” into the tree diameter box.
 - c. Leave other boxes at the default settings.
 - d. Image may automatically show the tree benefit zones around the structure. If not, click the icon that looks like a spider web.
 - i. The darker green areas are optimal areas for tree planting in terms of energy conservation.
 - e. Click the tree icon to place the tree in the optimal area for energy conservation benefits. Click “Ok” to confirm tree location.
 - i. Click “Model Crown Growth” to see simulation of tree canopy cover over a 60-year period.
 - f. Estimate Benefits
 - i. Input the number of years over which to calculate benefits. Use 25 for this example. Click “Calculate”.
 - g. View benefits by clicking on the various tabs. Save Report.
 - h. Repeat steps above with the other tree(s) you selected in Step 1.
 - i. Click “Return to Setup”.
 - ii. Click the first tab on the right side of image labeled “Your Trees”. Click “Delete”.
 - iii. Repeat the Place Trees step using the next tree on your list from Step 1.
 - iv. Save report. Compare estimated benefits of your selected trees.

New practical utilizing i-Tree Tools

Practical #2: Canopy Cover Analysis

The planning director for a local municipality has been directed by the mayor to come up with canopy cover goals and a tree preservation ordinance for the community. This is a relatively small municipality, but it is located near a larger municipality and they are beginning to feel development

pressure as new residents move into the community. The planning director has done some research and believes that a canopy cover analysis is the best place to start in developing canopy cover goals and tree preservation policies.

Question 1: The planning director does not have the budget to hire a consultant to conduct an extensive canopy cover analysis and is asking your advice on how they can conduct such a study. After learning how to use i-Tree Canopy, explain how it can be used as a simple and cost-effective method for obtaining canopy cover analysis data.

Method for answering Question 1

1. Navigate to <https://canopy.itreetools.org/>
2. Load ESRI shapefile or Define Project Area
3. Configure and Begin Your Survey:
 - a. Default values are “Tree” and “Non-Tree”
 - b. Select County in which municipality is located
 - c. Click “Begin Survey”
4. To add new point, click the “+” sign; Select the cover class
5. Collect at least 200 points
6. Run report

Utilizing i-Tree Tools in Real-World Scenarios

Student Survey Summary

Select your ranking choice by selecting the number/text and changing to **bold** font.

1. How likely are you to use the following i-Tree Tools in your interactions with homeowners or communities?

	Not Likely		Somewhat Likely		Very Likely
a. Species	1	2	3	4	5

40% of students equally ranked i-Tree Species as Likely (4) or Very Likely (5)

b. Design	1	2	3	4	5
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60% of students ranked i-Tree Design as Very Likely (5)

c. Canopy	1	2	3	4	5
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40% of students ranked i-Tree Canopy as Very Likely (5); with 20% ranking each for 2-4

2. How valuable do you think these tools will be to the service you provide to individuals and communities?

Not Valuable		Somewhat Valuable		Very Valuable
1	2	3	4	5

60% of students ranked value of tools as Very Valuable (5)

- a. Explain: **Student Responses**

- i. The county I work in mostly carries out yard tree requests and small urban plans. That is why I think the species and design tools would be the most beneficial to me. I see the canopy tool being used on larger projects such as municipalities or large suburbs- which we don't typically receive requests for in my county. But I am glad that I have this tool as an option if the request ever occurs.
- ii. I think the Canopy tool could be very helpful in doing community urban plans if the HOA/ tree board is interested in knowing the numbers or in help selling the idea of management cost. Without a way to add other parameters I don't think the Species tool is useful.
- iii. The tools will definitely be valuable when working with landowners to select tree species and location.
- iv. These tools will change the way people view trees and their benefits. The homeowner/municipality can see real life numbers at a glance.

- v. The species and design tool seem like they could be very useful for picking desired species and then analyzing the locational benefits of species placement. The canopy tool seems to be more focused on generating a list of benefits, which while useful, may be difficult for some individuals or communities to interpret.

3. How likely are you to recommend i-Tree Tools to the communities or groups you assist?

Not Likely		Somewhat Likely		Very Likely
1	2	3	4	5

40% of students equally ranked recommending i-Tree Tools as Likely (4) or Very Likely (5)

4. Would you be interested in learning more about i-Tree Tools?

Yes No

80% of students would be interested in learning more about i-Tree Tools

5. How do you see yourself using the tools your learned in your interactions with homeowners and communities?

- a. Like I stated above typically we deal with yard tree requests in our county. Most of the times this is because there are some signs of decline in the tree and the homeowner is concerned. I could see myself utilizing the species and design tools to help recommend tree species to replace the declining yard tree and the design tool to help the homeowner determine the best place to plant the replacement tree to get the most benefit.
- b. I mainly see using the I canopy tool in assisting communities.
- c. The tools will be helpful when explaining economic impacts of planting trees to a landowner.
- d. I think it's a great way to get people to see the value of trees in a different way. Smart, educated planning can save you money and bring you comfort in the areas you frequent. I think a question that will get a person's attention is do you like to save money? Let me show you how your decision to use this technology can save you money and help the environment today and more down the road.
- e. I could see this being used more for shade tree requests or for homeowners interested in planting trees. The ability of the design tool to project forward into the future and simulate potential tree canopy growth could be useful to avoid planting trees too closely to structures. I could also see this being used on special request by communities to generate reports that could be used to help justify green initiatives or the planting of more trees.

6. Other comments?

- a. I want to thank you for considering me to help with this project. I am glad that I now have knowledge of the i-tree tools available for use moving forward in my work.
- b. The species tool would be far better if it had parameters for space and other site considerations.
- c. I enjoyed this project. Thank you, Jennifer for teaching us.
- d. This is interesting software that I believe will appeal to the business and conservation minded person. It just makes good sense if you want to plant trees, plant them in the optimal location.
- e. I love the functionality of the tools, however I am curious to see how the monetary savings are determined for things like the heating/cooling and other impacts. I would like to “see under the hood” as to what the monetary amounts that get generated are based on. For instance, a house with an expensive and inefficient cooling system would benefit more monetarily from summer shade than a more modern and efficiently designed home. I’m just curious to see if there is a way to fine-tune some of these inputs to generate less generalized reports.

Report

- Top 10% shows the best matches.
- All shows the entire ranked list.



Trees Recommended by i-Tree Species

This is a list of the top 10% of tree species based on the following functions.

Generated: 4/29/2020

Location: Zebulon, North Carolina, United States of America

Hardiness: 7

Constraints:

- Minimum Height: None
- Maximum Height: None

Air Pollutant Removal (0-10 Importance)

- Overall: 0

Other Functions (0-10 Importance)

- Low VOC: 0
- Carbon Storage: 0
- Wind Reduction: 0
- Air Temperature Reduction: 0
- UV Radiation Reduction: 0
- Building Energy Reduction: 10
- Streamflow Reduction: 0
- Low Allergenicity: 0

S = Sensitive I = Intermediate S/I = Indeterminate

Species		Hardiness Zone	Invasive	Sensitivity			Pest Risk
Scientific Name	Common Name			Ozone (O3)	Nitrogen Dioxide (NO2)	Sulfur Dioxide (SO2)	Possible Pests
LIRIODENDRON TULIPIFERA	TULIP TREE	5 ~ 9		S			
ULMUS AMERICANA	AMERICAN ELM	3 ~ 9			I/S		Asian Longhorned Beetle, Dutch Elm Disease, Winter Moth
ULMUS GLABRA	WYCH ELM	4 ~ 7					Asian Longhorned Beetle, Dutch Elm Disease
TILIA AMERICANA	AMERICAN BASSWOOD	4 ~ 9		I	I		Gypsy Moth, Winter Moth
BETULA ALLEGHANIENSIS	YELLOW BIRCH	3 ~ 7		I	S		Asian Longhorned Beetle, Large Aspen Tortrix, Winter Moth

Species		Hardiness Zone	Invasive	Sensitivity			Pest Risk
Scientific Name	Common Name			Ozone (O3)	Nitrogen Dioxide (NO2)	Sulfur Dioxide (SO2)	Possible Pests
TILIA TOMENTOSA	SILVER LINDEN	5 ~ 7				Gypsy Moth	
ACER MACROPHYLLUM	BIGLEAF MAPLE	7 ~ 10	I			Asian Longhorned Beetle, Winter Moth	
ACER PSEUDOPLATANUS	SYCAMORE MAPLE	5 ~ 7				Asian Longhorned Beetle	
ACER X FREEMANII	FREEMAN MAPLE	4 ~ 8				Asian Longhorned Beetle	
ZELKOVA SERRATA	JAPANESE ZELKOVA	5 ~ 8	S				
CELTIS OCCIDENTALIS	NORTHERN HACKBERRY	3 ~ 9					
JUGLANS NIGRA	BLACK WALNUT	4 ~ 9				Thousand Canker Disease	
FAGUS GRANDIFOLIA	AMERICAN BEECH	4 ~ 8				Beech Bark Disease	
TSUGA HETEROPHYLLA	WESTERN HEMLOCK	6 ~ 7		I		Southern Pine Beetle, Western Spruce Budworm	
TSUGA MERTENSIANA	MOUNTAIN HEMLOCK	5 ~ 7				Fir Engraver, Southern Pine Beetle, Western Spruce Budworm	
PICEA ASPERATA	CHINESE SPRUCE	6 ~ 7				Southern Pine Beetle, Spruce Beetle	
PICEA ABIES	NORWAY SPRUCE	3 ~ 7				Mountain Pine Beetle, Pine Shoot Beetle, Southern Pine Beetle, Spruce Beetle, Western Spruce Budworm	
TSUGA CANADENSIS	EASTERN HEMLOCK	4 ~ 7	I			Hemlock Woolly Adelgid, Southern Pine Beetle	



Total Projected Benefits (2020-2045) - Over the next 25 years, based on forecasted tree growth, i-Tree Design projects total benefits worth \$1,046:

- \$9 of storm runoff savings by avoiding 991 gallons of stormwater runoff (intercepting 19,305 gallons of rainfall)
- \$14 of air quality improvement savings by absorbing and intercepting pollutants such as ozone, sulfur dioxide, nitrogen dioxide, and particulate matter; reducing energy production needs; and lowering air temperature
- \$245 of savings by reducing 10,535 lbs. of atmospheric carbon dioxide through CO₂ sequestration and decreased energy production needs and emissions
- \$1,109 of summer energy savings by direct shading and air cooling effect through evapotranspiration
- \$-331 of winter energy savings by slowing down winds and reducing home heat loss

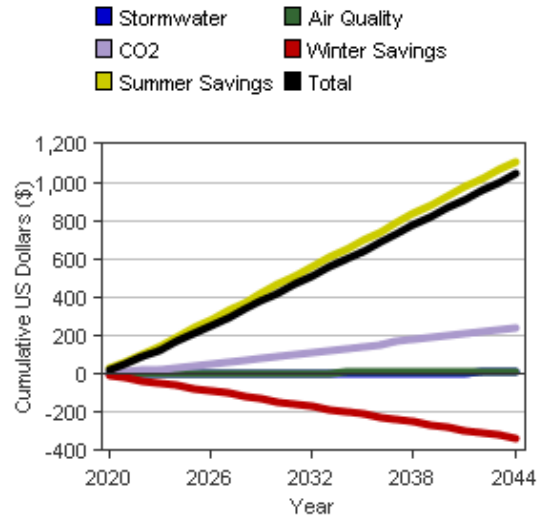


Figure 1. Tree benefit forecast for 25 years

- Stormwater
- Air Quality
- Winter Savings
- CO2
- Summer Savings

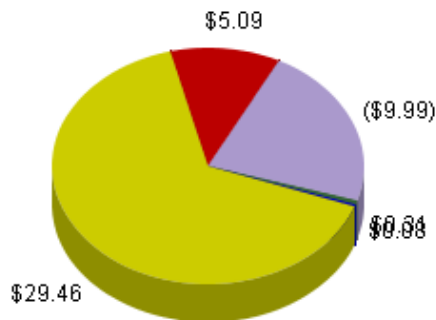


Figure 2. Annual tree benefits for 2020

Current Year - For 2020, i-Tree Design estimates annual tree benefits of \$24.95:

- \$0.08 of stormwater runoff savings by avoiding 9 gallons of stormwater runoff (intercepting 174 gallons of rainfall)
- \$0.31 of air quality improvement savings
- \$5.09 of carbon dioxide reduction savings
- \$29.46 of summer energy savings
- \$-9.99 of winter energy savings

A cooperative initiative between:





Future Year - In the year 2045, based on forecasted tree growth, i-Tree Design projects annual benefits of \$45.00:

- \$0.67 of stormwater runoff savings by avoiding 75 gallons of stormwater runoff (intercepting 1,471 gallons of rainfall)
- \$0.67 of air quality improvement savings
- \$11.25 of carbon dioxide reduction savings
- \$45.92 of summer energy savings
- \$-13.51 of winter energy savings

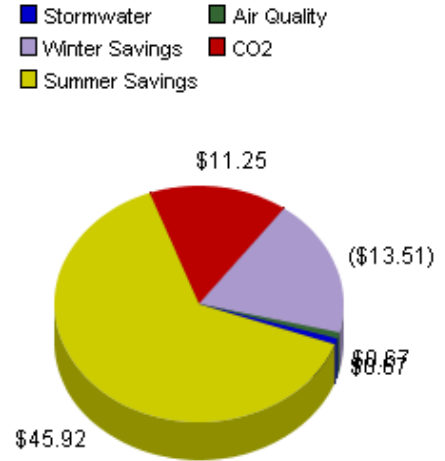


Figure 3. Annual tree benefits for the year 2045

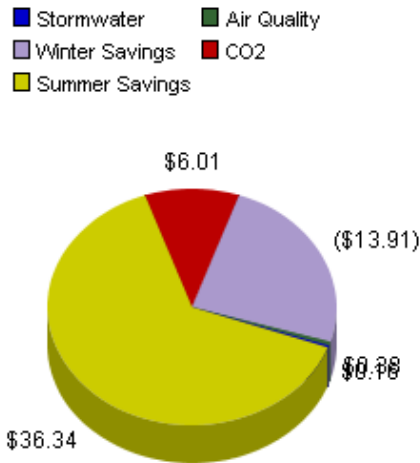


Figure 4. Total benefits to date

Total Benefits to Date - Over the life of the tree(s) so far, i-Tree Design calculates total benefits worth \$29:

- \$0 of stormwater runoff savings by avoiding 18 gallons of stormwater runoff (intercepting 343 gallons of rainfall)
- \$0 of air quality improvement savings
- \$6 of carbon dioxide reduction savings
- \$36 of summer energy savings
- \$-14 of winter energy savings

A cooperative initiative between:





Individual Tree Benefits

Tree	DBH (in)	Condition	Location to Structure	Benefits			
				Current Year (2020)	Future Year (2045)	Projected Total (2020-2045)	Total to Date
1. Tulip tree	3	Excellent	West (19 ft)	\$24.95	\$45.00	\$1,046	\$29
Total				\$24.95	\$45.00	\$1,046	\$29

DBH: "diameter at breast height" is the standard measurement of tree trunk width at 4.5 feet (1.5 meters) above the ground.

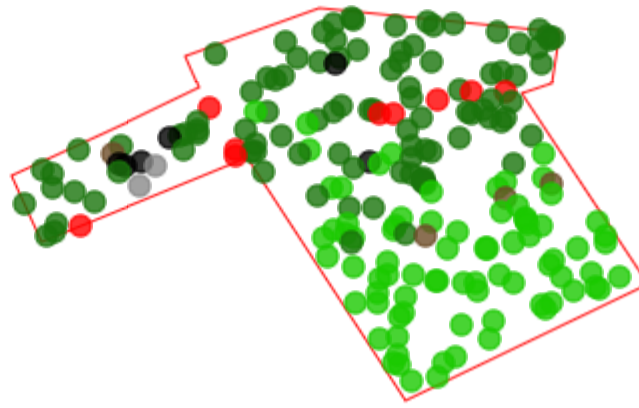
A cooperative initiative between:



i-Tree Canopy v7.0

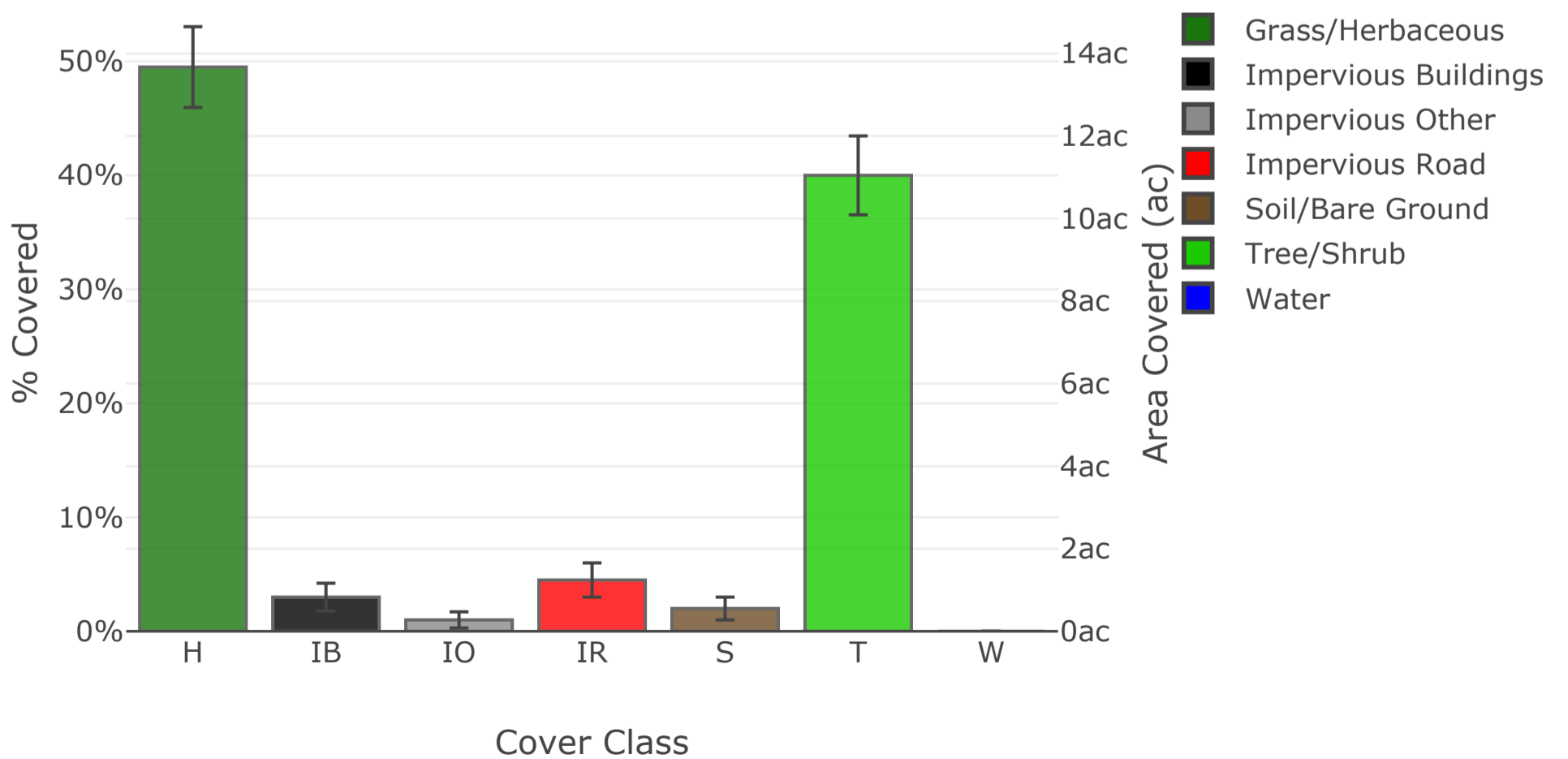
Cover Assessment and Tree Benefits Report

Estimated using random sampling statistics on 5/1/2020



Google

Land Cover



Abbr.	Cover Class	Description	Points	% Cover ± SE	Area (ac) ± SE
H	Grass/Herbaceous		99	49.50 ± 3.54	13.67 ± 0.98
IB	Impervious Buildings		6	3.00 ± 1.22	0.83 ± 0.34
IO	Impervious Other		2	1.00 ± 0.71	0.28 ± 0.20
IR	Impervious Road		9	4.50 ± 1.50	1.24 ± 0.41
S	Soil/Bare Ground		4	2.00 ± 1.00	0.55 ± 0.28
T	Tree/Shrub		80	40.00 ± 3.46	11.05 ± 0.96
W	Water		0	0.00 ± 0.00	0.00 ± 0.00
Total			200	100.00	27.61

Tree Benefit Estimates: Carbon (English units)

Description	Carbon (T)	±SE	CO ₂ Equiv. (T)	±SE	Value (USD)	±SE
Sequestered annually in trees	15.08	±1.31	55.29	±4.79	\$2,572	±223
Stored in trees (Note: this benefit is not an annual rate)	378.66	±32.79	1,388.42	±120.24	\$64,581	±5,593

Currency is in USD. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Carbon sequestered is based on 1.365 T/ac/yr. Carbon stored is based on 34.281 T/ac. Carbon is valued at \$46.51/T. (English units: T = tons (2,000 pounds), ac = acres)

Tree Benefit Estimates: Air Pollution (English units)

Abbr.	Description	Amount (lb)	±SE	Value (USD)	±SE
CO	Carbon Monoxide removed annually	9.86	±0.85	\$0	±0
NO ₂	Nitrogen Dioxide removed annually	53.75	±4.65	\$0	±0
O ₃	Ozone removed annually	541.21	±46.87	\$13	±1
PM ₁₀ *	Particulate Matter greater than 2.5 microns and less than 10 microns removed annually	182.33	±15.79	\$10	±1
PM _{2.5}	Particulate Matter less than 2.5 microns removed annually	26.25	±2.27	\$26	±2
SO ₂	Sulfur Dioxide removed annually	34.24	±2.96	\$0	±0
Total		847.64	±73.41	\$49	±4

Currency is in USD. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Air Pollution Estimates are based on these values in lb/ac/yr @ \$/lb/yr:

CO 0.893 @ \$0.01 | NO₂ 4.866 @ \$0.00 | O₃ 48.997 @ \$0.02 | PM₁₀* 16.507 @ \$0.06 | PM_{2.5} 2.376 @ \$0.98 | SO₂ 3.100 @ \$0.00 (English units: lb = pounds, ac = acres)

Tree Benefit Estimates: Hydrological (English units)

Abbr.	Benefit	Amount (gal)	±SE	Value (USD)	±SE
AVRO	Avoided Runoff	2.41	±0.21	\$0	±0
E	Evaporation	410.65	±35.56	N/A	N/A
I	Interception	412.87	±35.76	N/A	N/A
T	Transpiration	587.80	±50.90	N/A	N/A
PE	Potential Evaporation	3,202.31	±277.33	N/A	N/A
PET	Potential Evapotranspiration	2,608.33	±225.89	N/A	N/A

Currency is in USD. Standard errors of removal and benefit amounts are based on standard errors of sampled and classified points. Hydrological Estimates are based on these values in gal/ac/yr @ \$/gal/yr:

AVRO 0.218 @ \$0.01 | E 37.177 @ N/A | I 37.379 @ N/A | T 53.215 @ N/A | PE 289.915 @ N/A | PET 236.140 @ N/A (English units: gal = gallons, ac = acres)

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.



Use of this tool indicates acceptance of the [EULA](#).