Stakeholder Summit 2016

Human Environment Regional Observatory

July 14, 2016

CLARK UNIVERSITY

Outline

- **Introduction**
  - Tree planting initiatives
  - HERO program
- **Tree Survey**
  - Data collection
  - Findings
- **Interview and Survey Response**
  - Data collection
  - Emerging themes
- **Summary and Future Directions**

Our Team

Members:

- 5 Clark undergraduate fellows
- 2 Clark graduate students
- 2 Professors

Activities:

- Attended training sessions
- Measured tree health
- Conducted interviews with residents and reviewed online surveys responses
- Assessed implications of all data

Rishi Singh, Eli Simonson, Tyler Anderson, Emma Freud, Savannah Sanford

Tree Planting

Initial Goal:

Plant 30,000 trees to replace those that were cut in the ALB Quarantine Zone (Worcester, Boylston, West Boylston, Shrewsbury, Holden, and Auburn)

Organizations:

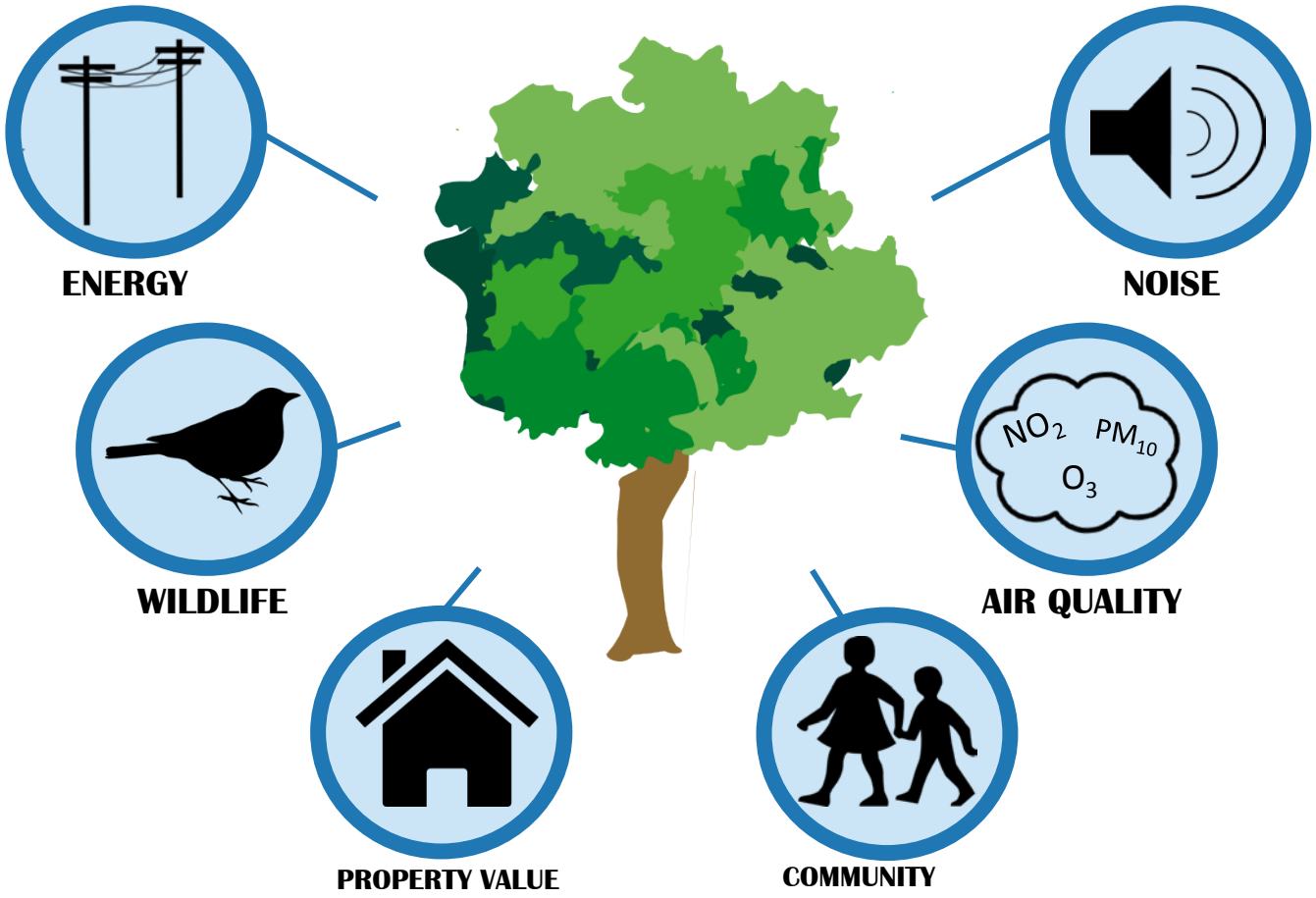
- **The Massachusetts Department of Conservation and Recreation (DCR)** assists communities and nonprofits to manage community trees and forest ecosystems
- **The City of Worcester** plants street trees in communities affected by ALB
- **Worcester Tree Initiative (WTI)** promotes urban forestry and stewardship in the City of Worcester and surrounding communities. Provide tree giveaways.

dcr Massachusetts

Rebuilding Worcester's Urban Forest

WORCESTER TREE Initiative

Benefits of Trees



The HERO Program

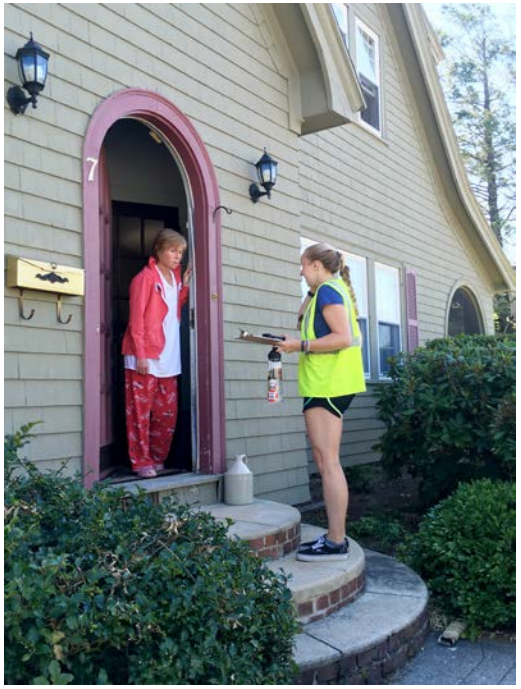
The Human Environment Regional Observatory program analyzes the causes and consequences of global environmental changes at local scales

Past Research:

- Beetle Impact
- Place Making
- Initial Tree Planting Assessment
- Resident Experience

Current Research:

- Tree Planting Assessment
- Resident Experience
- Street Tree



Study Objectives

1. Characterize the overall health and survivorship rates of juvenile trees planted by the DCR, mostly at residential homes

2. Characterize the overall health and survivorship rates of juvenile trees planted by the City on streets

3. Characterize residents' experience with tree planting initiatives in Worcester (conducted by the DCR, WTI, and City)

HERO students planting a tree on Birch Street

Data Collection

Surveyed trees

- 318 DCR trees
  - (Planted Fall 2010 – Spring 2012)
- 539 street trees
  - (Planted Fall 2009 – Spring 2015)

Interviews

- 21 interviews

Surveys

- 34 and ongoing

Rishi Singh measuring the DBH of a tree in Main South

Research Questions

What is the current **survivorship** of the planted trees?

What is the current overall **condition** and **composition** of the planted trees?

What are the **residents' experiences** with the tree planting process?

Who is participating in the planting process and what **new areas** should be **prioritized**?

Sampling Design

DCR Sampling

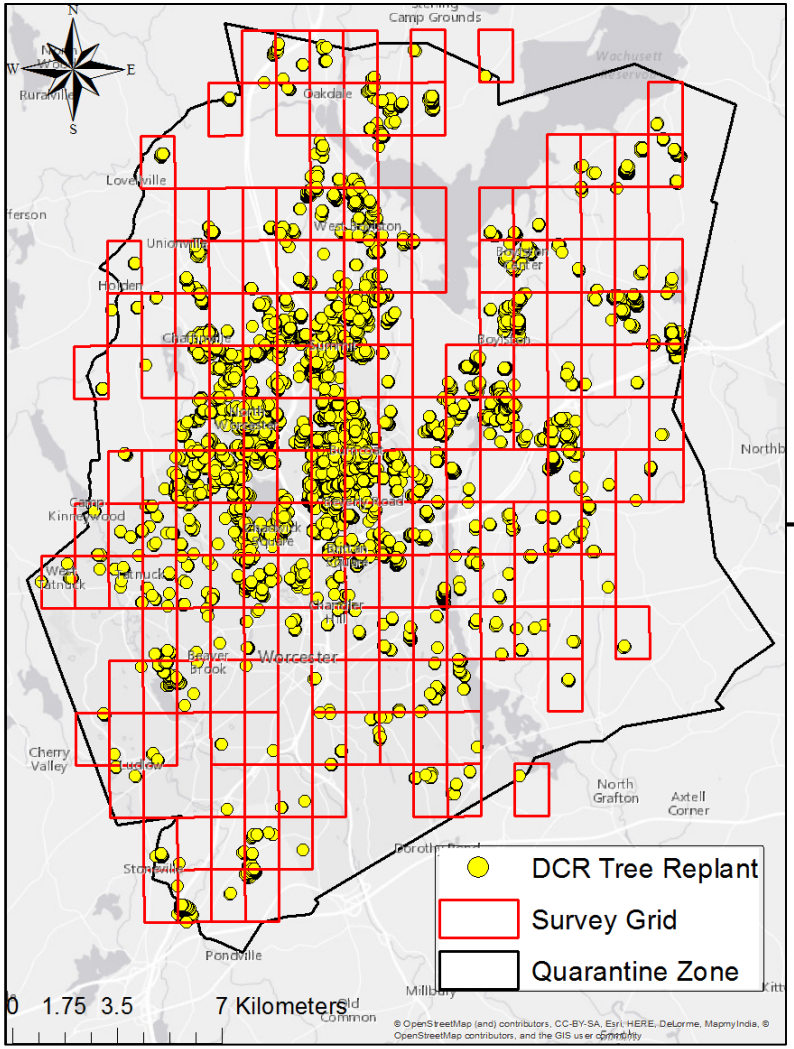
- Develop Dataset (***17,000*** points)→ remove arborvitae species → randomized sample of ***345*** trees→ ***318*** accessible

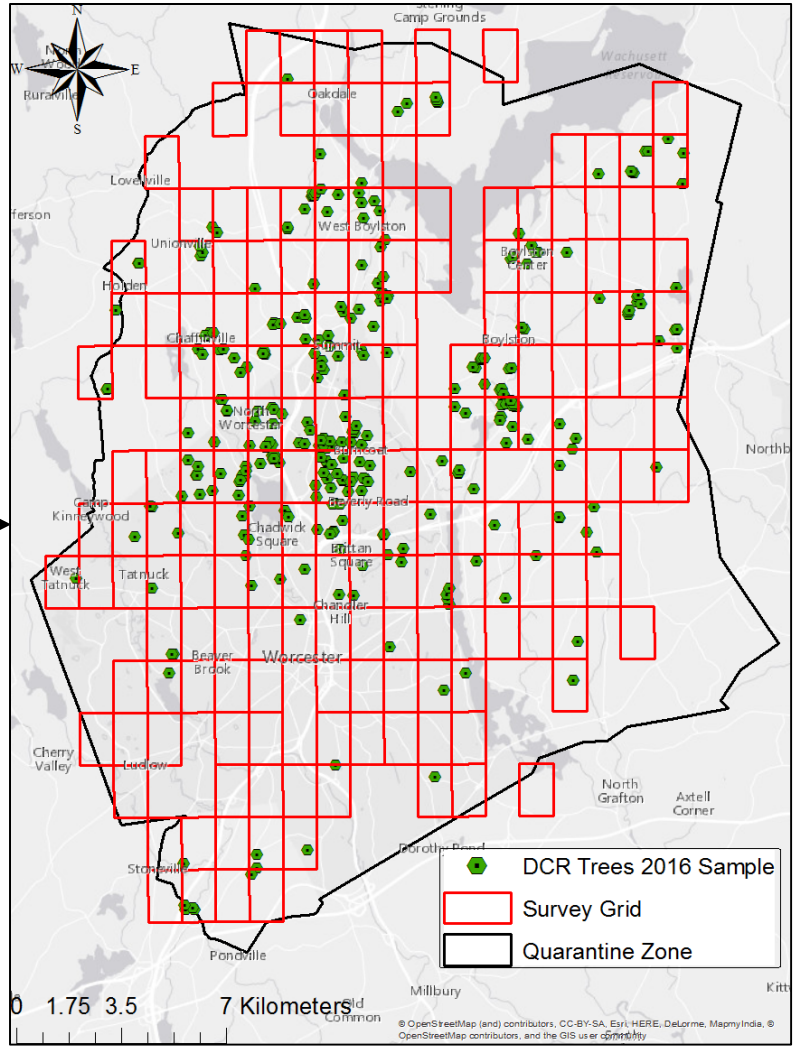
Street Tree Sampling

- Non-probabilistic convenience sample
- Blocks chosen from a list of WTI watered trees
- Created street tree transects→ measured **539** juvenile trees along transects

Tile J9 in Worcester

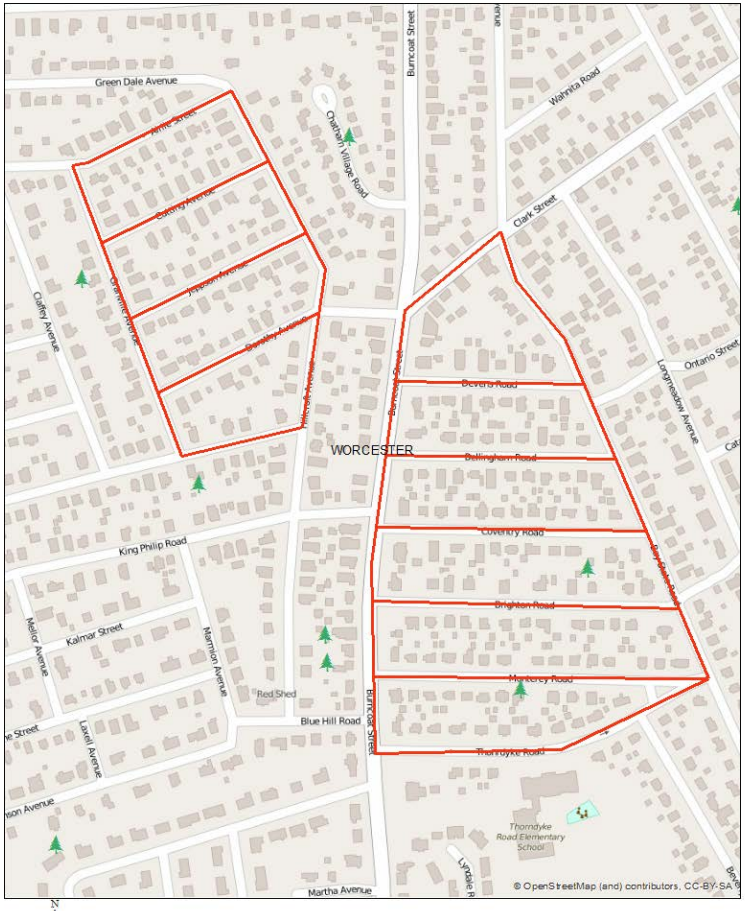
DCR Sampling Design





Street Tree Transects

Burncoat Area

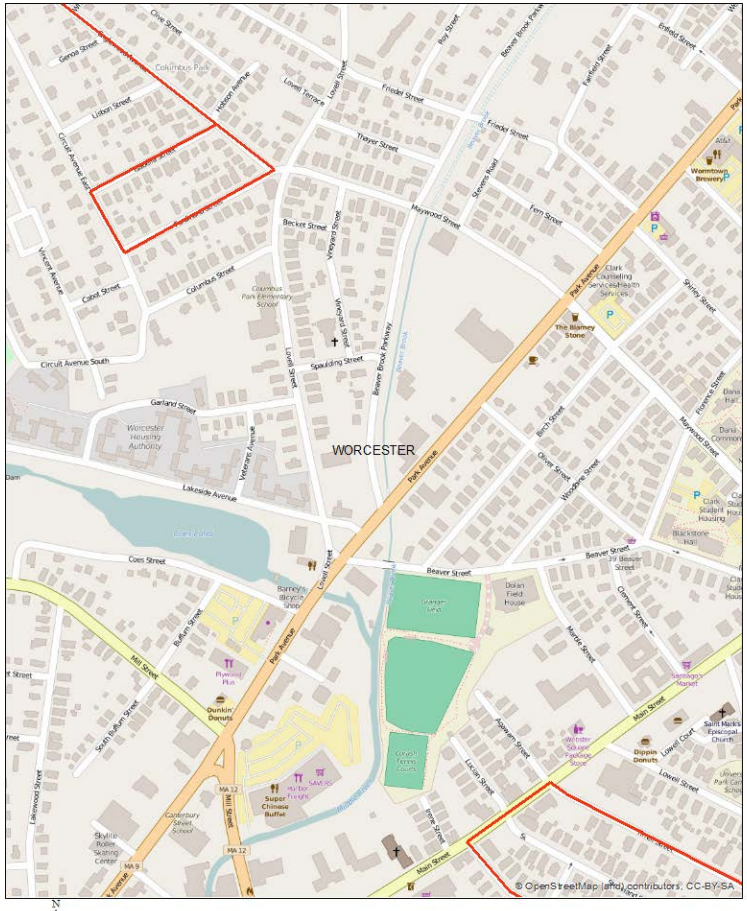


Street Tree Transects Collected 2016

DCR Yard Trees Collected 2016

0 0.1 0.2 0.4 Kilometers

Columbus Park & Main South Area

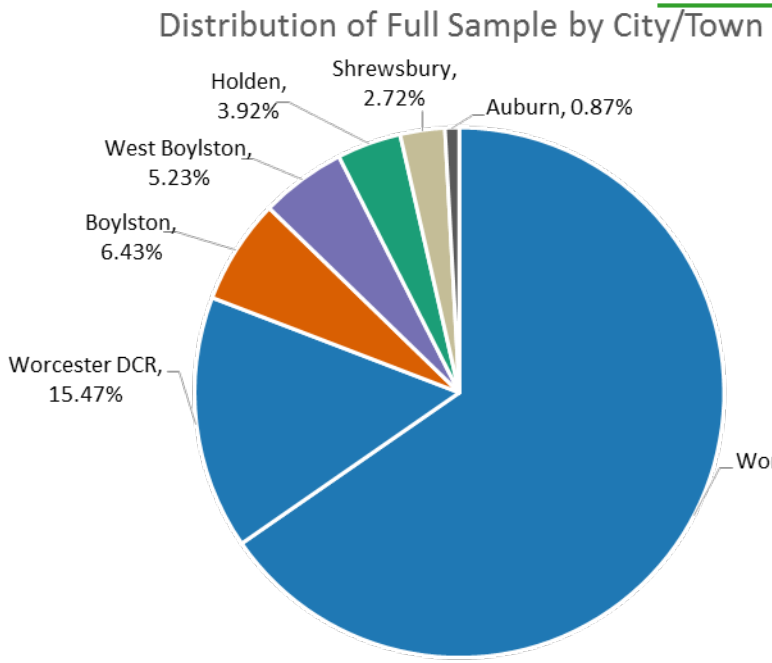


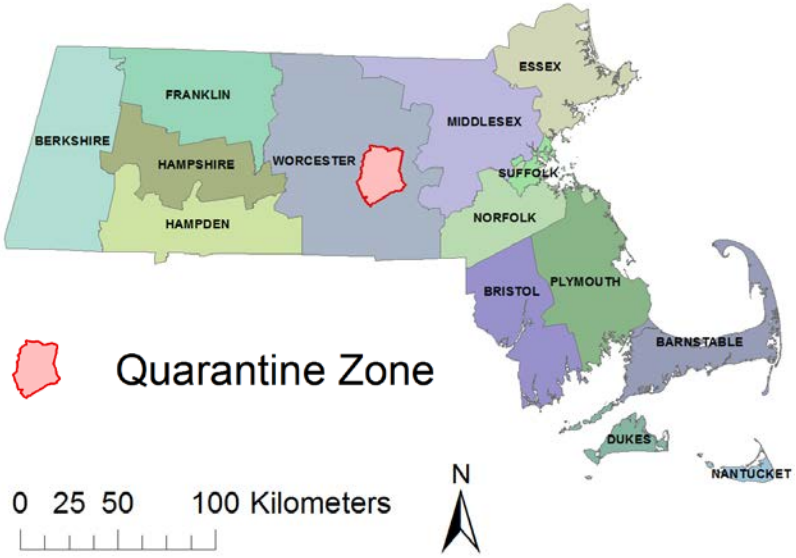
Street Tree Transects Collected 2016

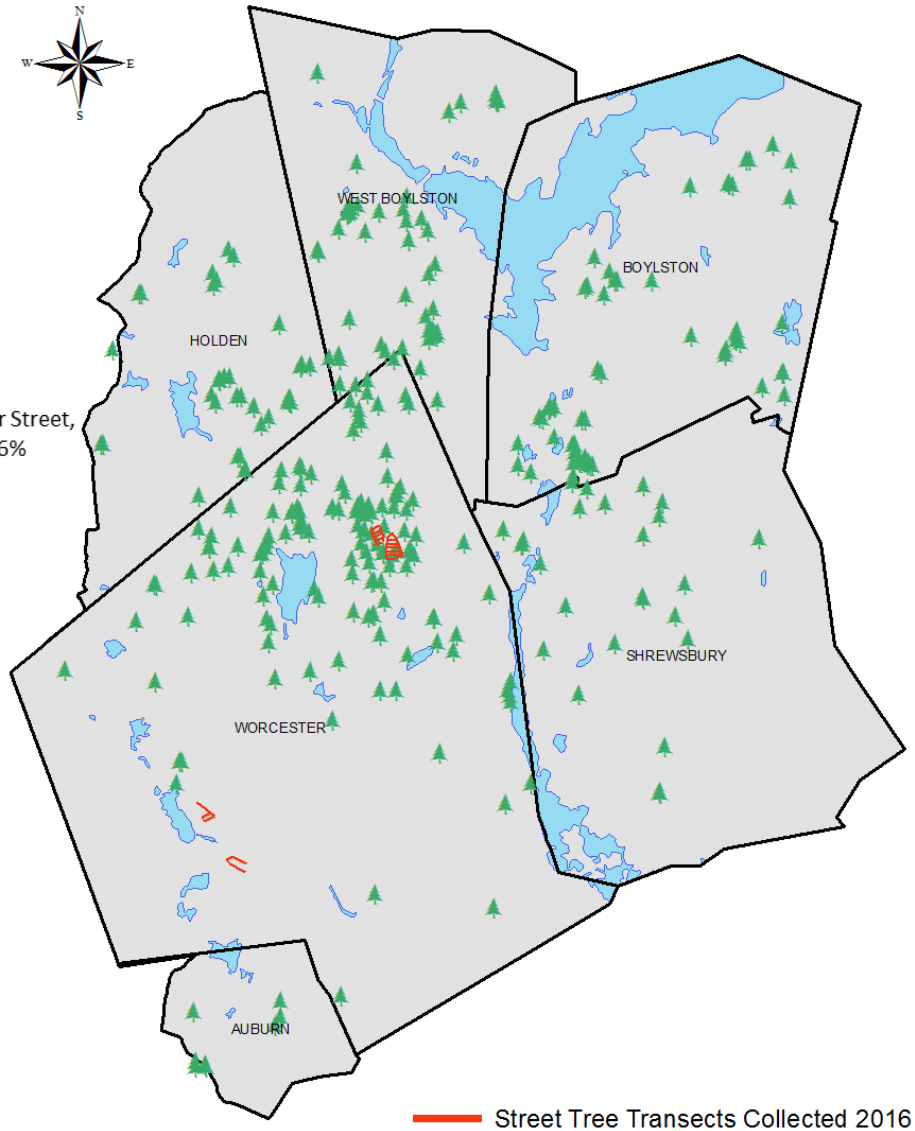
DCR Yard Trees Collected 2016

0 0.1 0.2 0.4 Kilometers

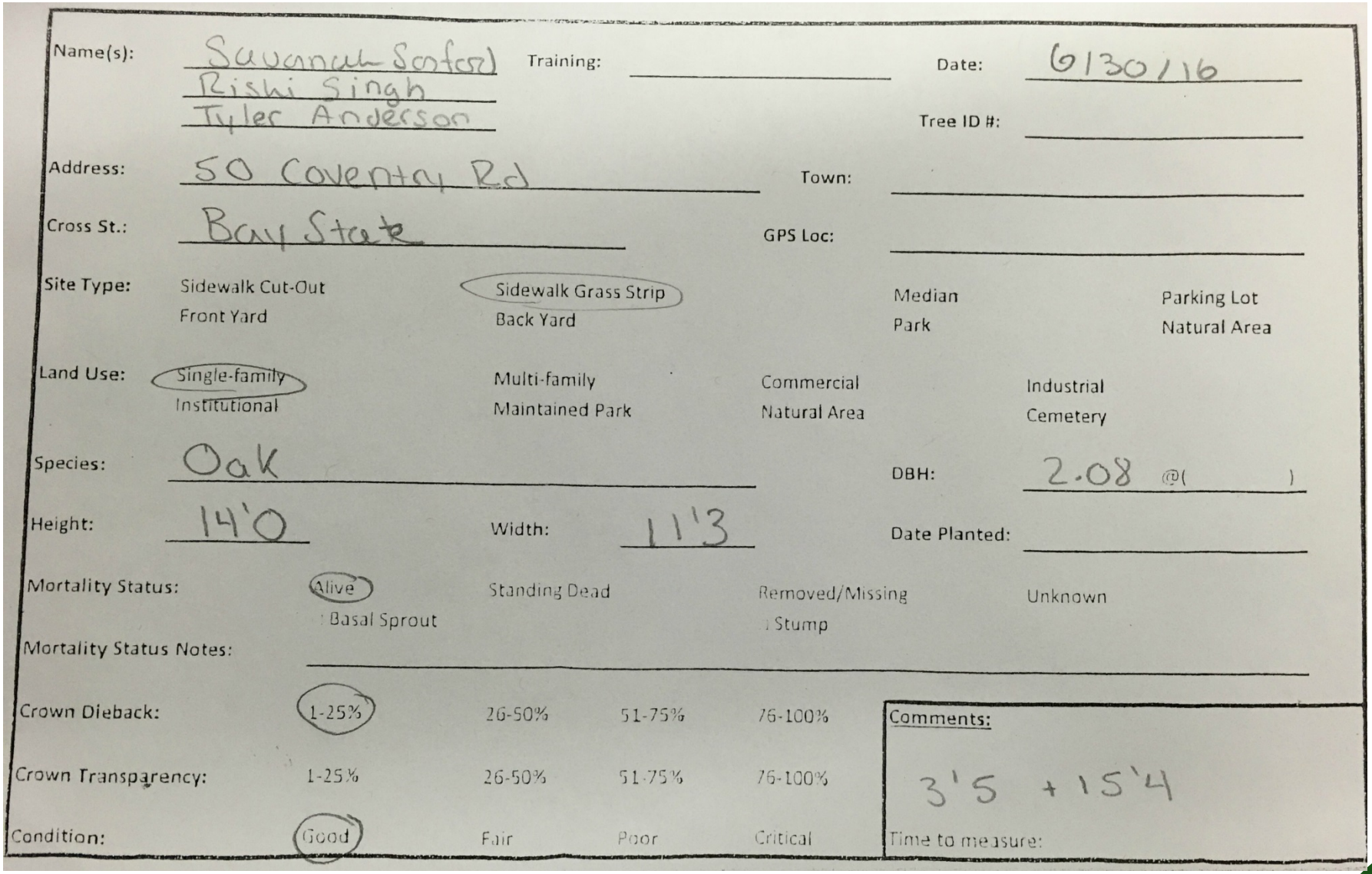
2016 Study Area







Tree Assessment Characteristics



Name(s): Savannah Sanford, Rishi Singh, Tyler Anderson
Training:
Date: 6/30/16
Tree ID #:
Address: 50 Coventry Rd
Town:
Cross St.: Bay State
GPS Loc:

Site Type: Sidewalk Cut-Out, Front Yard, (Sidewalk Grass Strip), Back Yard, Median, Park, Parking Lot, Natural Area

Land Use: (Single-family), Institutional, Multi-family, Maintained Park, Commercial, Natural Area, Industrial, Cemetery

Species: Oak
DBH: 2.08 @( )

Height: 14'0
Width: 11'3
Date Planted:

Mortality Status: (Alive), Basal Sprout, Standing Dead, Removed/Missing, Stump, Unknown

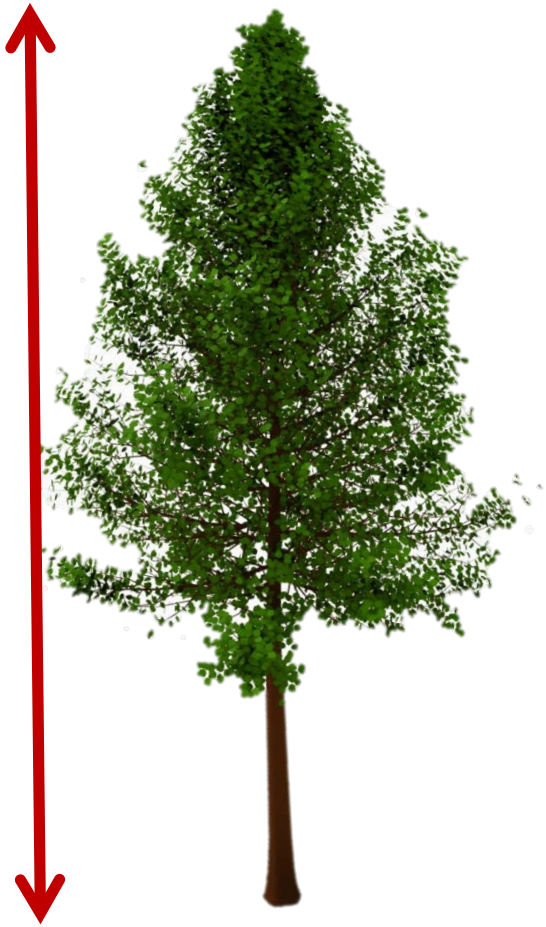
Mortality Status Notes:

Crown Dieback:	(1-25%)	26-50%	51-75%	76-100%
Crown Transparency:	1-25%	26-50%	51-75%	76-100%
Condition:	(Good)	Fair	Poor	Critical

Comments:
3'5 + 15'4

Time to measure:

Size Metrics



Height

DBH

Width

Crown Dieback

1-25%

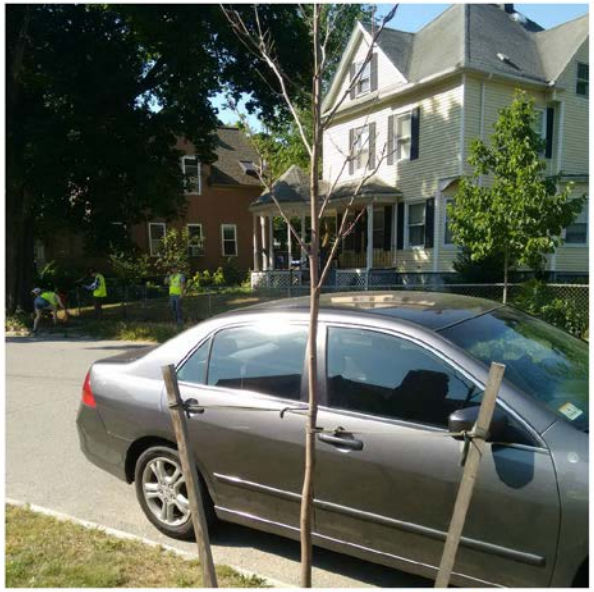
26-50%

51-75%

76-100%

Other Health Characteristics

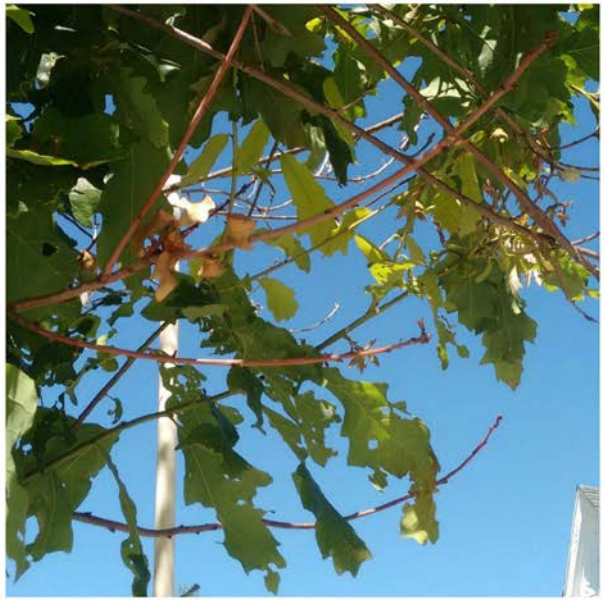
Standing Dead



Trunk Damage

Basal Sprouting

Pest Damage



Overall Rating

Good

Fair

Poor

Critical

Investigating DCR Trees

- Species Composition of DCR Trees

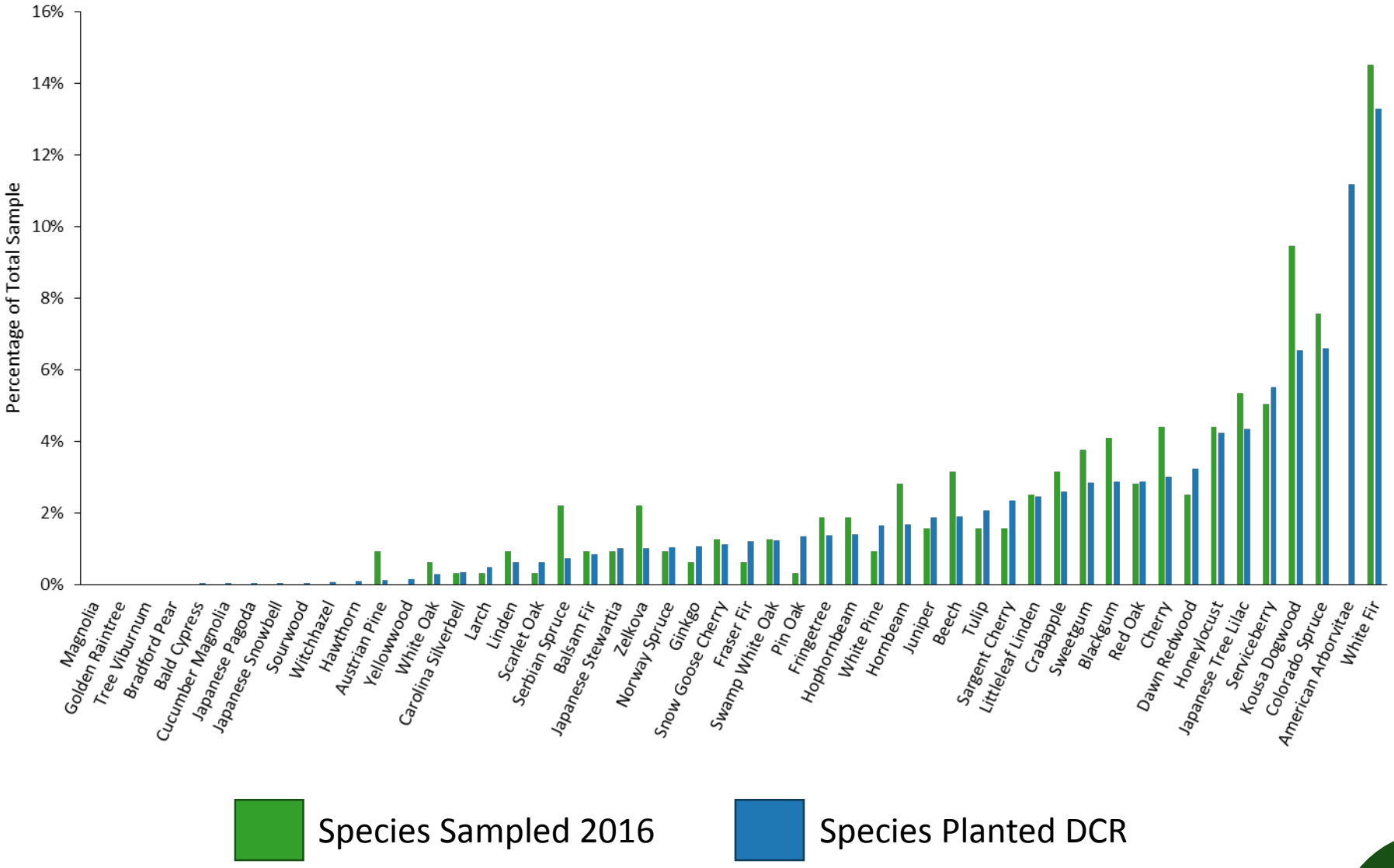
- DCR Tree Survivorship
  - Native vs. Non-Native Survivorship
  - Shade vs. Ornamental Survivorship
  - Site Type Survivorship

- Species Specific Analysis
  - Species Specific Survivorship
  - Growth Analysis

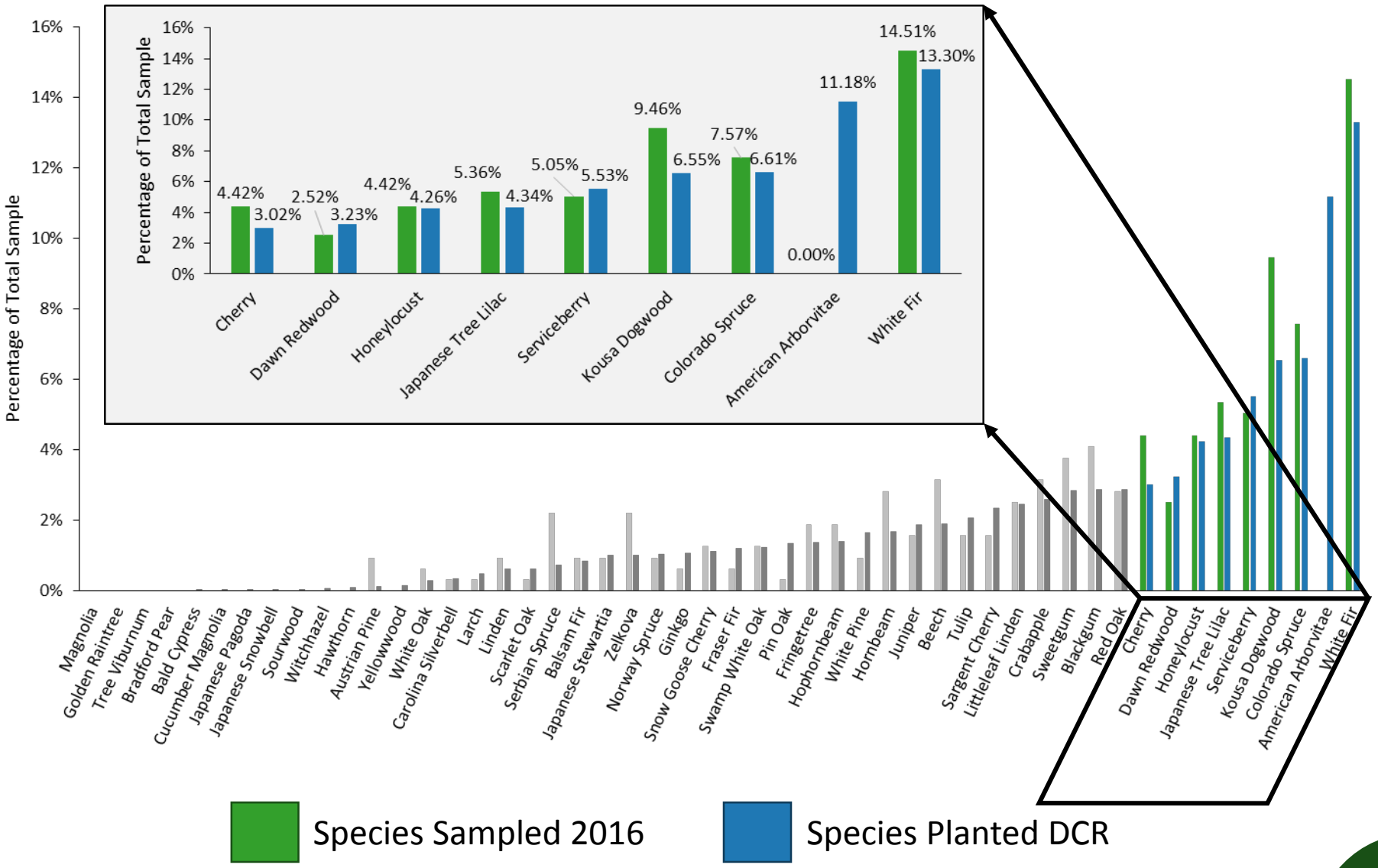
- Tree Survey Multiple Year Comparison
  - Annual Average Mortality

Graduate student Arthur Elmes in the field

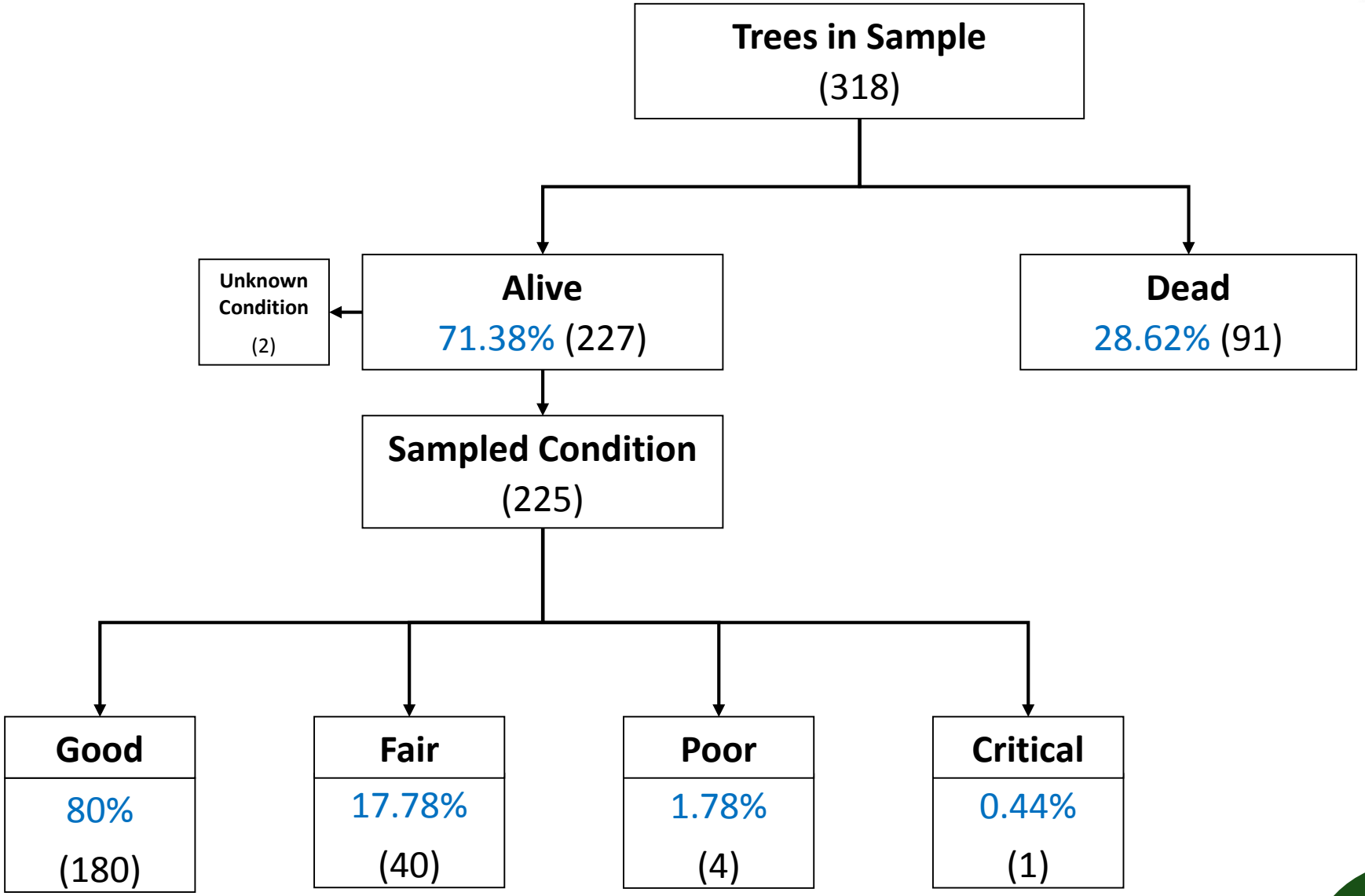
DCR Tree Species Composition



DCR Tree Species Composition



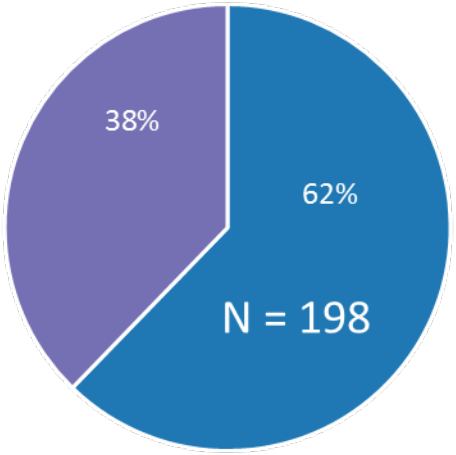
DCR Tree Survivorship



Survivorship Status: Native vs. Non-Native

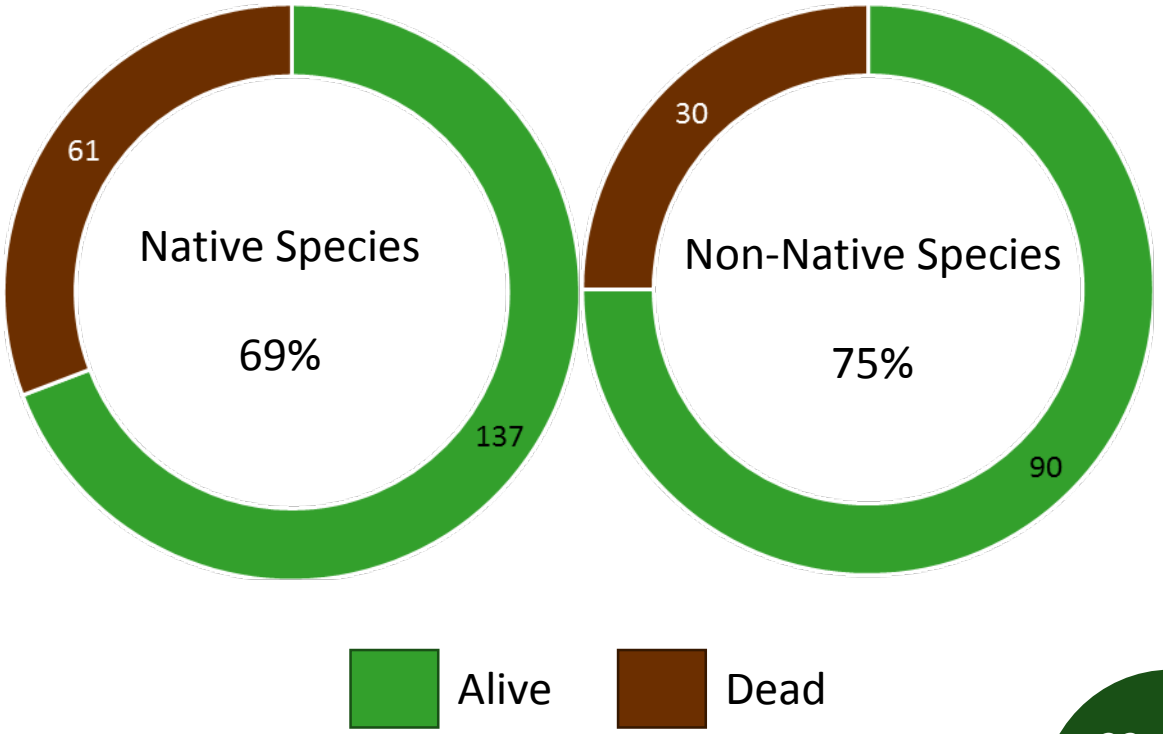
Non-Native

Native



Vs.

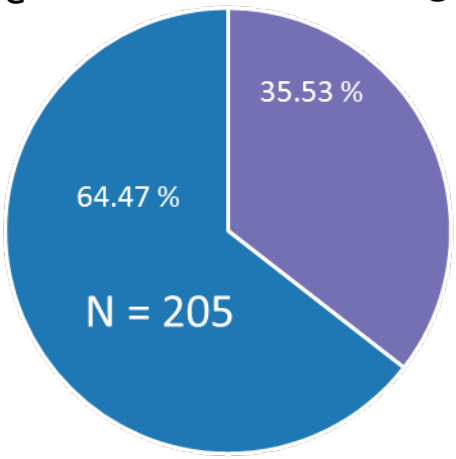
Representation within DCR sample, 2016



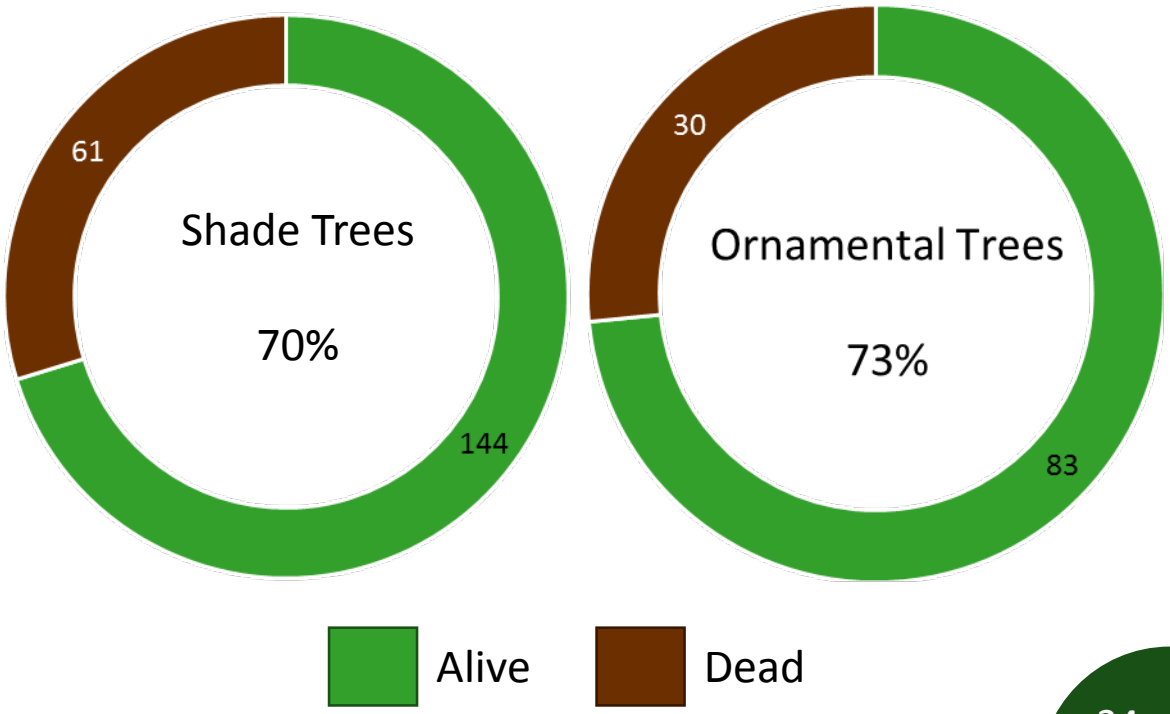
Survivorship Status: Shade vs. Ornamental

Shade

Ornamental

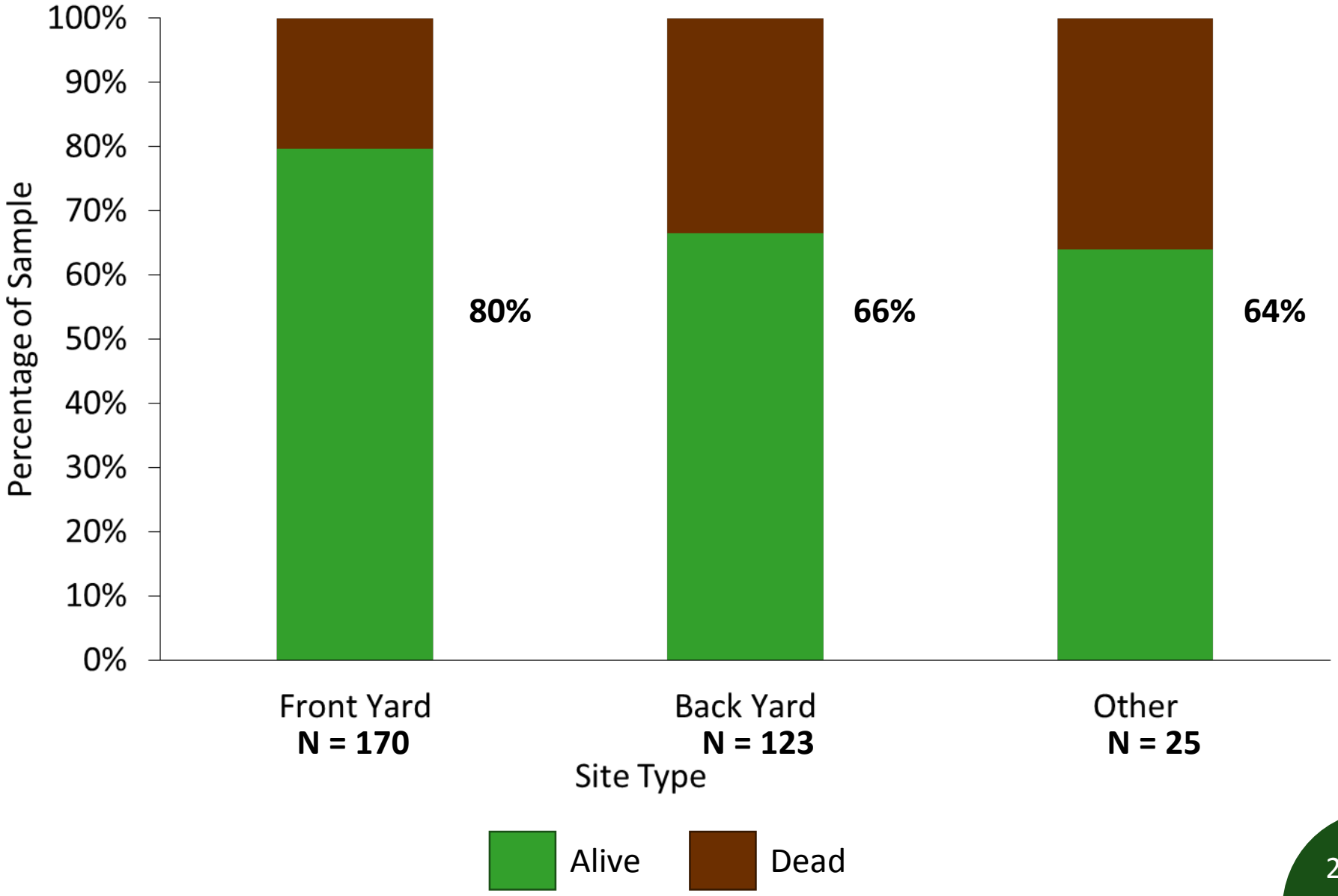


Representation within
DCR sample, 2016

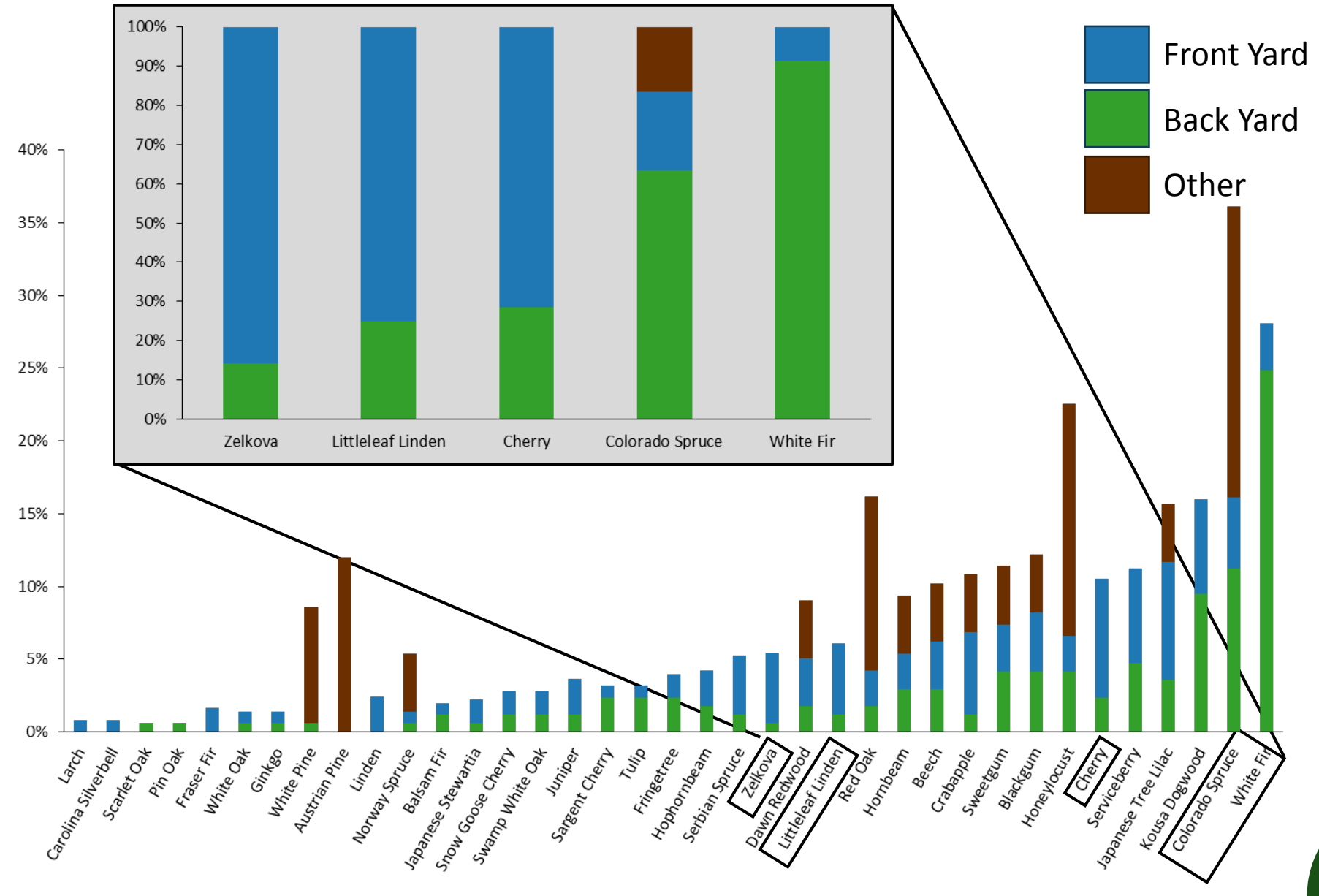


Vs.

Site Type Survivorship



Species Composition by Site Type

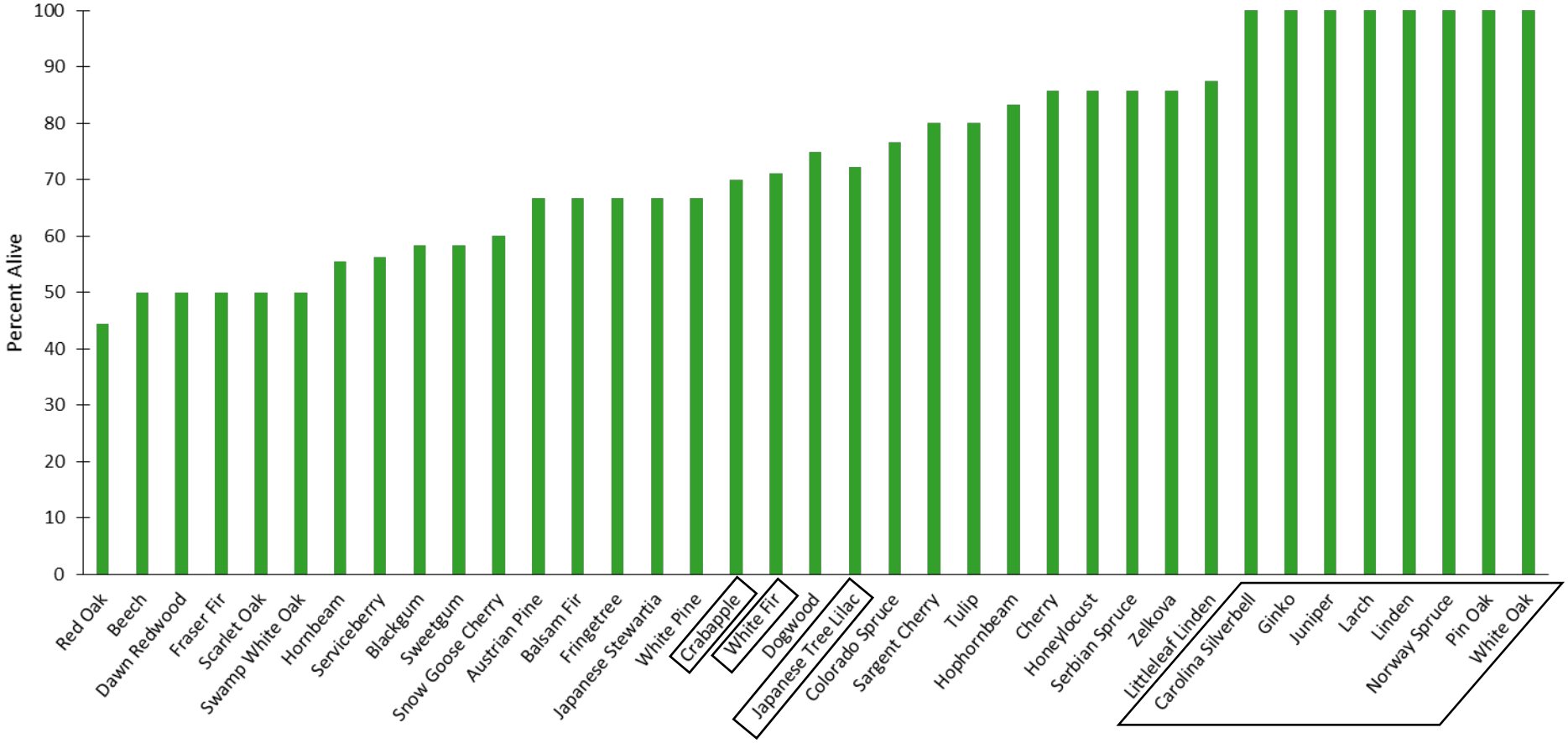


Species Specific Variables

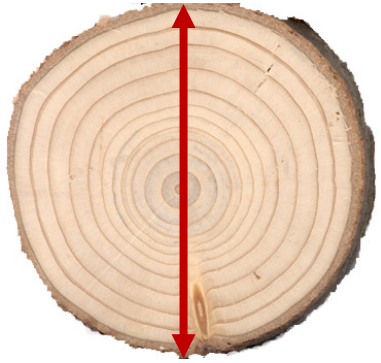
- Survivorship by Species
- DBH Growth by Species

Graduate student Zhiwen Zhu examines basal sprouting in the field

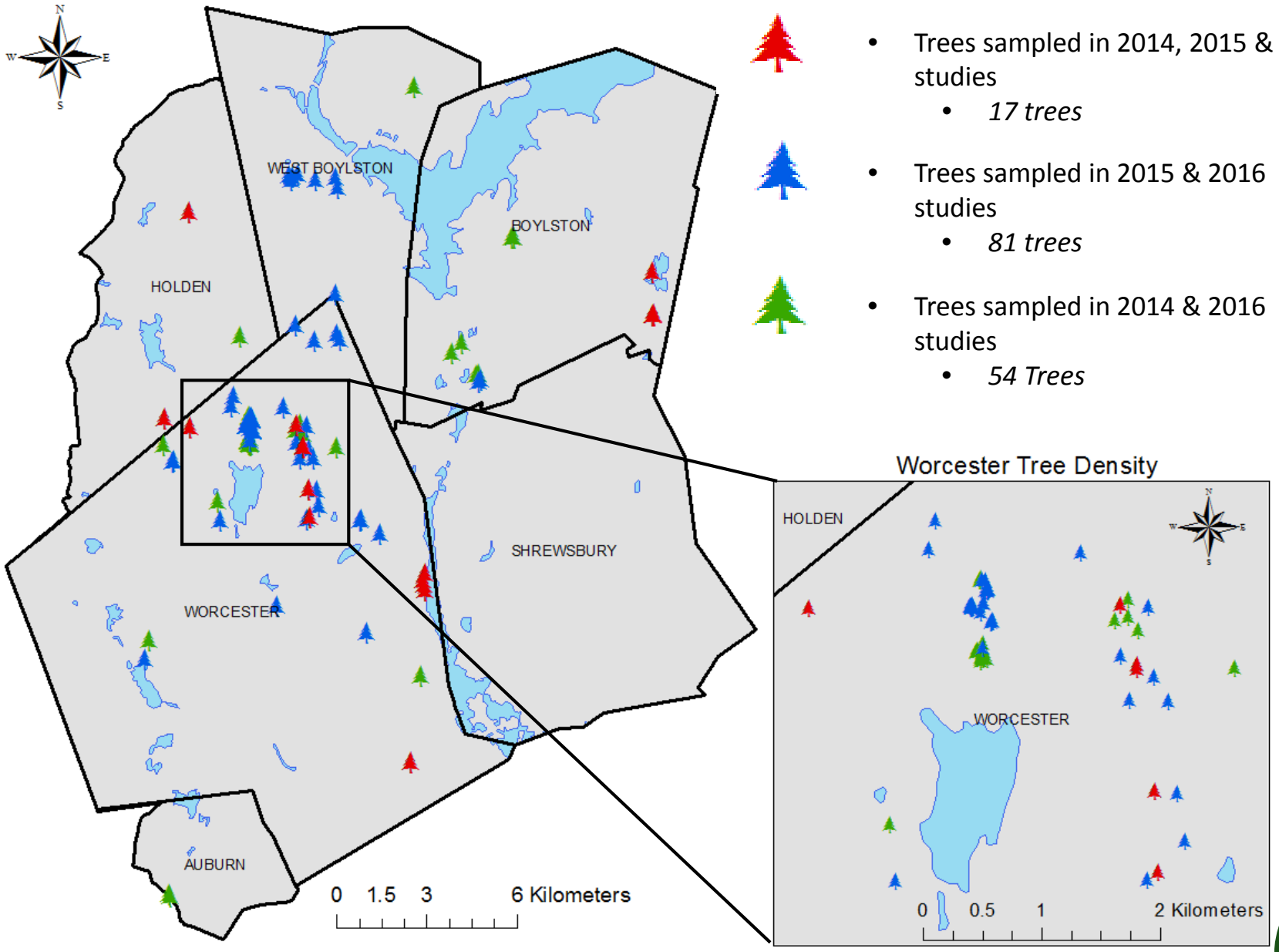
Survivorship by Species



DBH Growth 2014-2016



Multiple Year Comparison

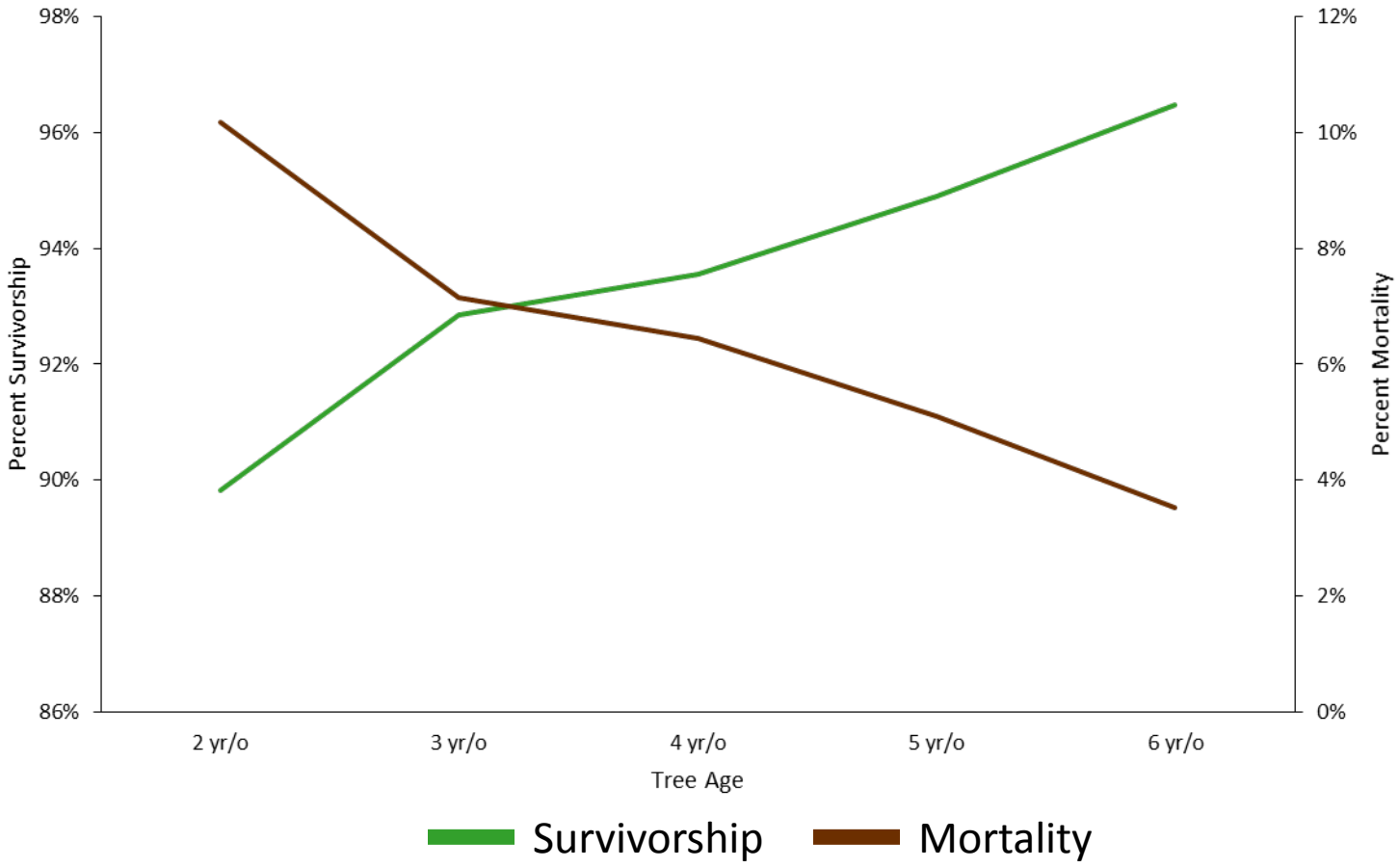


- Trees sampled in 2014, 2015 & 2016 studies
  - *17 trees*
- Trees sampled in 2015 & 2016 studies
  - *81 trees*
- Trees sampled in 2014 & 2016 studies
  - *54 Trees*

Speed of Juvenile Mortality

Sampled 2014 → Sampled 2016

Average Annual Survivorship

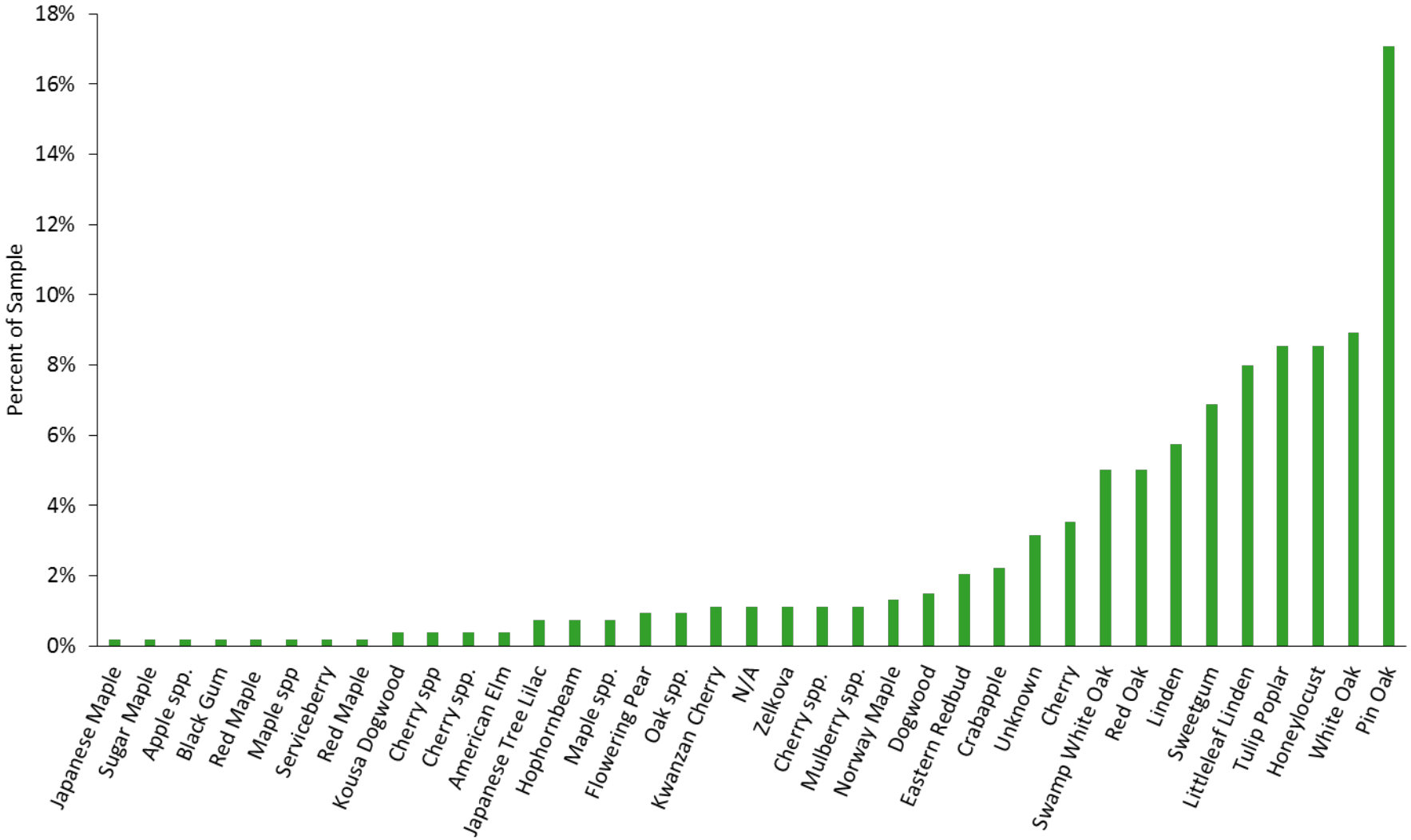


- Trees split by observation year and planting year
- As trees become **older** and more established, **survivorship goes up**

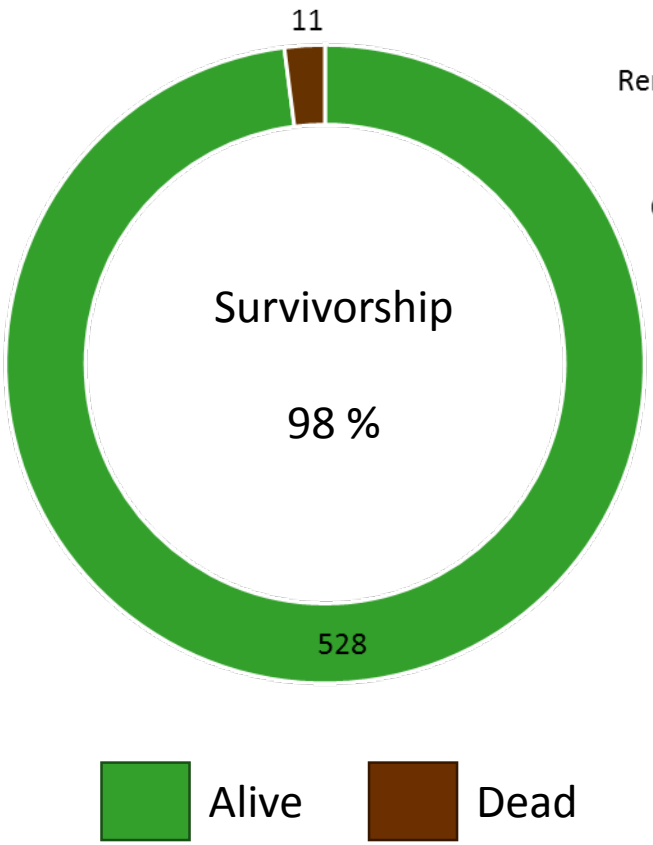
Investigation of Street Trees

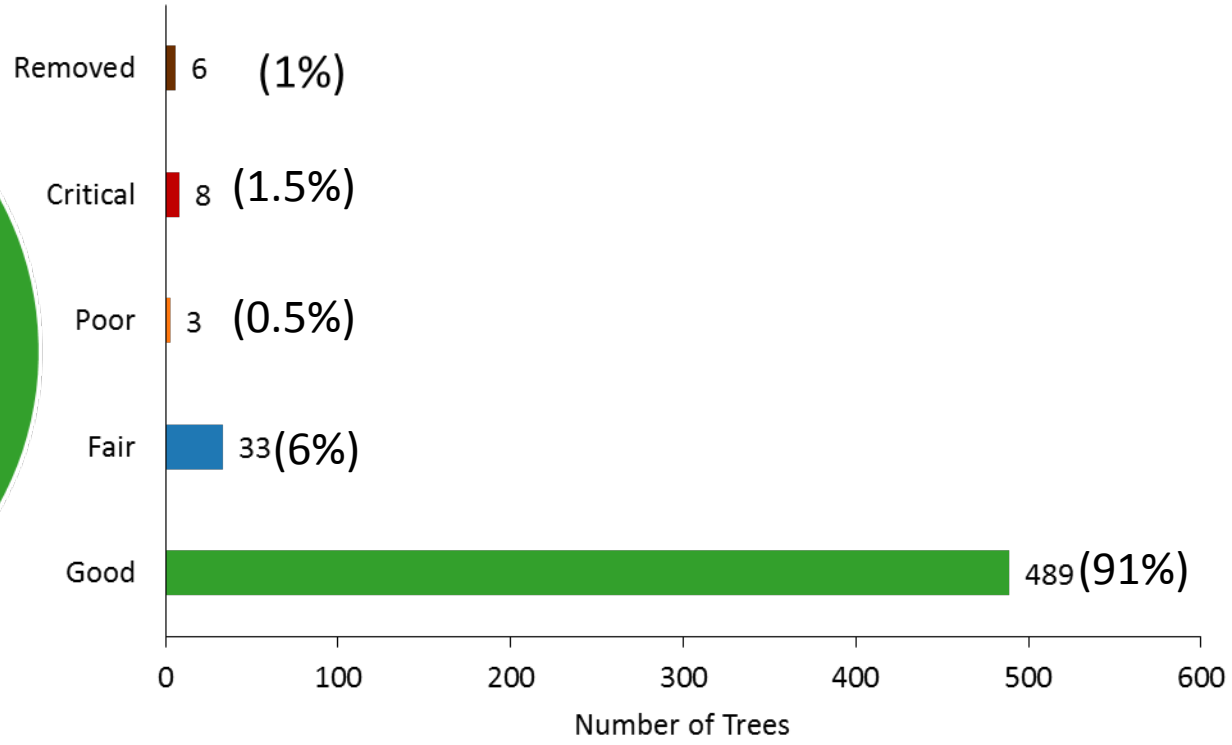
- Street Tree Composition
- Survivorship
- Condition

Street Tree Species Composition



Street Tree Survivorship & Condition





2016 Tree Survey Summary

- DCR tree survivorship → 71.38%
  - 80% in good condition
  - Planted 2010-2012
- Street tree survivorship → 98%
  - 91% in good condition
  - Planted 2009-2015

Well performing trees

Shade Trees
- Pin Oak*
- Tulip Poplar*
- Linden spp.
- Honeylocust

* Good street tree species

Ornamental Trees
- Japanese Tree Lilac
- Dogwood spp.
- Cherry spp.

Evergreen Trees
- Colorado Spruce
- White Pine
- Serbian Spruce

Resident Experience Assessment

- Our goal was to characterize the various experiences residents were having as a result of the tree planting
  - Are residents happy with the overall success of the program?
  - Have residents been caring for their trees?
  - Are they aware of the vast range of services trees can provide?

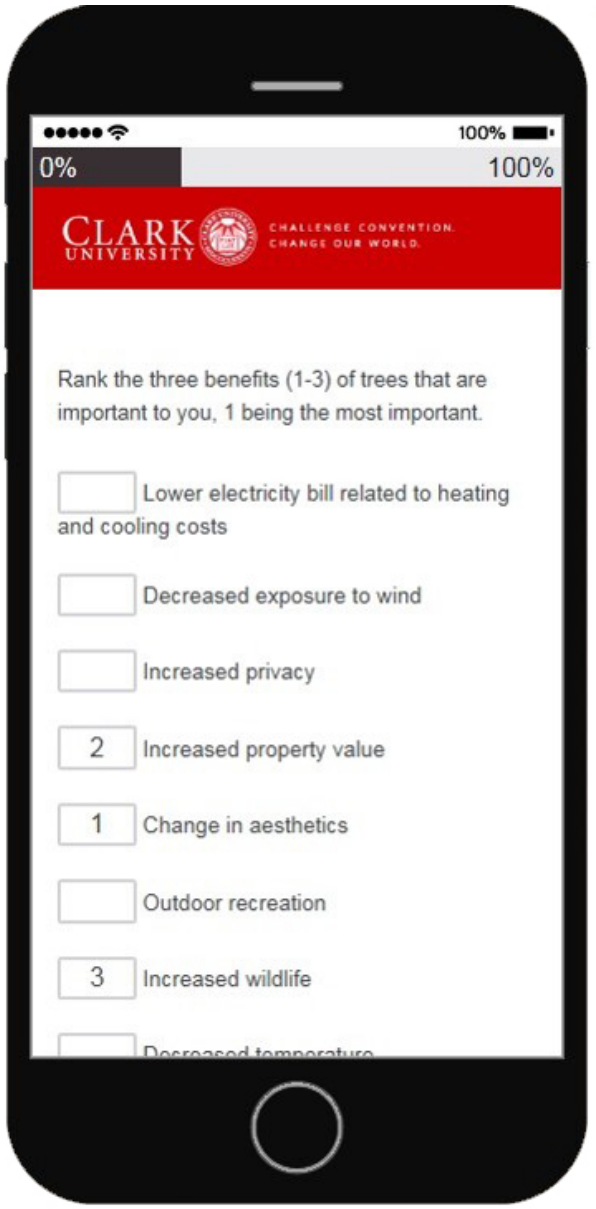
- Survey
  - Online
  - 34 respondents from the summer of 2016

- Interview
  - In-person
  - 21 short (5-15 minutes) interviews
  - Audio recording

Rishi Singh interviews a resident

Survey Methods

- Online survey links were sent out via postcards and through a flyer we left at houses when we surveyed trees
  - 200 postcards mailed to *random* DCR tree recipient addresses
  - Approximately 300 flyers left at random sample of tree addresses
- The survey consisted of 43 questions
  - Same questions as last year's survey
  - 33 questions about the tree planting
  - 10 questions about more personal information (town, age, gender, etc.)



Interview Methods

- Random convenience sample
- Interviewed residents willing to talk when out measuring trees
- 5-15 minutes
- Audio recorded when possible

Emma Freud interviews two residents

Short Interview Questions

1. How did you come to have this tree?

- How did you hear about the (DCR or WTI) program?
- How or why did you decide to get a tree?
- How did you choose the species and location of your tree(s)?
- If they have both DCR and WTI trees, ask:
  - How did you hear about both programs?
  - Which trees did you get first? DCR or WTI?
  - Why did you choose the species you chose for each program?

2. Tell me about the care of your tree:

- Did you find it hard to care for your tree(s)?
- Now that it is older, do you water it as much?
- Do you or have you ever pruned your tree?
  - If yes, how often do you prune your tree?

3. Do you feel there has been a difference in your neighborhood as a result of the tree-planting effort?

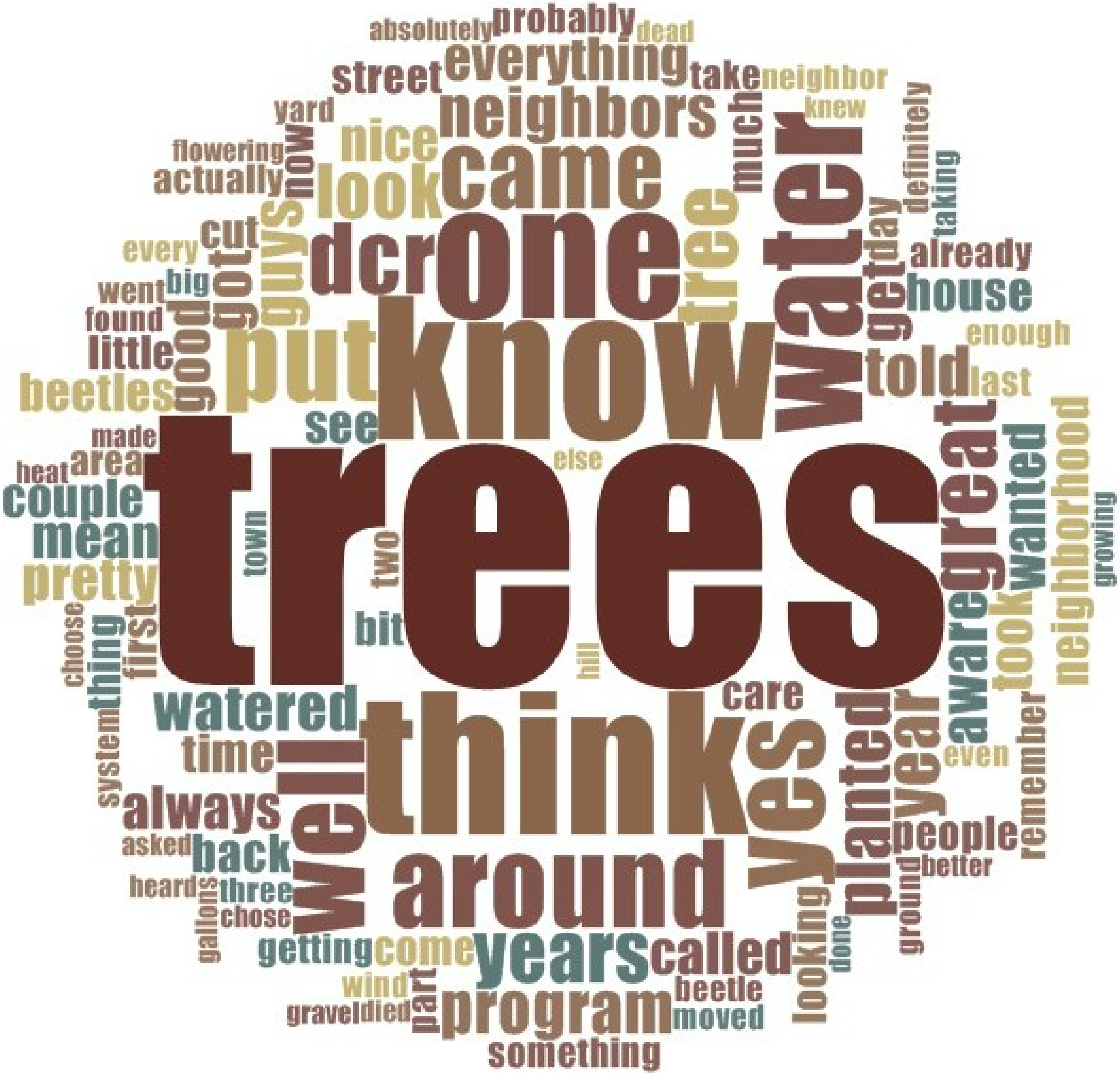
- Do you have a close relationship with your neighbors?
  - Do neighbors help each other out in caring for trees?
- Are there any community replanting efforts? Tell me about them

4. Have tree-replanting efforts affected your environmental awareness? If so, how?

- Do you talk about trees more often?
- Do you discuss trees with your neighbors?

5. Have the tree-replanting efforts helped you to be more aware of environmental issues or groups?

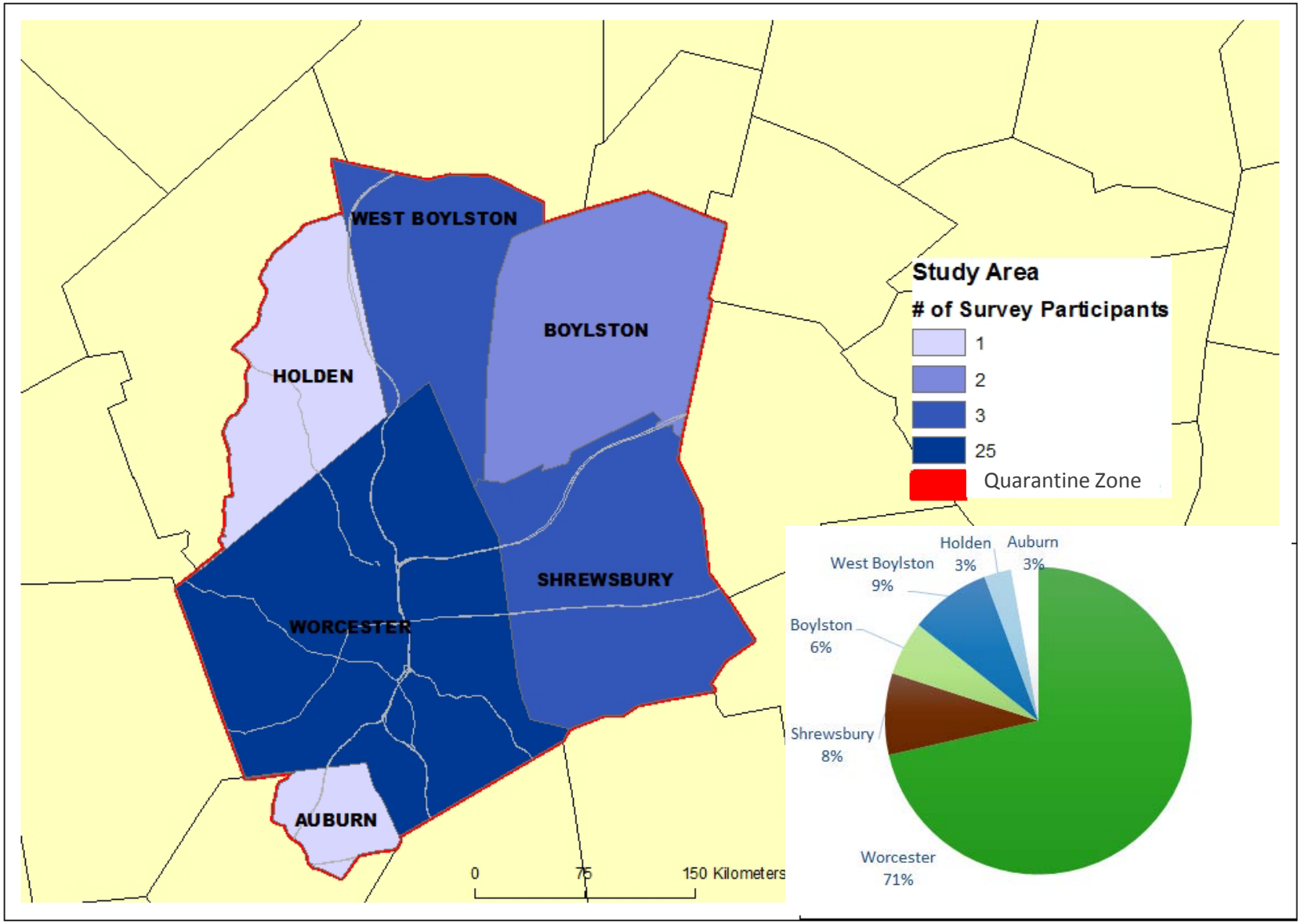
- WTI, Massachusetts Audubon, Tower Hill Botanical Garden, Greater Worcester Land Trust
- Climate Change, weather, wildlife conservation


absolutely
probably
dead
street
everything
take
neighbor
yard
neighbors
much
knew
definitely
flowering
now
nice
came
water
taking
actually
look
tree
day
every
cut
guys
dcr
one
already
went
big
got
get
house
found
good
put
know
enough
little
told
beetles
last
see
great
wanted
neighborhood
made
else
heat
area
trees
couple
growing
mean
town
two
pretty
took
choose
thing
first
bit
aware
hill
watered
care
system
time
well
think
yes
year
planted
even
remember
always
people
asked
back
around
better
heard
three
gallons
chose
looking
done
ground
getting
come
years
called
wind
part
beetle
gravel
died
program
moved
something

Demographics from Survey

Average Age: 52
94% White
26% Retired

Geographic Distribution of Survey Respondents

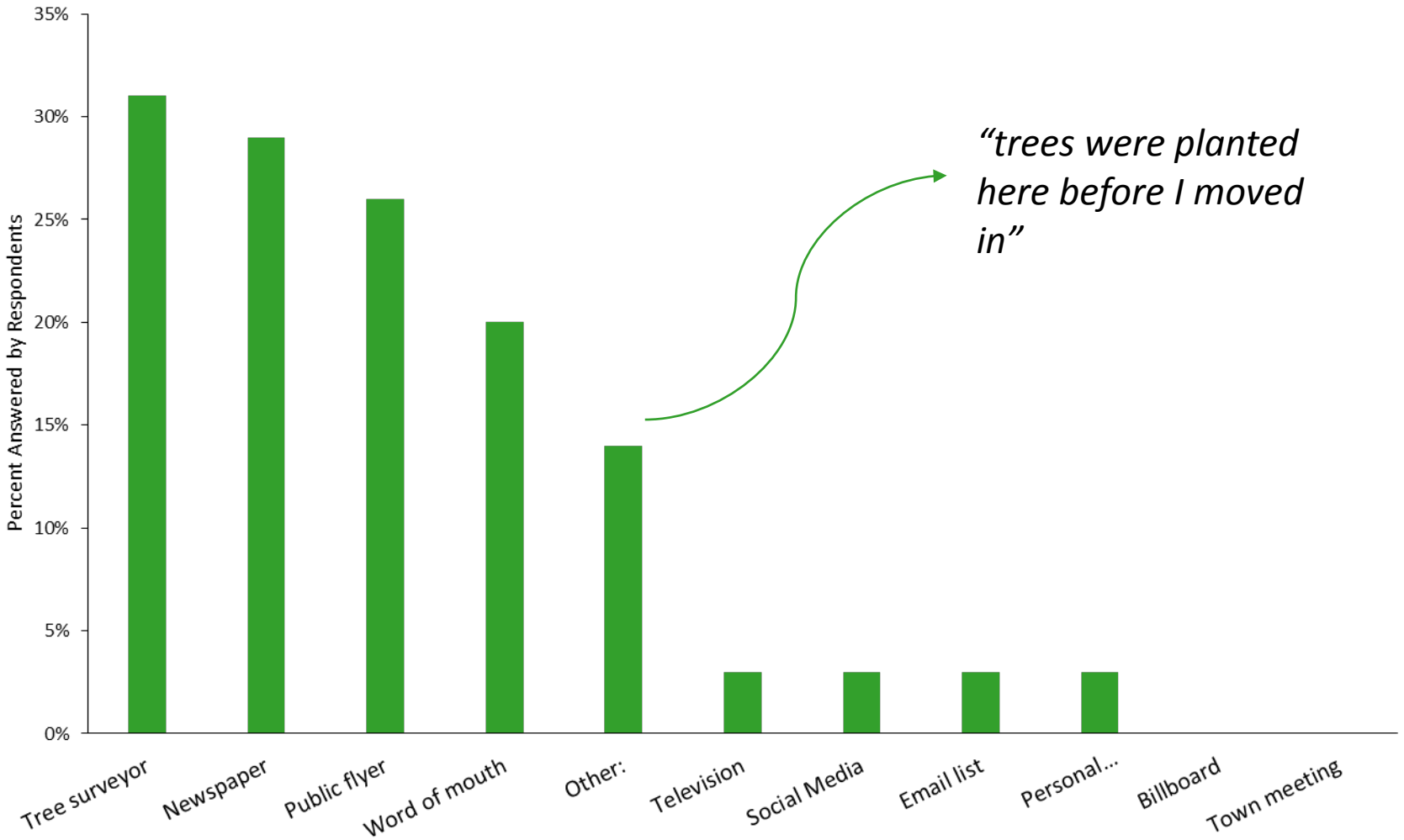


Worcester's Need for Trees

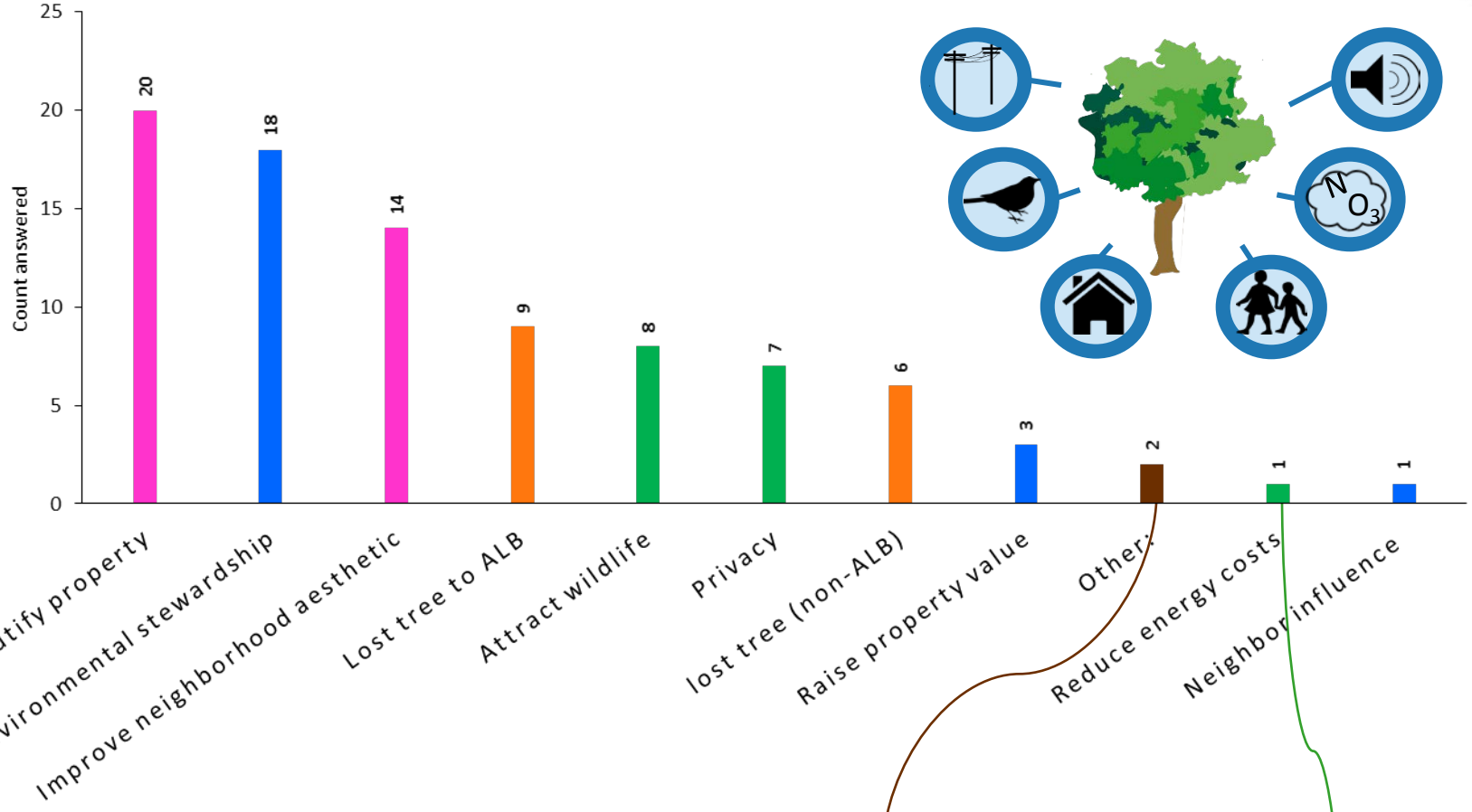
Intact canopy on Whitmarsh Avenue located in the Burncoat neighborhood (2016).

Whitmarsh Avenue several years after ALB host removal. Located in the Burncoat neighborhood (2016).

How did you first find out about tree planting?



What Motivates Residents to Plant Trees?



- Aesthetics (34)
- Neighborhood & Community (29)
- Disaster Adaptation (15)
- Ecosystem services (9)

*"Thought I would be **losing** a tree to **ALB**"*

*"We lost all the shade trees in the neighborhood. Without the trees, the **backyard is unbearable** in the summer and **wind damage has increased**"*

Qualitative Themes

Aesthetics

- Aesthetics was seen as the most important factor in several survey answers, other than just “motivations”
  - Residents considered aesthetics when considering, species choice, neighborhood benefits, and improvements because of the replanting

- Aesthetics was also an important topic discussed by residents in the interviews

*“…Looking **nice** and **colorful.”***

*“…Helps with the **aesthetics** of the street.”*

*“I guess it was **aesthetic** at a certain level […] with the kids and the dogs and everything I just wanted more **shade**.”*

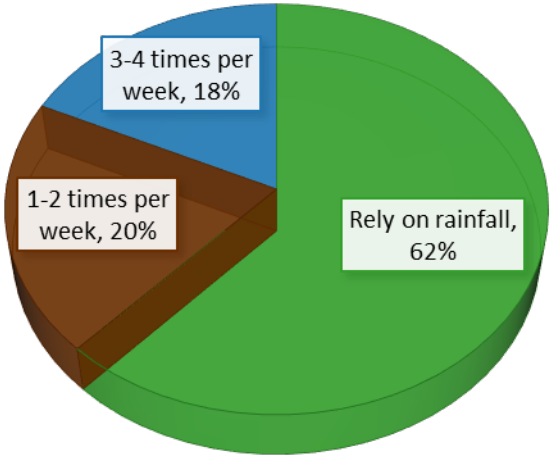
Residential Stewardship

- Austin (2002) did a study on partnership opportunities for neighborhood tree planting initiatives in Detroit, MI
    - She notes that “bringing nature closer” is a top-ranked motivation for volunteer involvement in tree planting initiatives

*“[tree planting programs] make you more **conscious** of how to take care of things and be more **respectful** towards stuff. You know, it’s like a project for me. It makes me come out and **maintain**, and everybody always stops by in the neighborhood and are like ‘wow, those trees are getting big’, so there’s kinda like, a **pride factor** “*

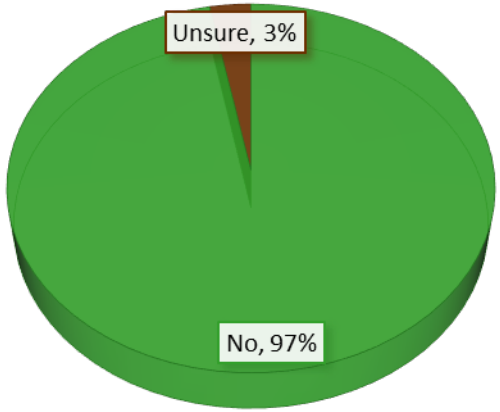
Residential Stewardship

HOW OFTEN DO YOU WATER YOUR TREE?



*"[The trees] were supposed to be watered regularly, but I just **let nature take care of it**."*

IS WATERING YOUR TREES BURDENSOME?



*"So out of the 16 that were here there was 7 or 8 that were pretty much gone [due to] **lack of water**. And so we pulled those out."*

Ecosystem Services

- Ecosystem services were seldom mentioned by residents
- A few residents noted the benefits of shade, privacy, noise abatement, etc.

Dogwood in backyard of residential home

*"We like the **privacy** part of it, I like the nature part of it. And eventually the **shade**"*

*"The re-plantings make the **air** better and improve **noise** reduction"*

Ecosystem Services

*"I now have significant knowledge of the improvements to air quality, temperature control and addressing **water erosion**. I also benefit everyday in my own home by the **beauty** and improvements due to the planting of a number of trees. More importantly, the city is **visibly a more pleasant place**, even in the most difficult neighborhoods."*

*"I mean we had to replace our roof because we had no trees and the **wind** is really bad. And, we had water in our basement which we **never had before**. So definitely, yeah it has made us more aware of how **important** trees are."*

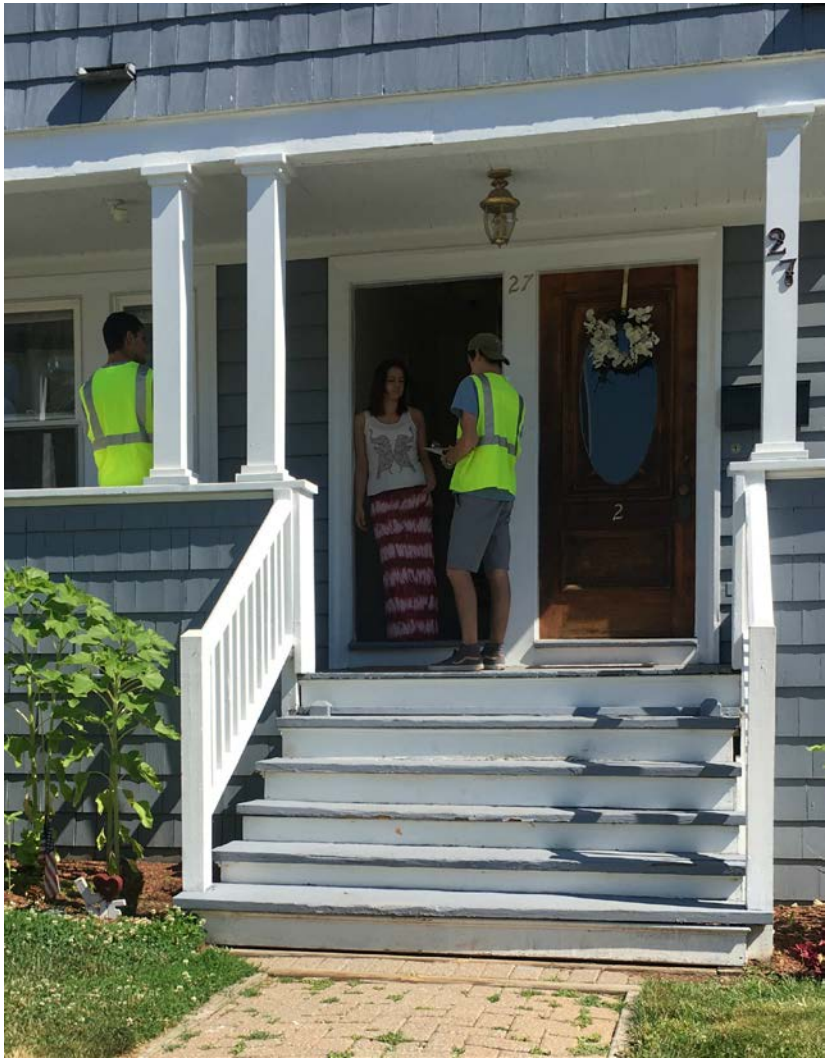
Perceived Benefits of Trees

Neighborhood & Community

- 50% of residents considered their neighborhood to be active in the planting
- A survey question asked residents how often they communicated with their neighbors; 93% reported positive interactions

*"When we've had **difficulties** such as the **ice storm** that came between the discovery of the beetle in August and the removal in February, and a lot of trees were damaged and powerlines came down. The neighbors all came out and **helped one another** making sure things are safe."*

"…the neighborhood would be better if there was no people in it, you know. It's too crowded around here, I'm gonna get out of here."



Tyler Anderson interviews a resident

Neighborhood & Community

- 50% of residents said that their neighbors had no influence on their tree care
- Residents with planted trees may influence neighbors

*"Well the neighbors that come in here say that they (trees) are **beautiful**."*

*"Oh yes, well because once you came here **I told all my neighbors** and a lot of them got trees."*

*"**I tell a lot**. Sitting here, people come out, when we are sitting, I show them that tree. That nice tree you put in for free! **How could we go wrong?!** Just the right kind of tree for the area too."*

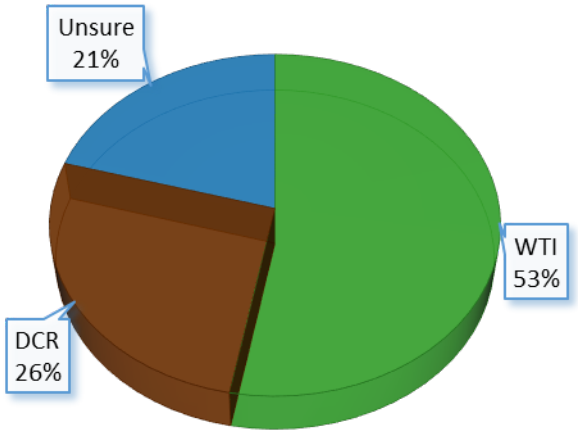
Stakeholder Organizations

- Residents we interviewed seemed to be unaware of the differences between separate stakeholder organizations, often referring to them as ***"the beetle people"***

- When asked "who provided you with the trees?" in the survey, 27 residents identified the organization that provided them with the trees, while 7 residents did not know

- Although several residents were unsure of where their tree came from, most residents had heard of the stakeholder organizations

TREE SOURCES



Resident Quotes

DCR and WTI

*"Whoever was running that program, I **think** the DCR"*

*"Not 100% sure whether it was one of the groups (DCR/WTI), **it was the organization with the beetle."***

*"Hmm **probably not** more aware of issues or organizations, well we're aware of what your program does."*

*"I think it's a great thing that you guys have done. We are very very lucky to have the resources to do this replanting and as you can see in my **yard I take great pride in my yard** and it's just an awesome addition to have these trees planted so it's great"*

*"I see you guys around all the time. I think a lot of people around town are having you guys plant stuff and I think the **word is getting around town**, too."*

Environmental Awareness

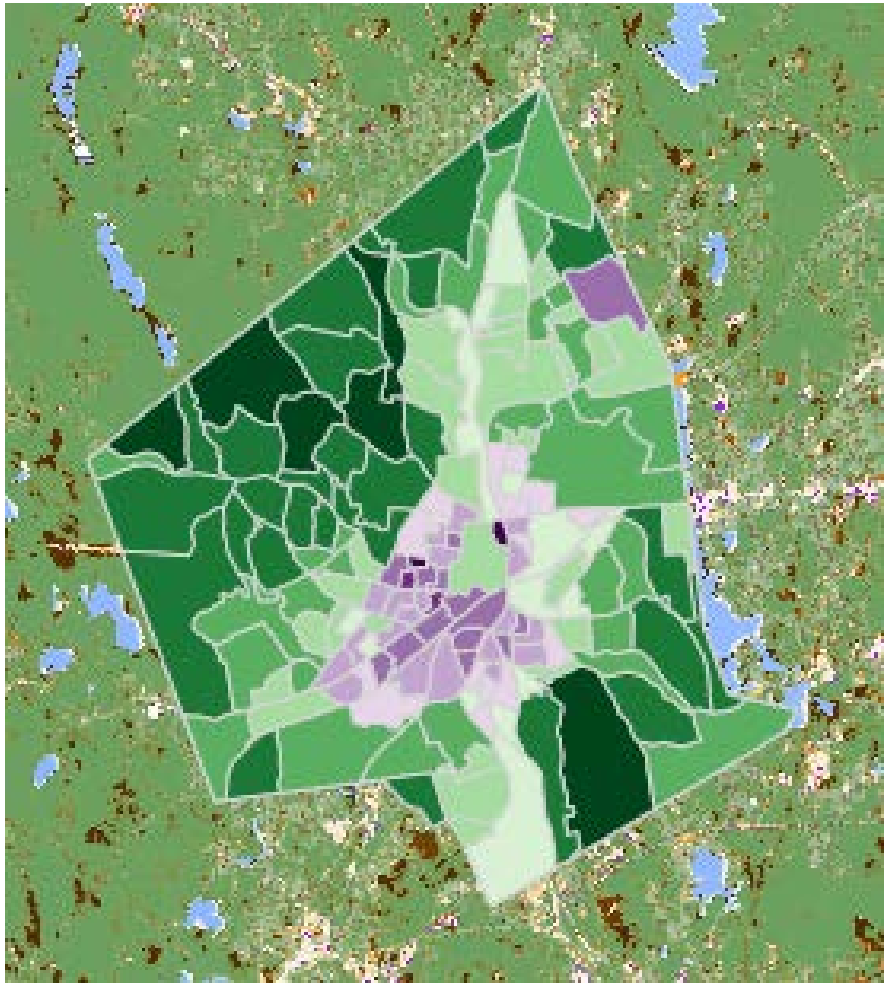
- We asked if residents had become more aware of environmental groups or issues because of the replanting effort
  - 71% of online participants said yes
  - Residents from in person interviews focused more on becoming more environmentally aware in general, not becoming more aware of specific organizations
    - Many mentions of ALB and looking out for the beetle

*"I don't think it has made me **more aware**. I mean I'm aware of those things but I don't think the tree planting made me more aware of it."*

*"**I've always been aware**, so more aware, possibly, but I'm always kinda cautious because I really don't like trees being cut down."*

"Yea I look at every tree for beetles. Now that I know what to look for I notice that right away."

Prioritizing New Plantings



Map of Worcester, MA. Areas in purple show census block groups that could be prioritized for new plantings.

Why do we want to plant trees?

- Increase tree canopy for **ecosystem services**
- Allow as many people to enjoy the trees as possible to foster sense of **community**
- Increase access to trees (and nature) in lower income neighborhoods to create a more **environmentally just** landscape

i-Tree Landscape Weights

- Tree Stocking Level (33%)
- Population Density (33%)
- Percent Population Below Poverty Line (33%)

Summary & Recommendations

- Educate residents on ecosystem services
- Tree planting could be looked at as a **process of beautification**
  - Stewards have a **sense of purpose**
  - Vacant lots
- Continue planting initiatives and educational opportunities
- Continue stewardship programs
- Prioritize areas based on environmental justice concerns

Future Projects

- Engage in tree planting with the Main South community
- Explore disparities in street tree vs. yard tree survivorship
- Investigate relationships between tree mortality, socioeconomics, and biophysical geography
- Characterize the overall age and health of Worcester's urban forest

i-Tree Landscape

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