



Stakeholder Summit 2015

Human Environment Regional Observatory

July 30, 2015



CLARK
UNIVERSITY



Outline



1. Introduction

- Tree Planting Programs
- The HERO Program

2. Tree Survey

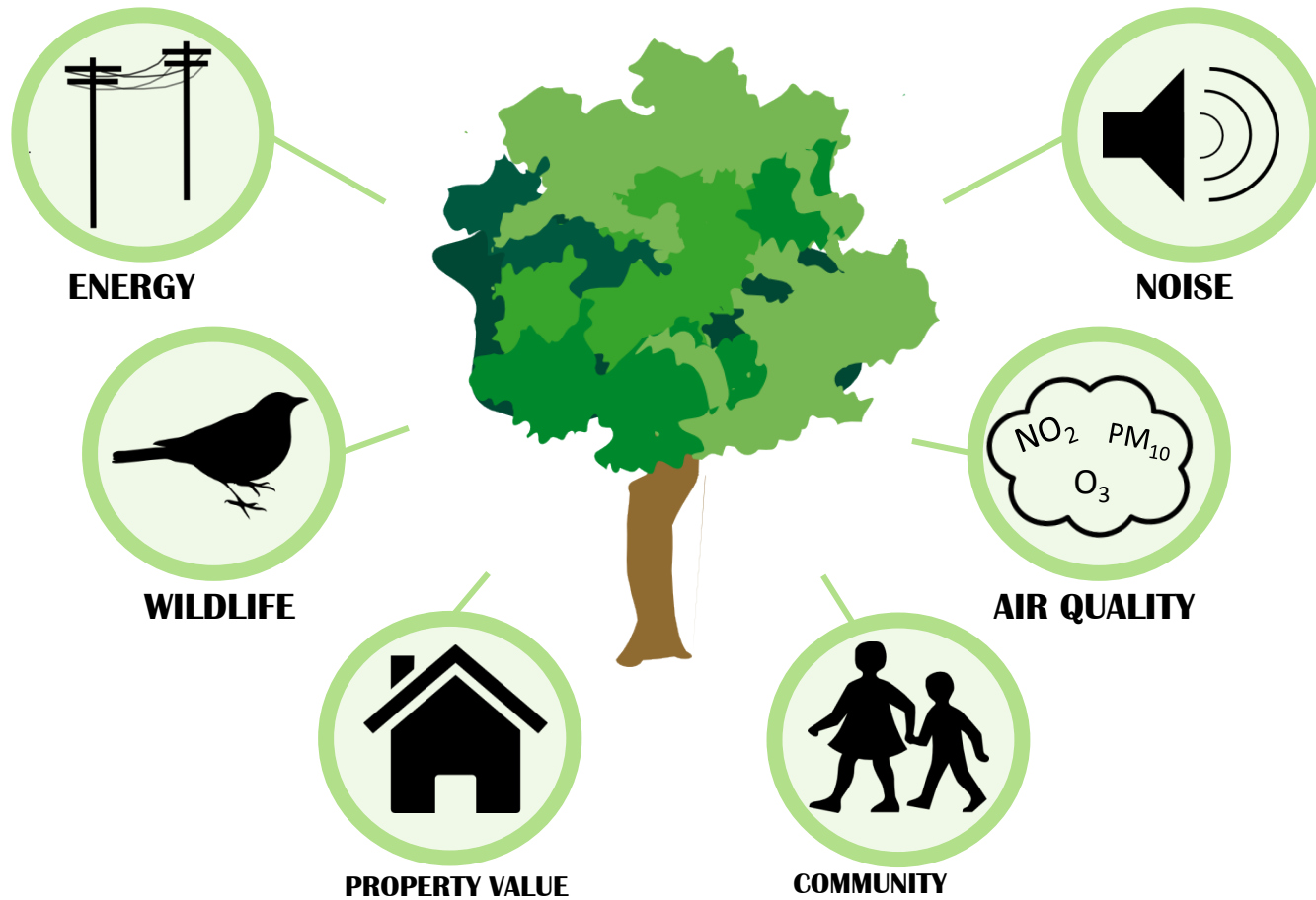
- Data Collection
- Data Analysis: Survivorship, Condition and Size

3. Interview Response

- Data Collection
- Emerging Themes

4. Summary and Future Directions

Benefits of Trees



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
- **Worcester Tree Initiative (WTI)** promotes urban forestry and stewardship in the City of Worcester and surrounding communities



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 Assessment
- Place Making Assessment



Current Research:

- Tree Planting Assessment
- Resident Experience Assessment



Broad Goals



1. Characterize the survivorship and health of the newly planted trees (planted by the DCR)
2. Characterize residents' experiences of the planting program (conducted by DCR and WTI)



Our Team



Members:

- 6 Clark undergraduate fellows
- 2 Clark graduate students
- 3 Professors

Activities:

- Attended training sessions
- Measured tree health
- Conducted interviews with residents
- Began to analyze data



*Isabel Miranda, Eli Goldman, Chung Truong Nguyen
Ali Filipovic, Hannah Rosenblum, Yuka Fuchino*

Data Collection



Surveyed trees:

- 1,516

Interviews:

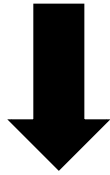
- 67 short
- 12 long

Online survey:

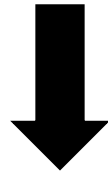
- 3, ongoing



Research Questions



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



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

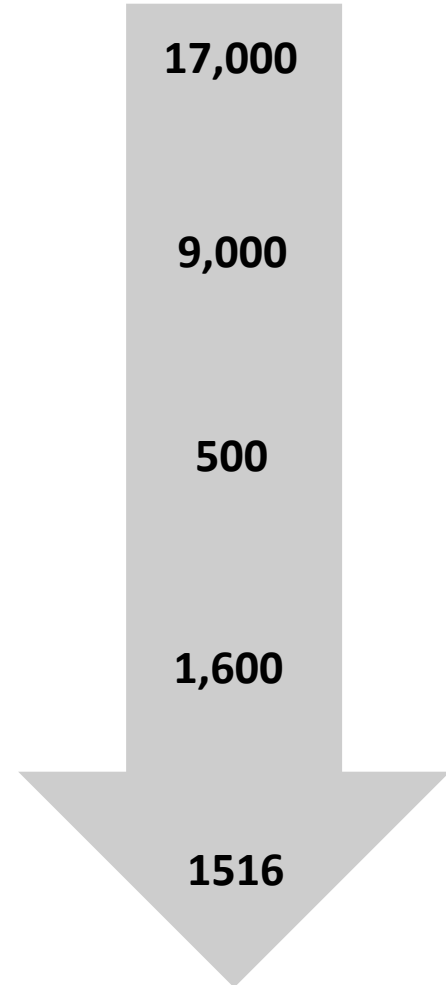
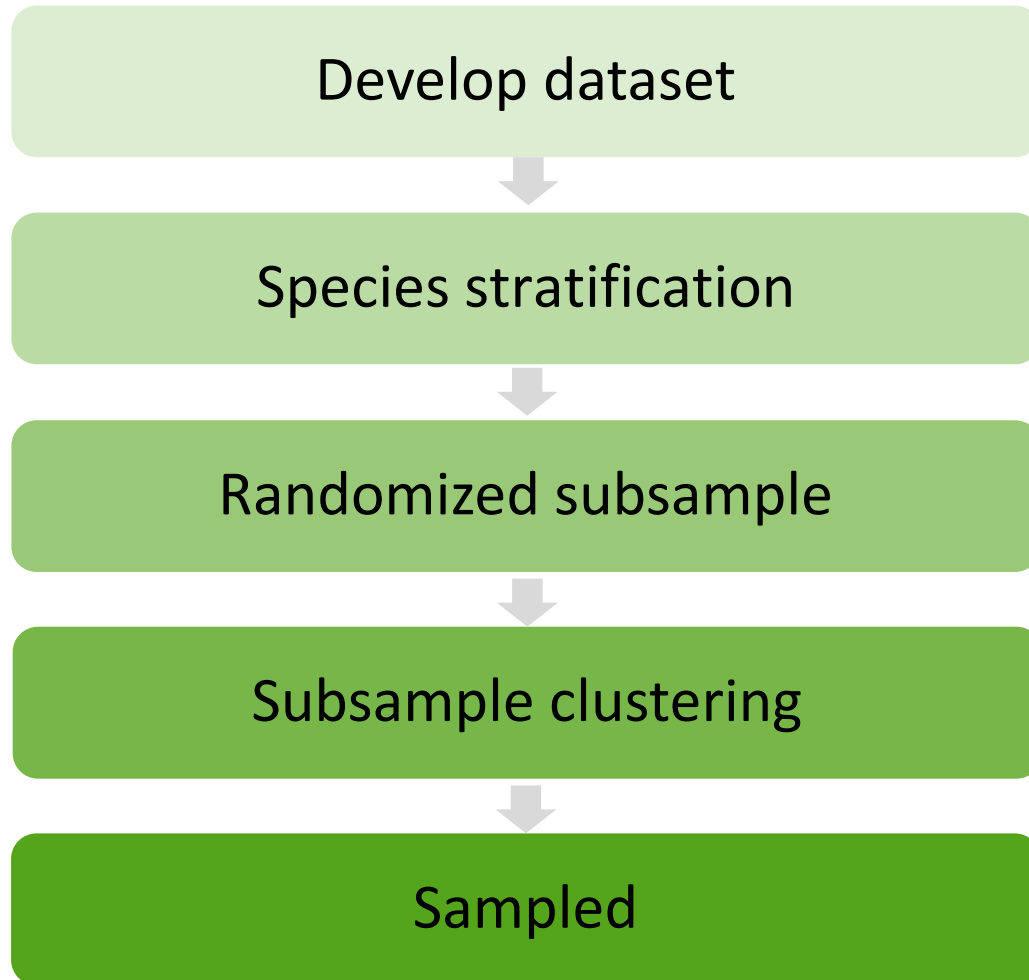


What are the **residents' experiences** with the tree planting process?

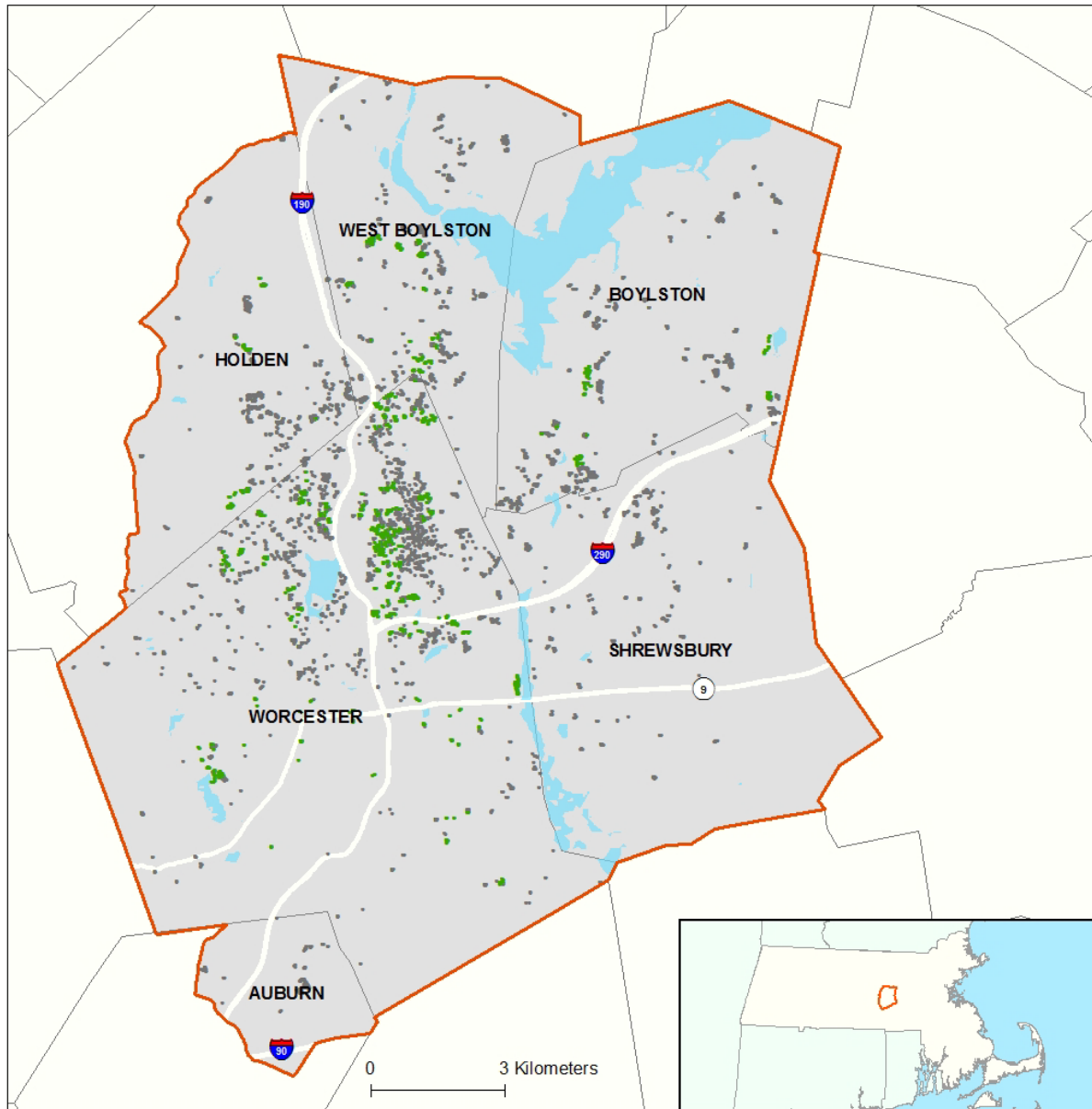
Sample Design



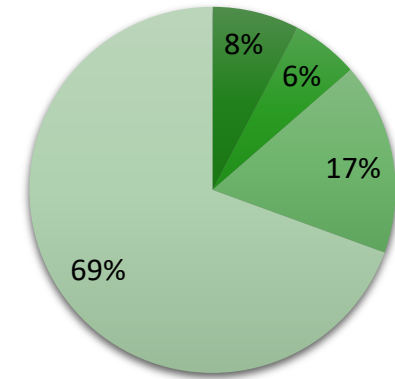
Number of Trees



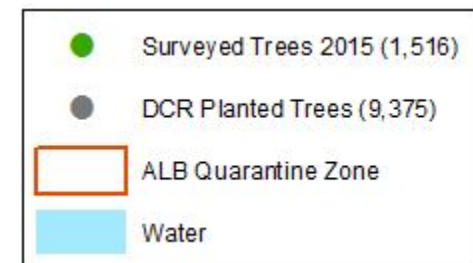
2015 Study Area



Distribution of Surveyed Trees



■ Boylston ■ Holden
■ West Boylston ■ Worcester



Summary of Assessment Characteristics



Names: YR
HR

Training: _____

Date: 6/28/15

Tree ID: 2906

Address: 19 MARY ANN DR

Town Name: Worcester

Loc. Notes: centered on top of hill 10-15ft from fence

GPS: -71.793189429 42.299772413

In Sample? No

Site Type:	Sidewalk Cut-Out Front Yard	Sidewalk Grass Strip <u>Back Yard</u>	Median Park	Parking Lot Natural Area
Land Use:	<u>Single-Family</u> Front Yard	Multi-Family Back Yard	Commerical Park	Industrial Natural Area

Species: Dawn Redwood

DBH: 2.83 @ ()

Height: 15' Width: 12'7" 12'2"

DBH2: _____ @ ()

Date Planted: Yes

Mortality Status:	<u>Alive</u>	Standing Dead Basal Sprout	Removed/Missing Stump	Unknown
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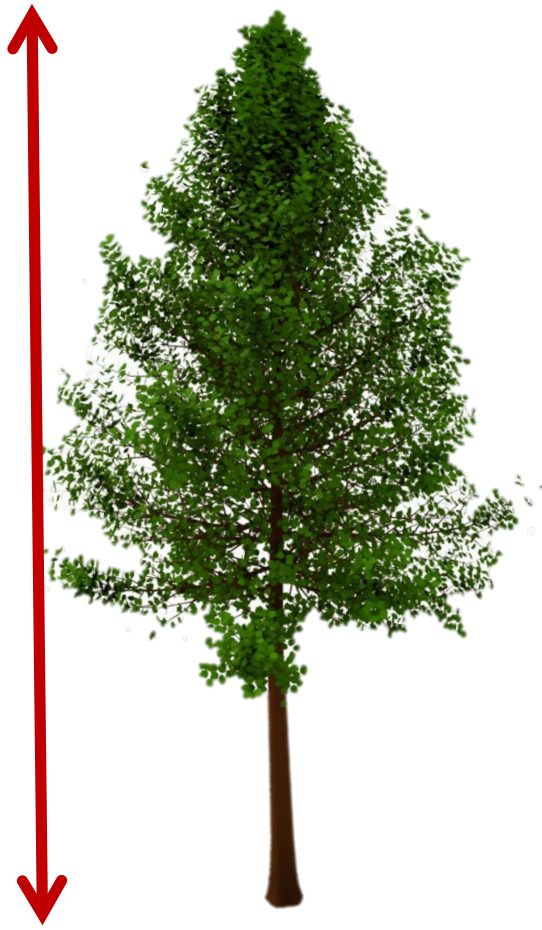
Mortality Status Notes:

Crown Dieback:	<u>1-25%</u>	26-50%	51-75%	76-100%
Crown Transparency:	<u>1-25%</u>	26-50%	51-75%	76-100%
Condition:	<u>Good</u>	Fair	Poor	Critical

Comments:

Time to Measure:

Size Metrics



Height



DBH



Width

Crown Dieback



1-25%



26-50%



51-75%



76-100%

Crown Transparency



1-25%



26-50%



51-75%



76-100%

Other Health Characteristics



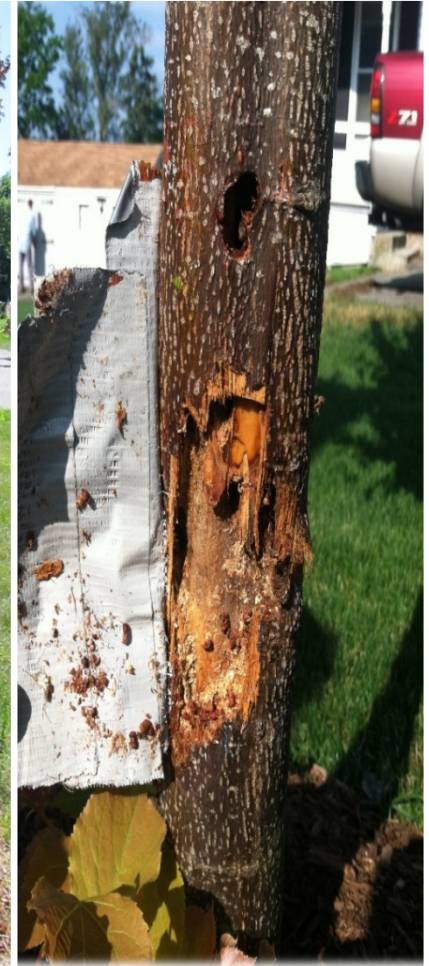
Standing Dead



Basal Sprouting



Trunk Damage



Pest Damage

Overall Rating



Good



Fair

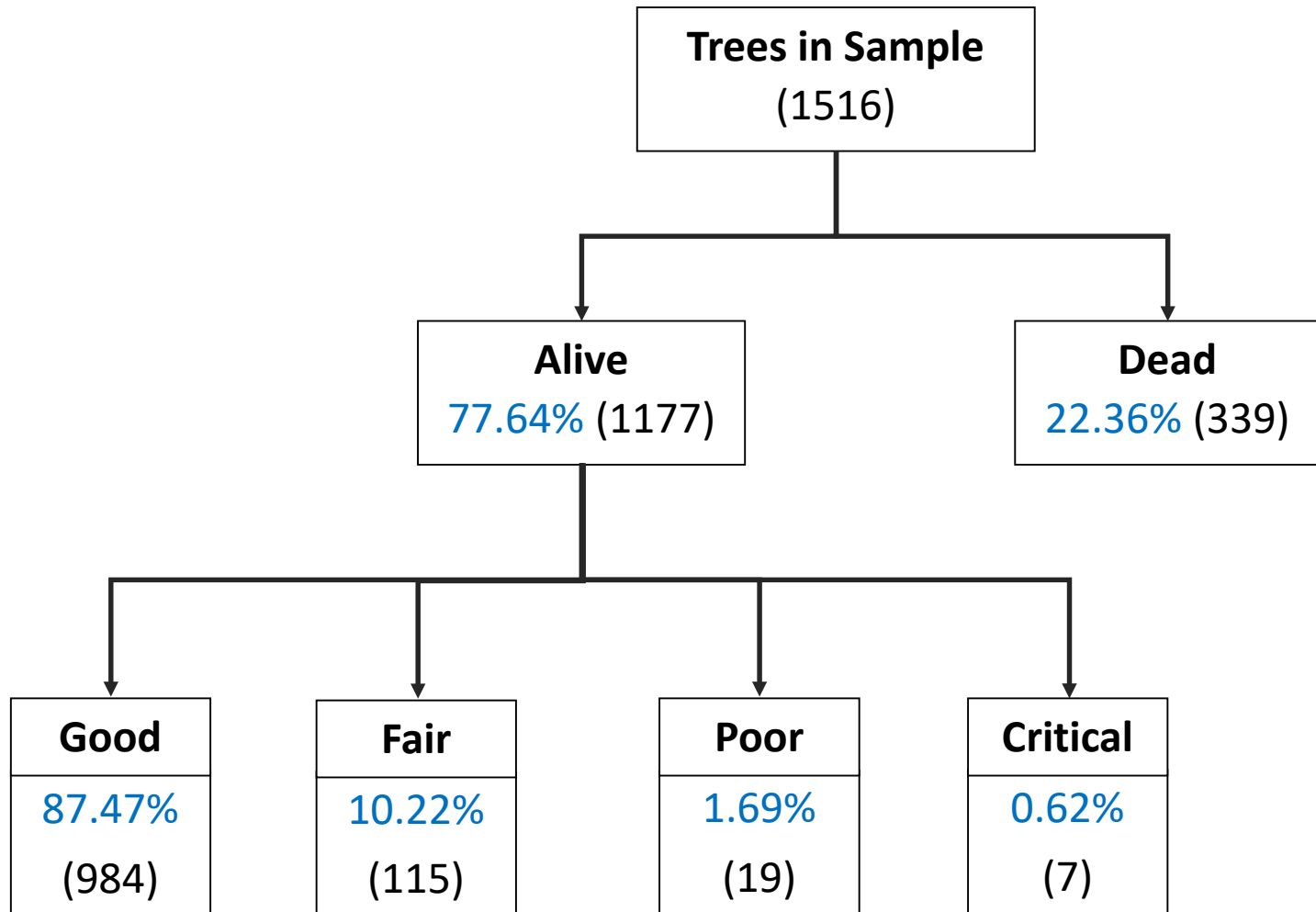


Poor

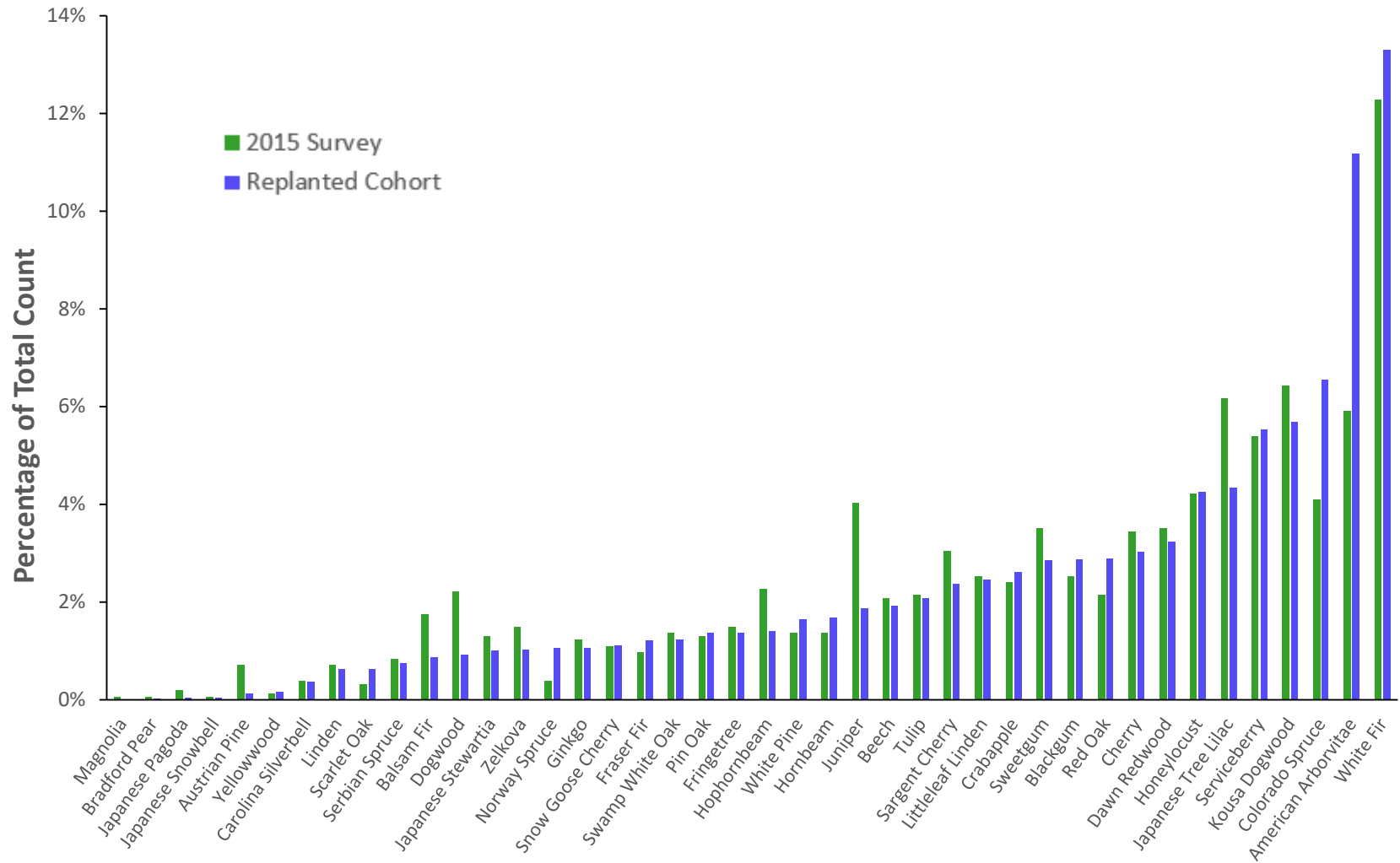


Critical

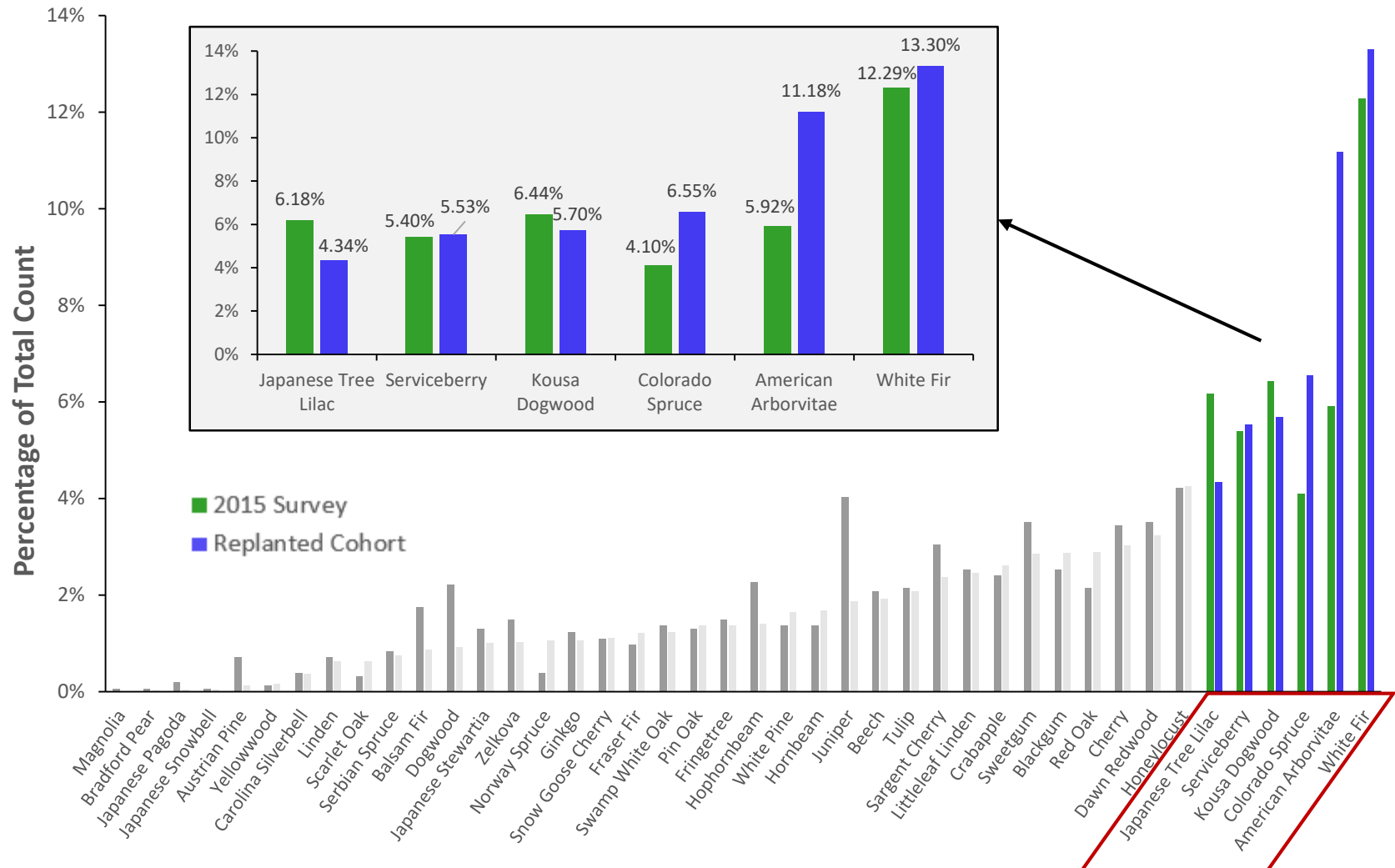
Tree Survivorship and Condition Within Sample



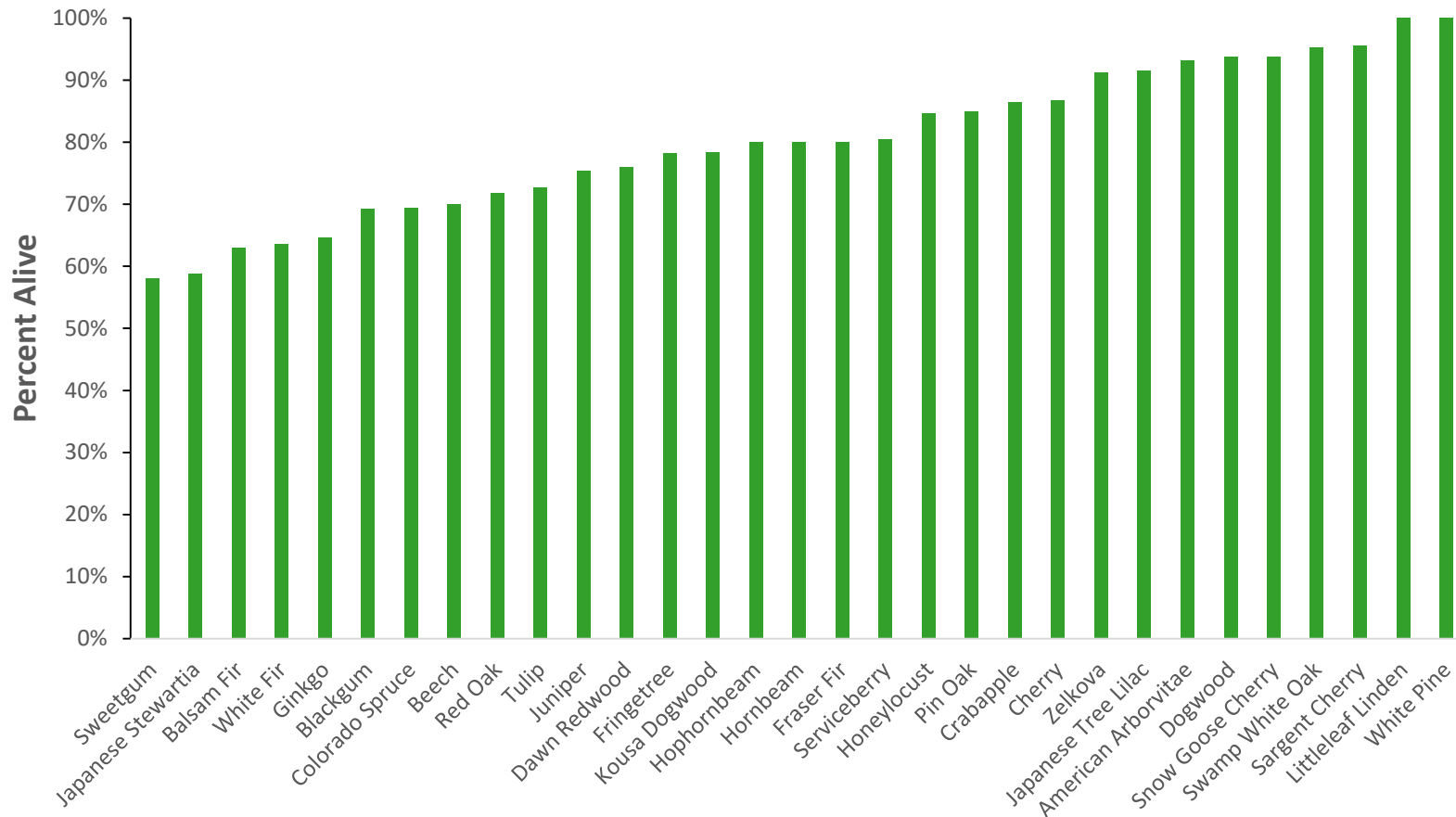
Species Distribution of Planted and Sampled Trees



Species Distribution of Planted and Sampled Trees



Survivorship Status by Species

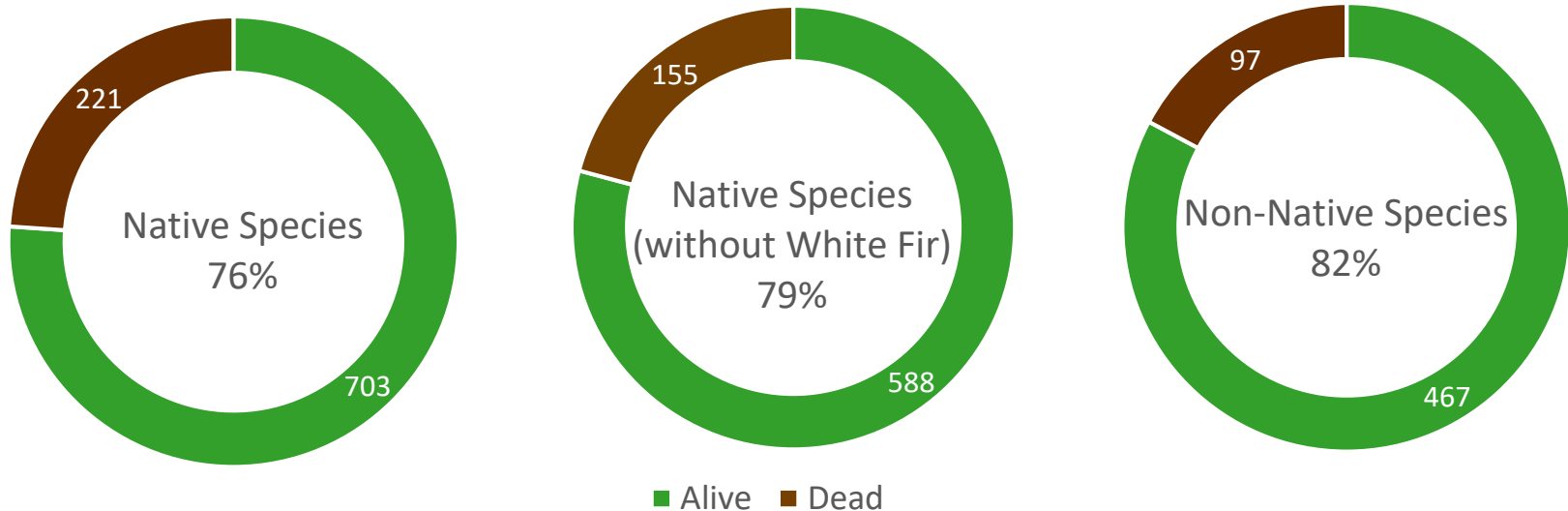


Investigating Survivorship

1. Native vs. Non-Native
2. Shade vs. Ornamental
3. Site Type
4. Land Use
5. Planting Season



Survivorship Status by Native vs. Non-Native



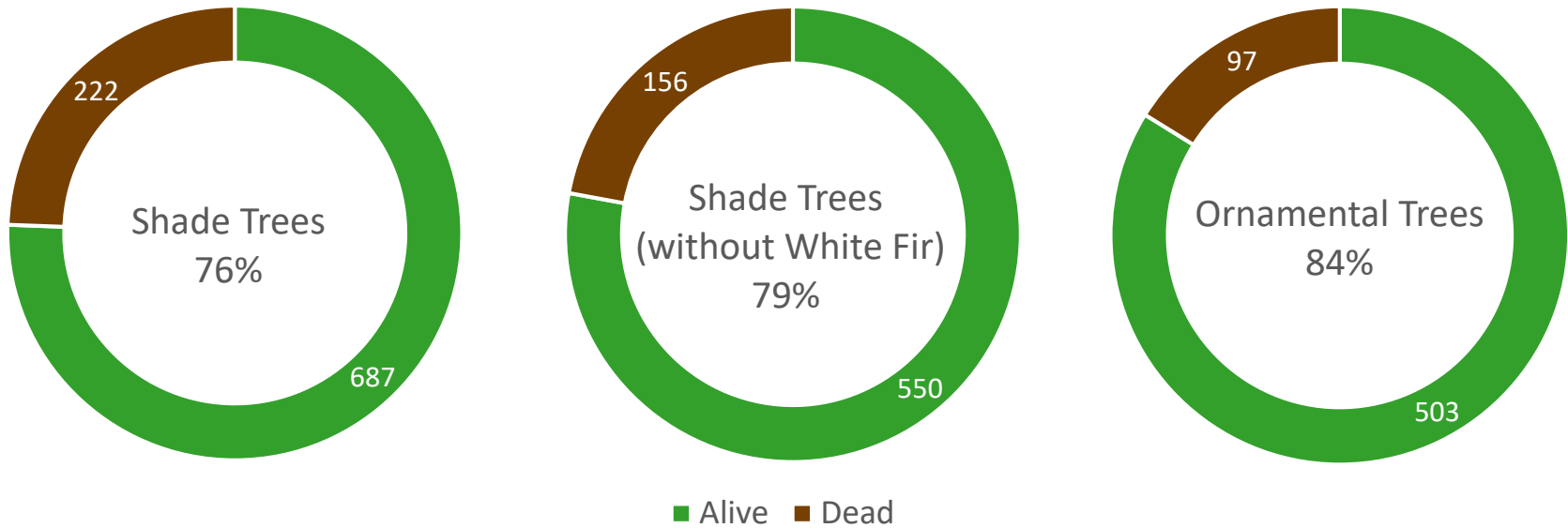
Most frequently planted native species

White Fir
American Arborvitae
Serviceberry
Honeylocust
Colorado Spruce

Most frequently planted non-native species

Cherry
Kousa Dogwood
Japanese Tree Lilac
Dawn Redwood
Littleleaf Linden

Survivorship Status by Shade vs. Ornamental



Most frequently planted shade species

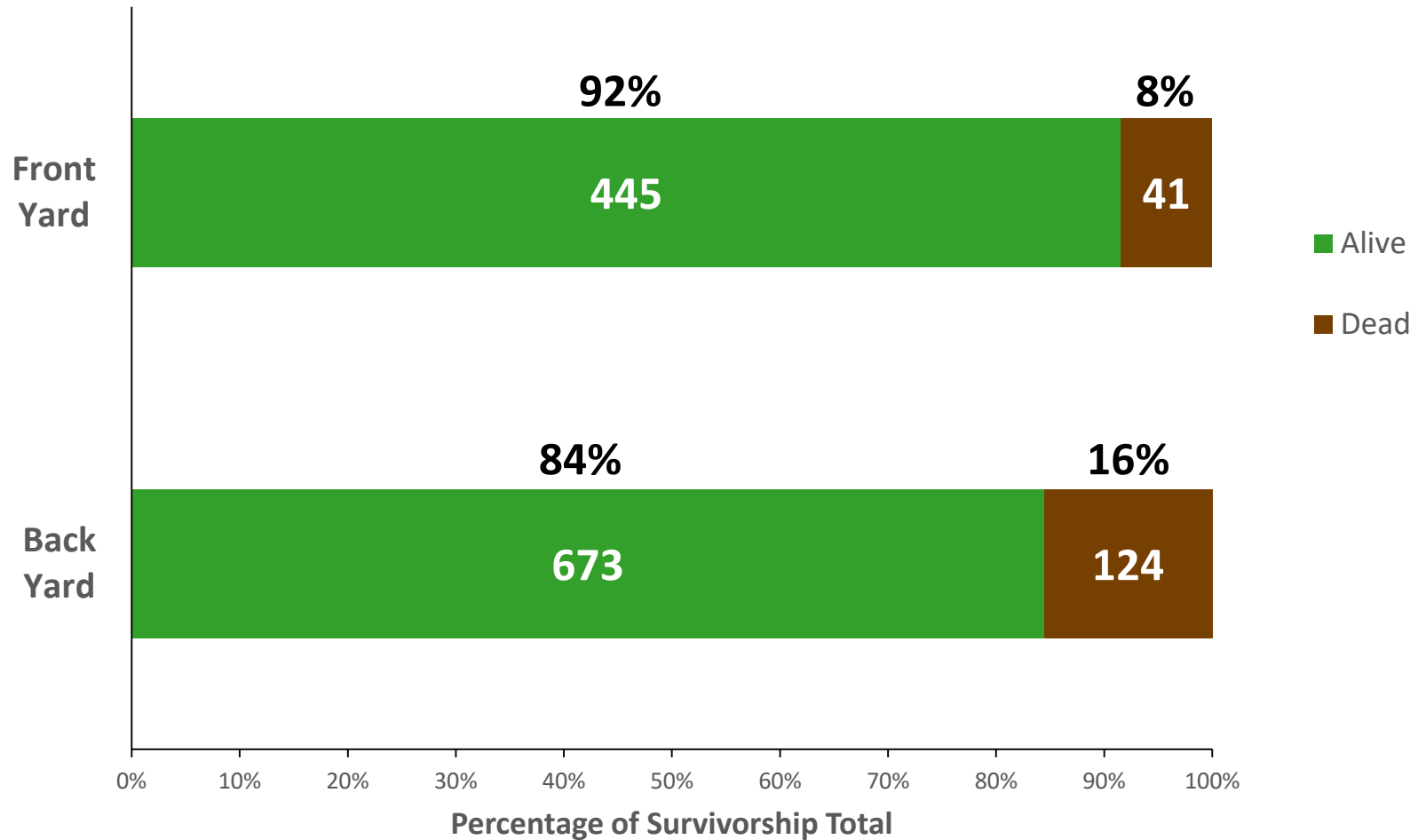
White Fir
American Arborvitae
Honeylocust
Colorado Spruce
Dawn Redwood

Most frequently planted ornamental species

Cherry
Kousa Dogwood
Japanese Tree Lilac
Serviceberry
Juniper

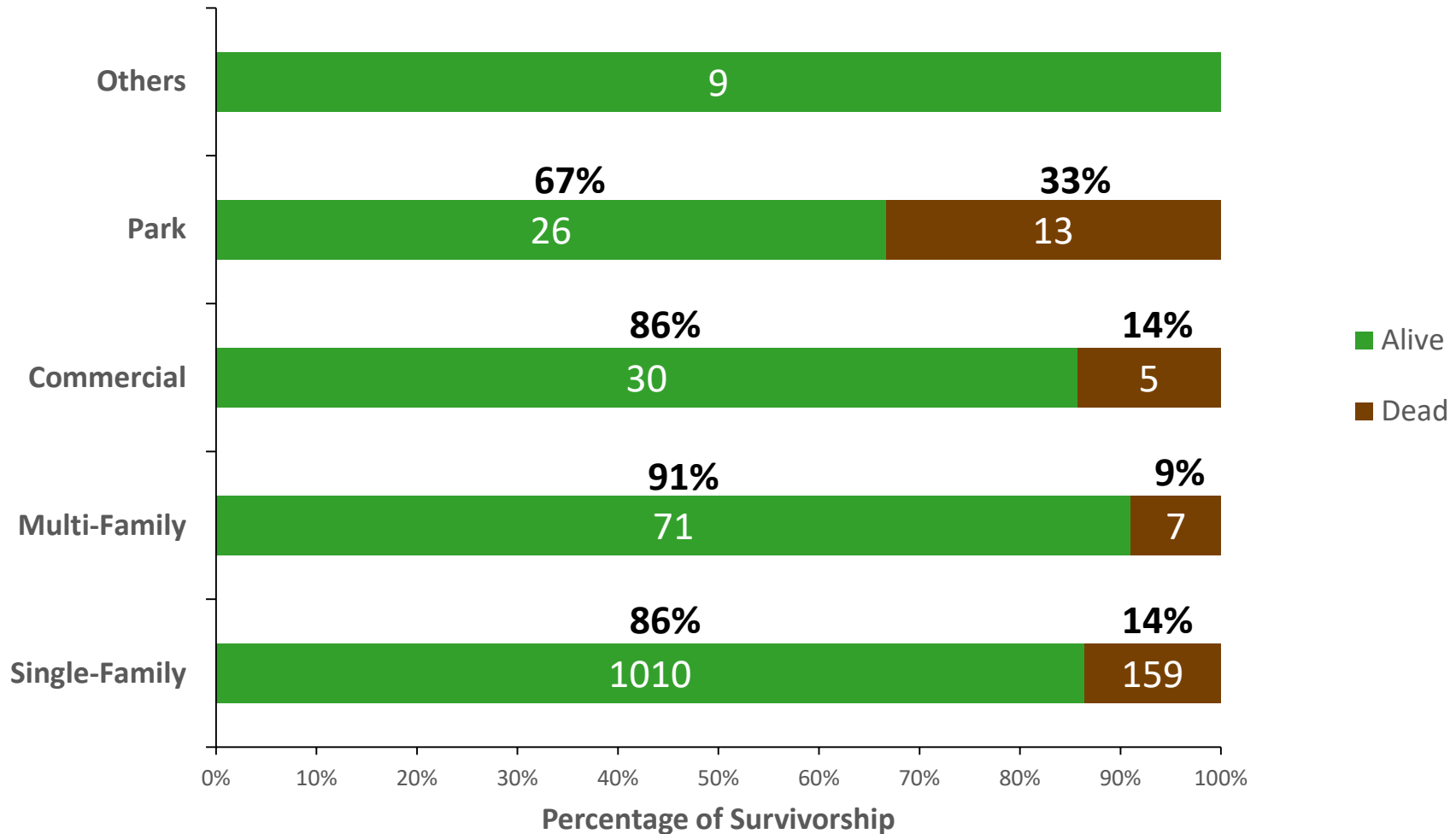


Survivorship Status by Site Type



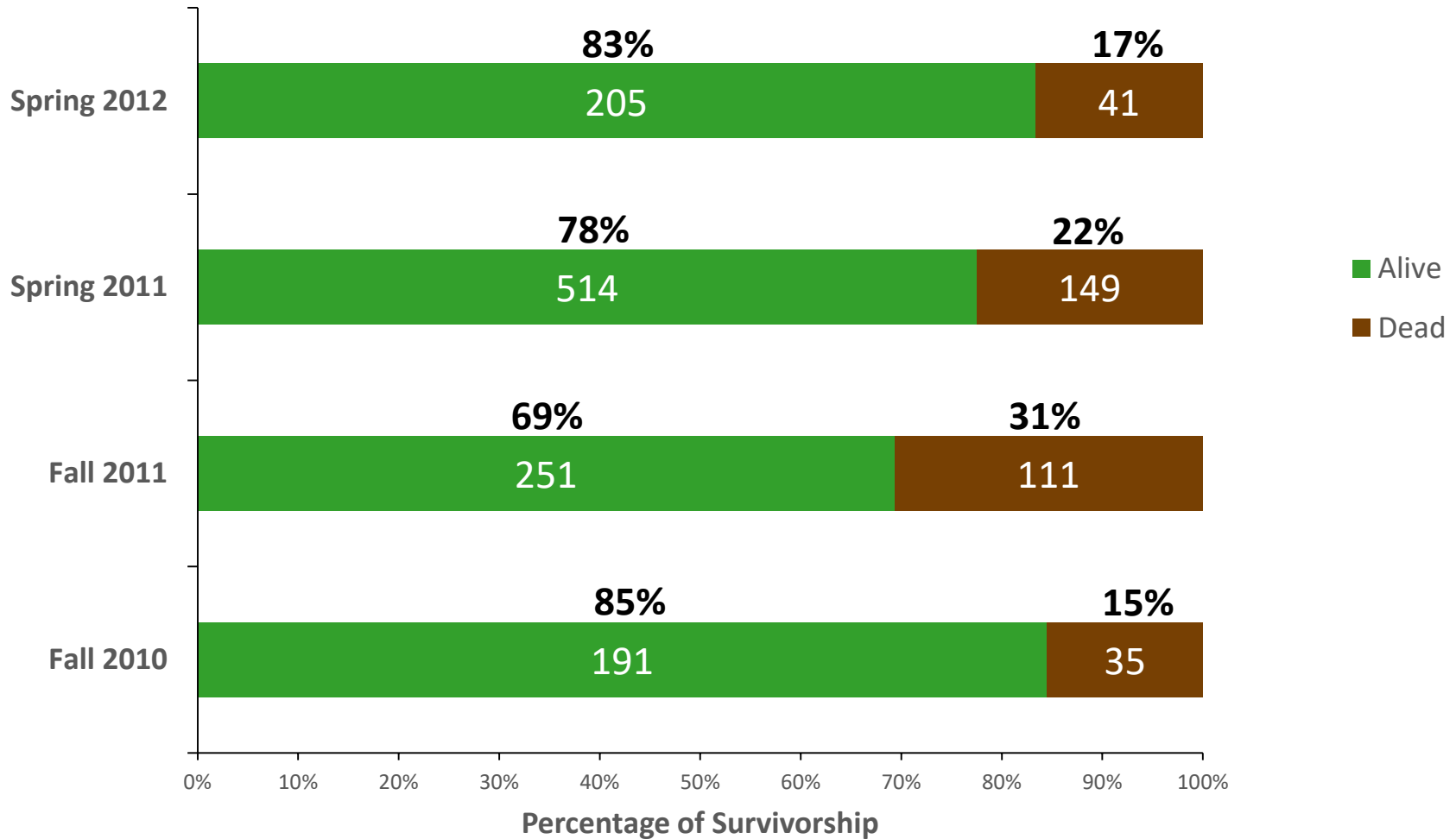


Survivorship Status by Land Use





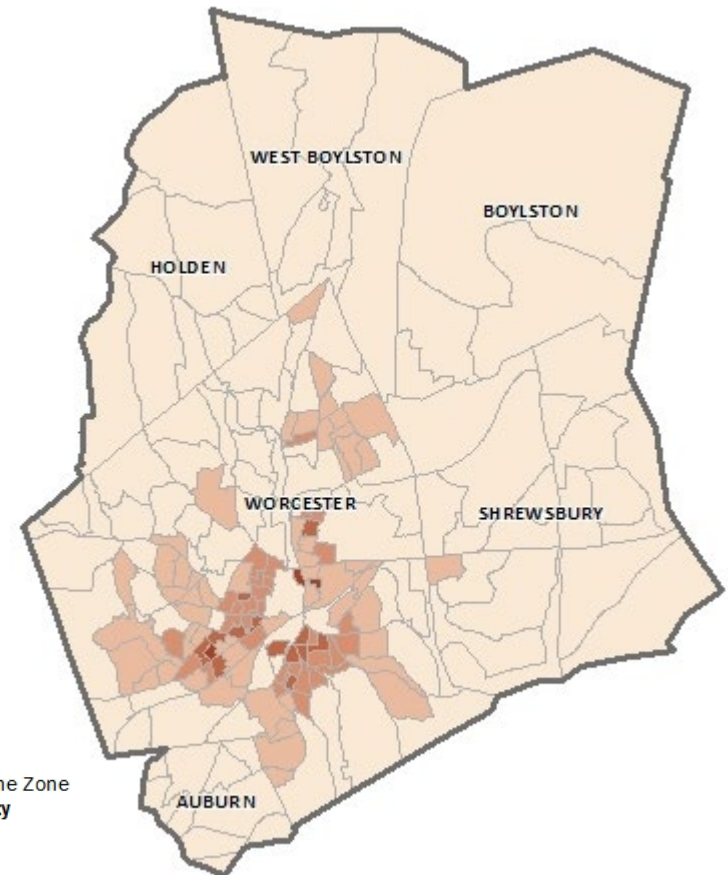
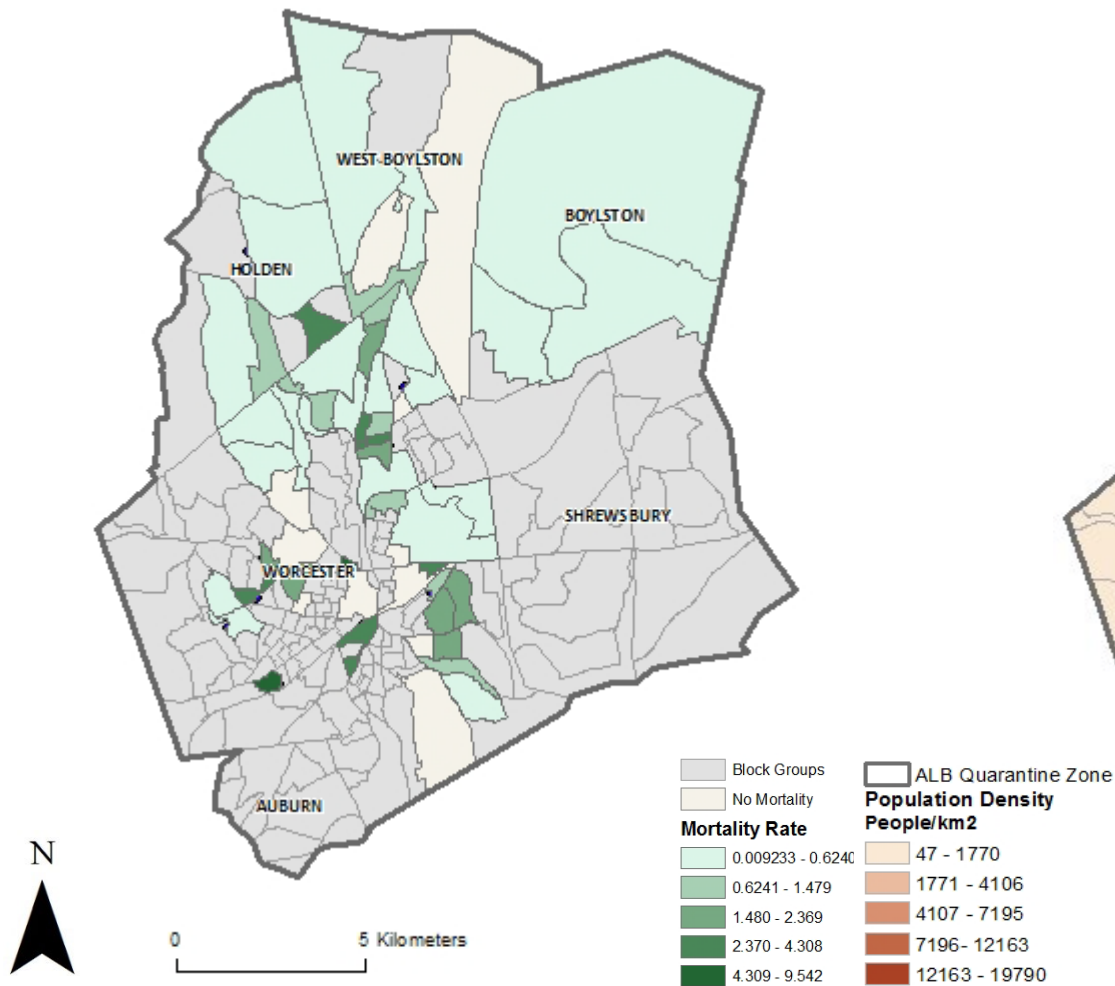
Survivorship Status by Planting Season



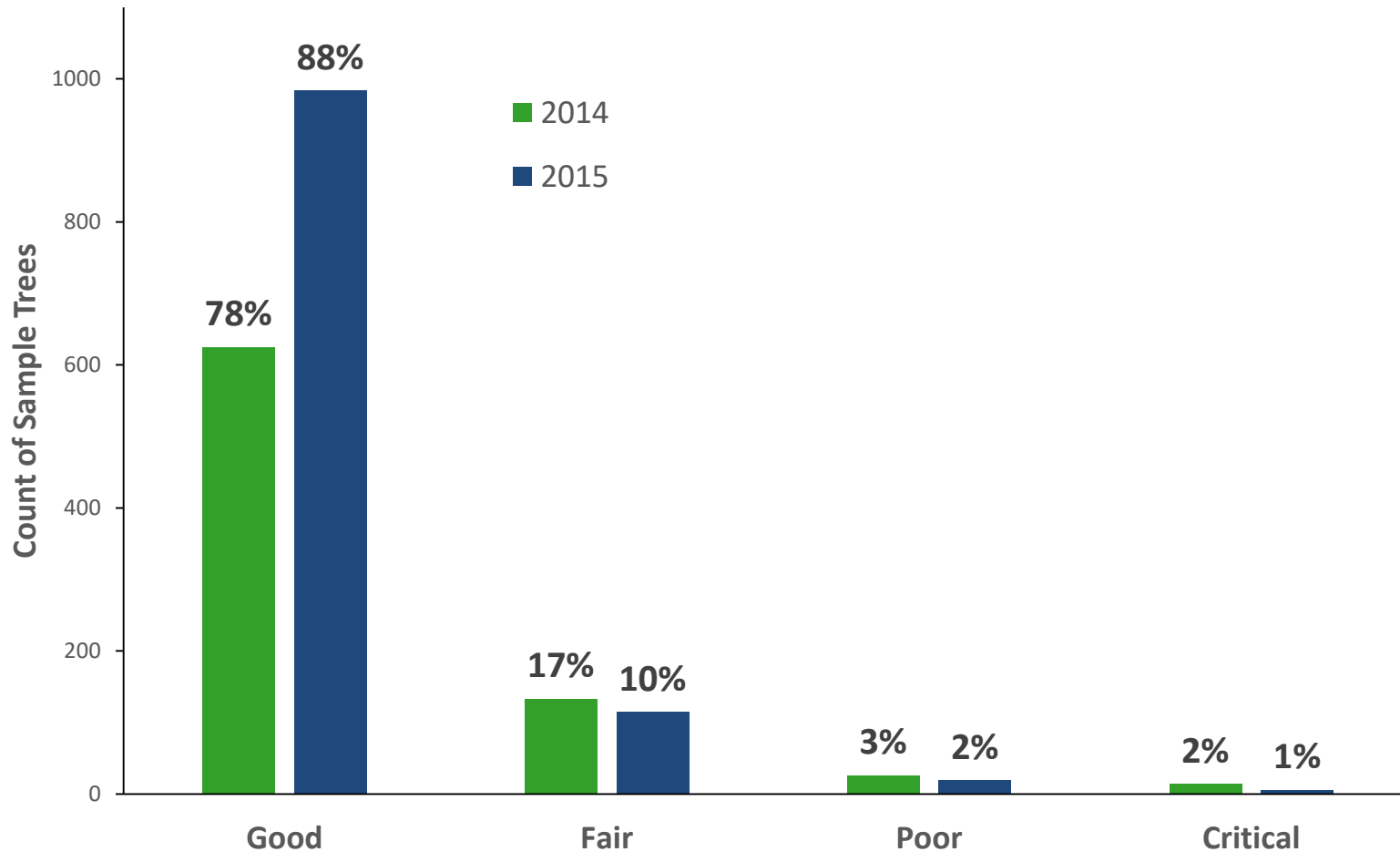
Survivorship by Census Block

Tree Survivorship Density

Population Density

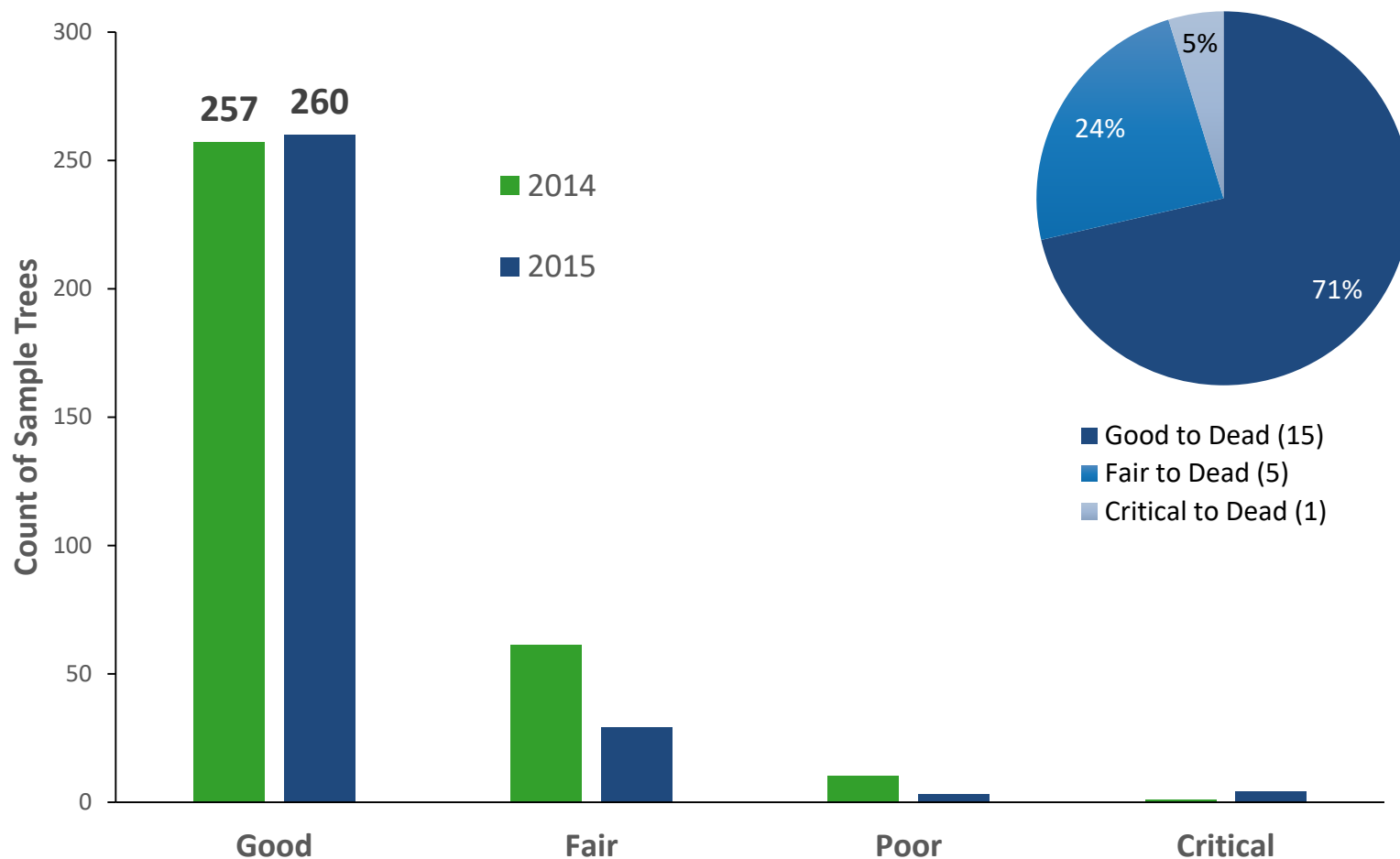


Count of Tree Condition in 2014 and 2015



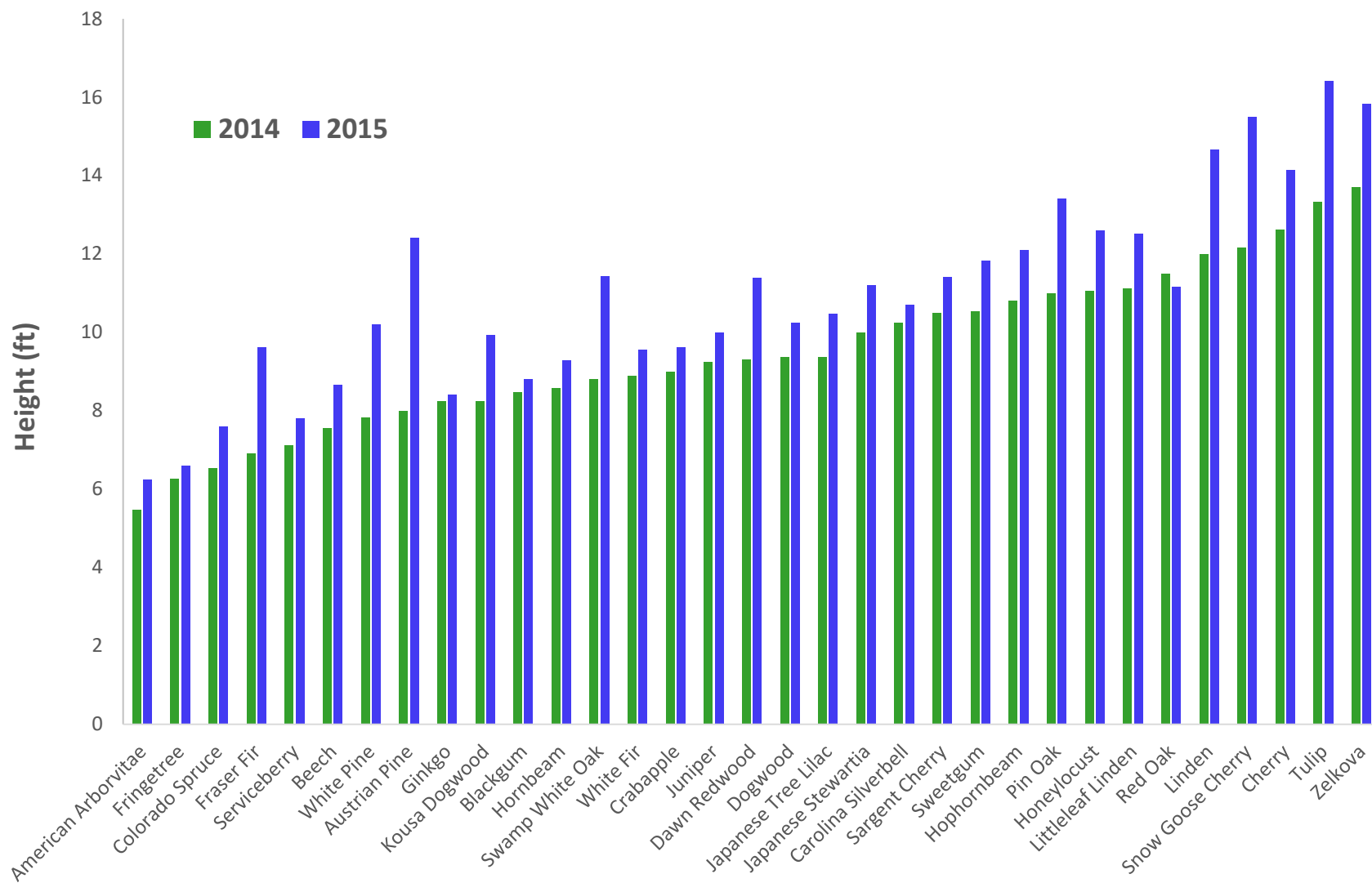
Condition of Re-Surveyed Trees

n = 342



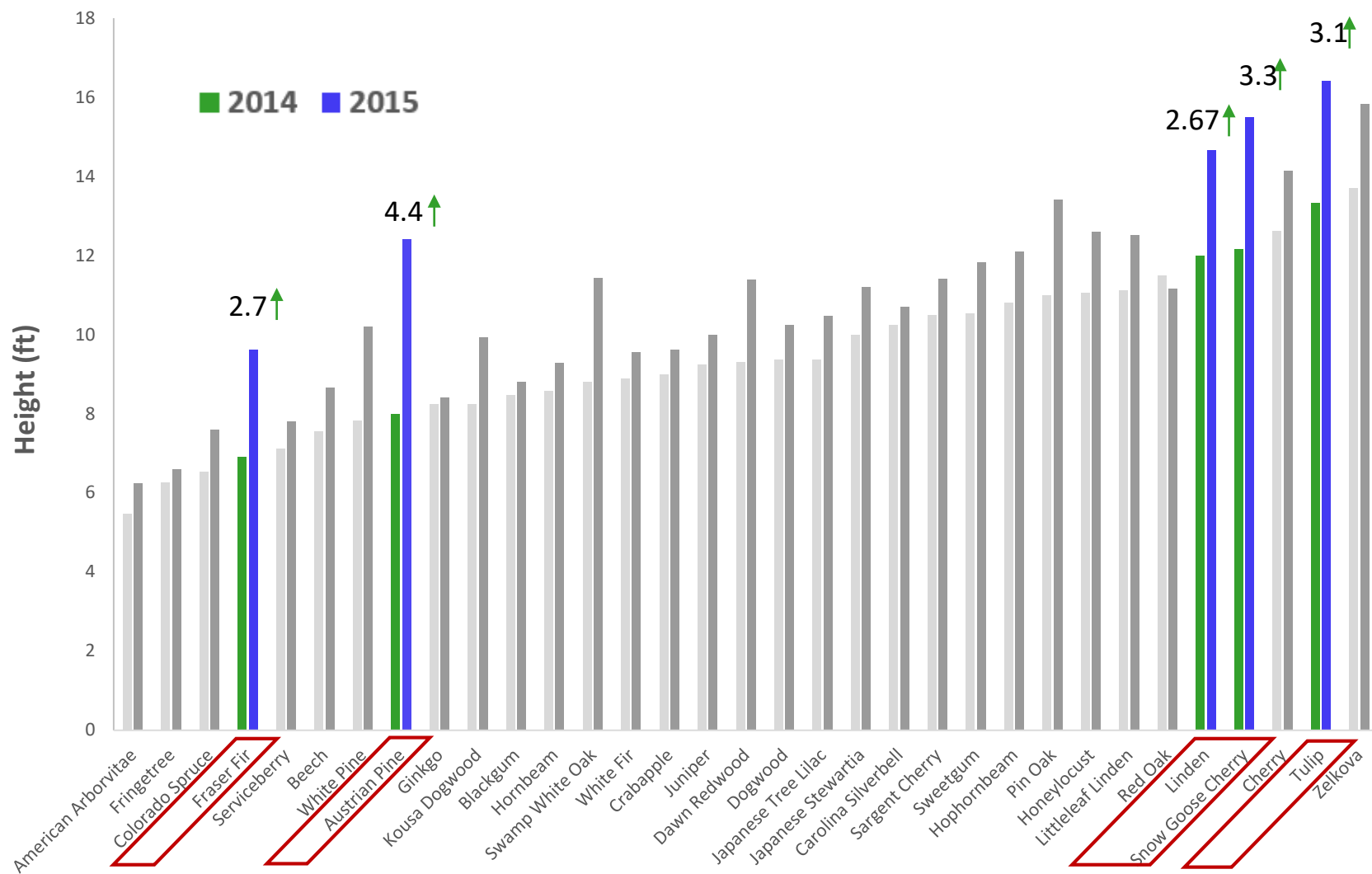


Average Heights by Species 2014 and 2015



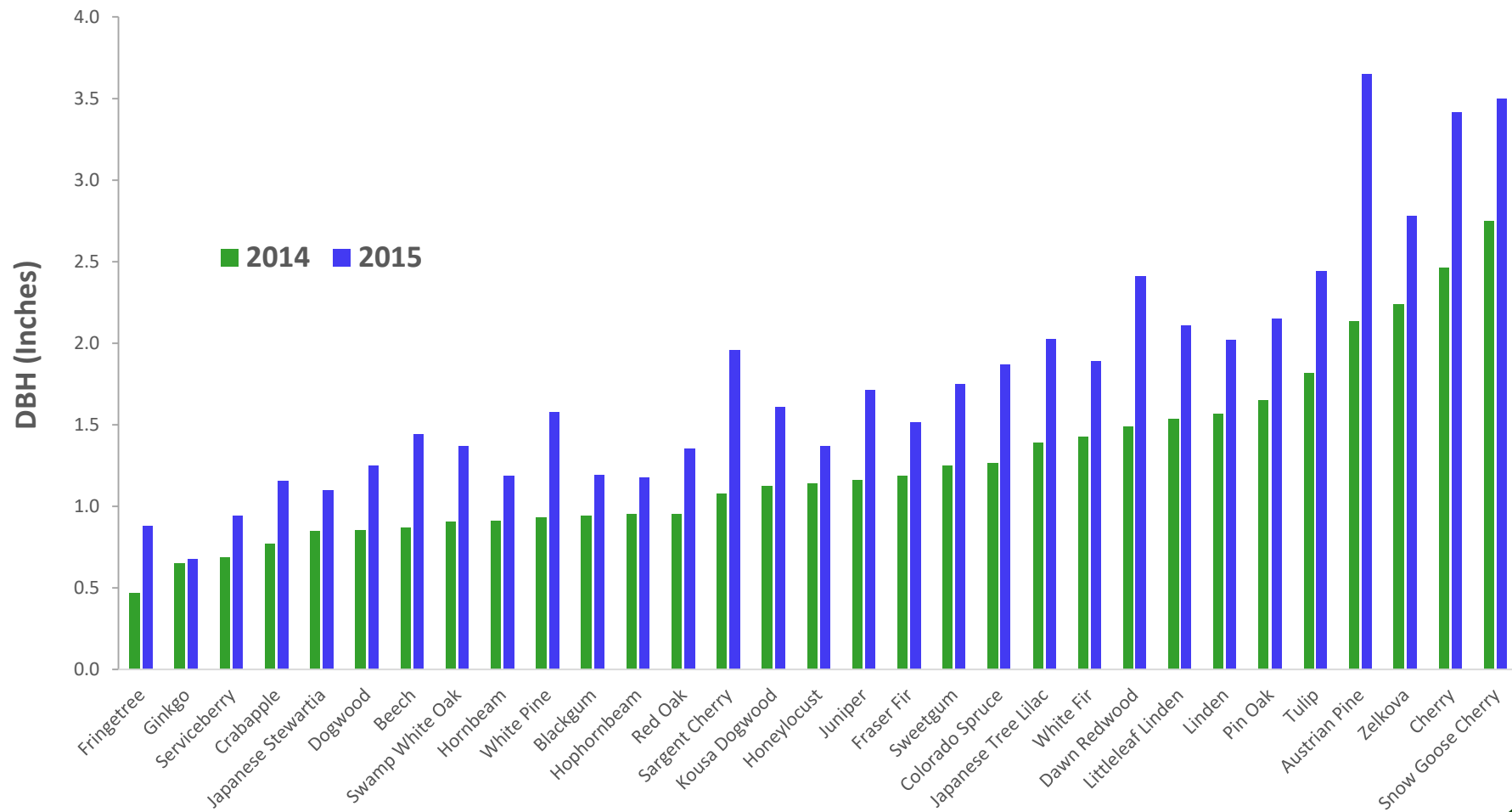


Average Heights by Species 2014 and 2015

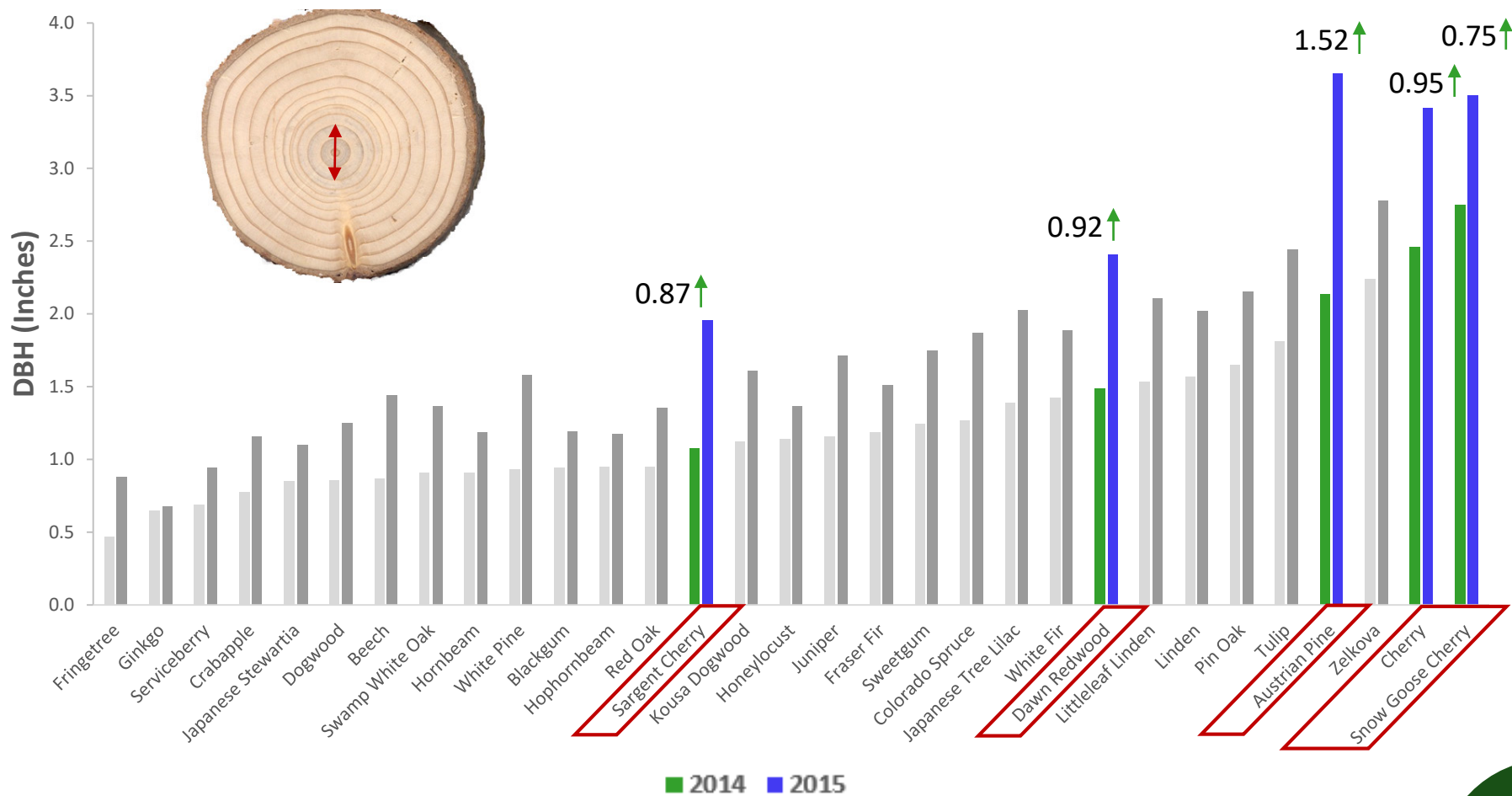




Average Diameter at Breast Height (DBH) by Species 2014 and 2015



Average Diameter at Breast Height (DBH) by Species 2014 and 2015



Resident Experience Assessment

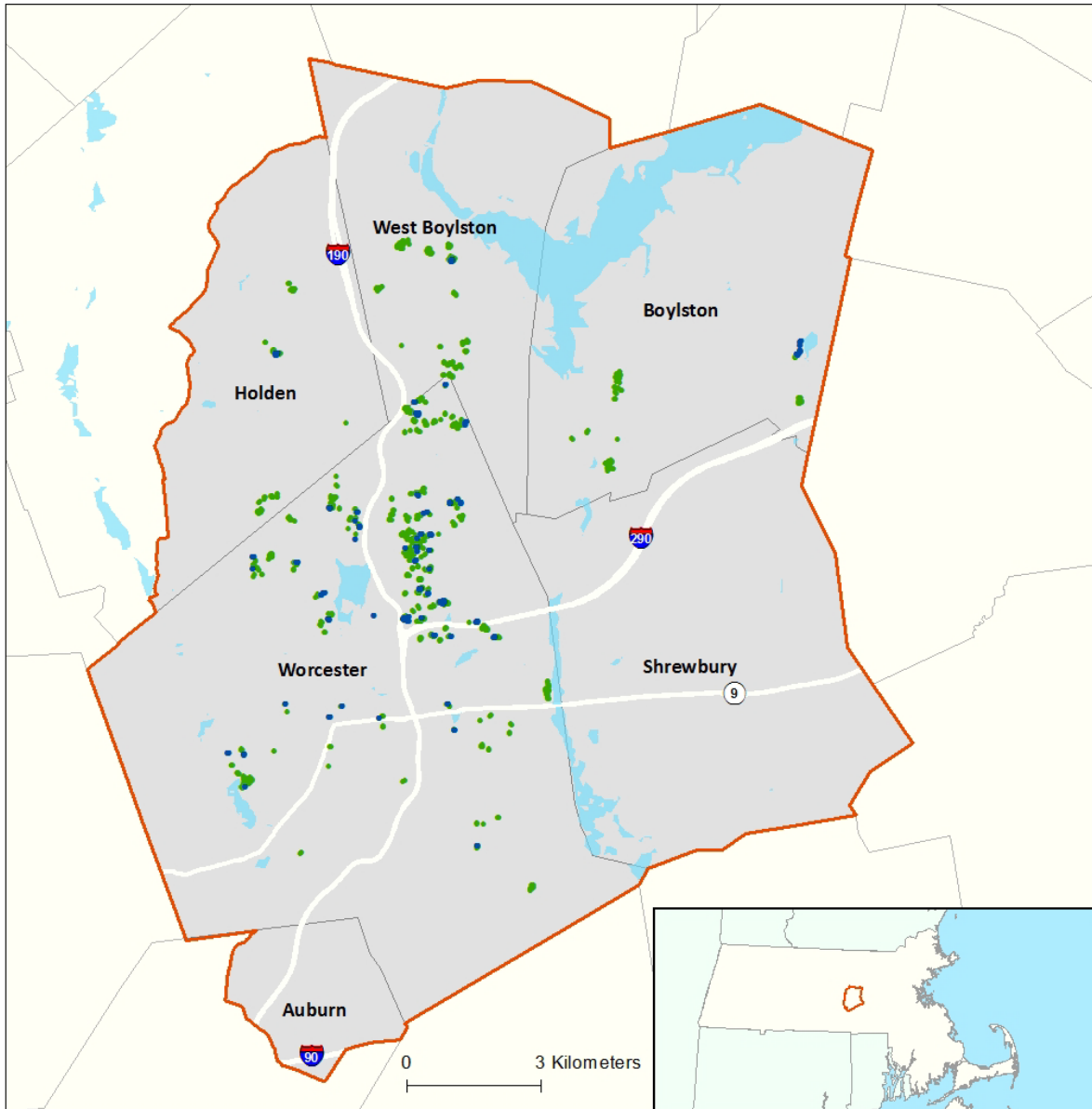


Interviewees

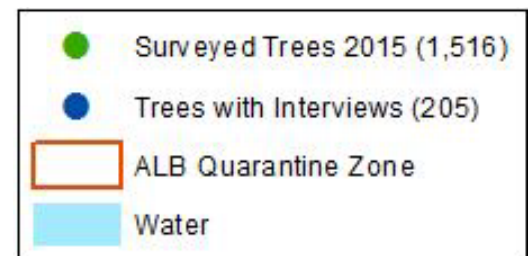
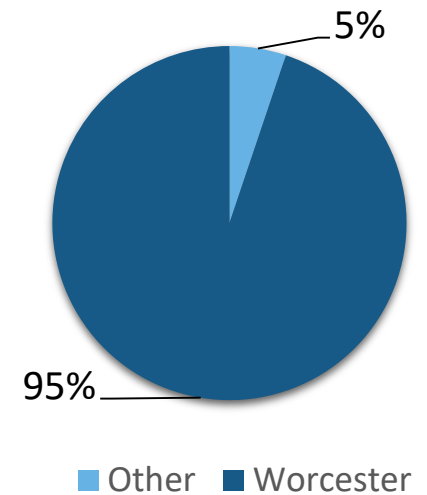
- 67 Short Interviews (3 to 5 minutes)
- 12 Long Interviews (20 to 40 minutes)



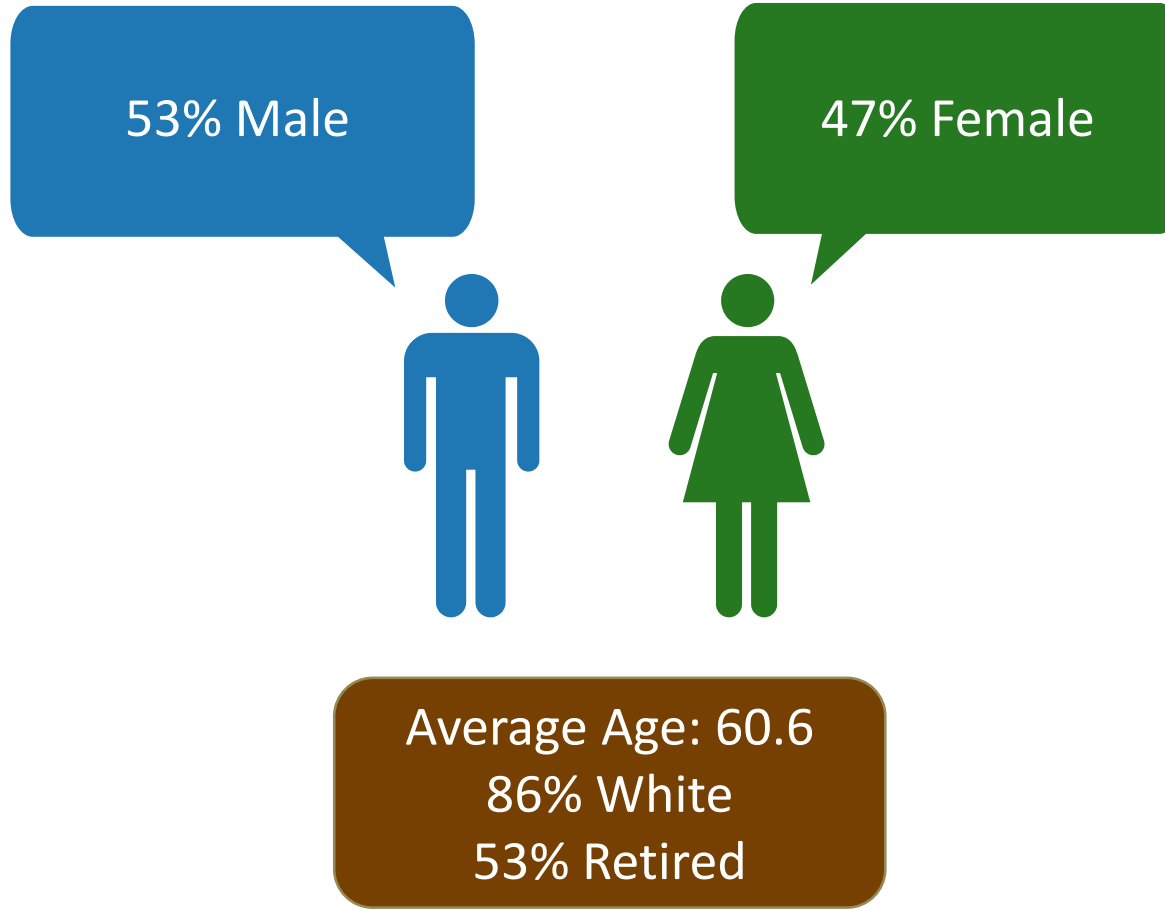
Resident Interview Response



Number of Interviewees by Municipality



Demographics of Interviewees



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

Identifying Themes in the Data



Identifying Themes in the Data



Tree Care: Burdens and Limitations



Questions

- In what ways are trees burdensome?
- What is the hardest part of maintaining your tree?



Inherent to Trees

“There’s **no hard part**, for me. I’m very happy to have them”
– Resident



Watering

“Oh we had to water them for two years – all of them we watered and watered, it was **quite an expense on our water bill** unfortunately. We were not too happy with that. **But now we have the nice trees.**”

– Resident



Age or Condition

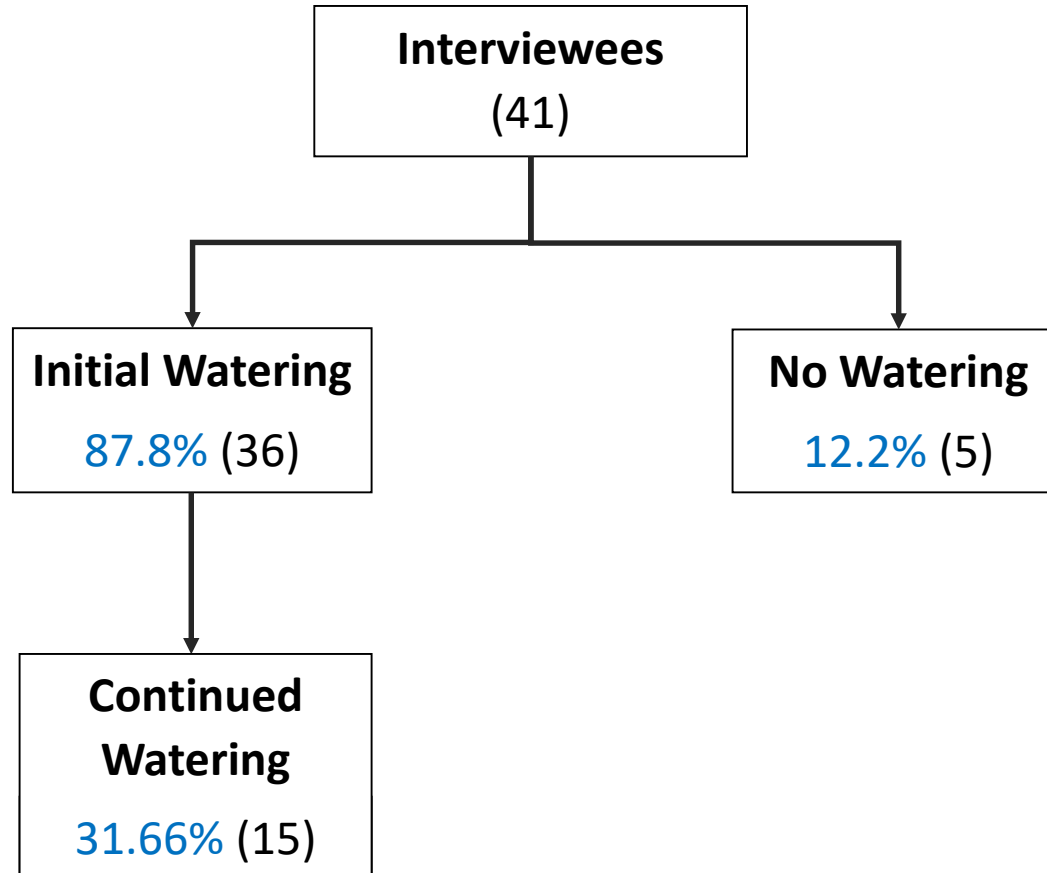
“**We’re trying.** We’re in our 80s so it’s not easy.”

– Resident

“Well, **I was watering** up until this past year, and then I became handicapped.”

– Resident

Tree Care: Watering Results



Tree Care: Motivations



Personal

“I enjoy botany, certain aspects of plant life, and to make my yard more beautiful and then environment more beautiful. Plant a tree.”

-Resident



Neighborhood

“Since they’ve replanted trees it seems that people are paying more attention to how their houses look, you know.”

-Resident



Environmental Awareness

“If you have green you have a fabulous feeling of the environment and how it positively impacts your life.”

-Resident

Identifying Themes in the Data



Stakeholder Interactions



DCR and WTI

“It was **very easy to work with everybody**, get your questions asked, and get information that you needed and also information that you didn’t know you needed.”
– Resident

“We **had wonderful experiences** with the groups that we’ve worked with whether it be the Worcester Tree Initiative or the DCR.”
– Resident

“The DCR, they **do good work**. I think they are limited with their budget and personnel but they do a good job.”
– Resident

Relationship
with
Stakeholders

Summary



Tree Planting Assessment

- Survivorship was 77.6% (79.6% without White Fir)
 - Survivorship increased from 75.6% in 2014
- The high survivorship rate was hypothetically linked to greater care of ornamental/non-native/front yard trees
- Opportunity to improve communication about shade/native/back yard trees and their ecosystem services

Resident Experience Assessment

- Most residents were appreciative of the tree planting programs and had a positive feeling regarding the WTI and DCR
- The majority of residents watered their trees and didn't feel burdened by their trees

Future Directions

- Link interview data with tree survey data to better understand neighborhood attitudes
- Explore the relationships between income, demographics, and tree survivorship
- Investigate ecosystem services of planted trees

Acknowledgements



Special thanks to:

Clark University and the
O'Connor Fund

Principal Investigators

- John Rogan
- Deborah Martin
- Verna DeLauer

Managers

- Arthur Elmes
- Michelle Andrews

Our interviewees
Former HERO cohorts
Visiting lecturers

Staff Support

- Brenda Nikas-Hayes
- Pamela Dunkle
- Rachel Levitt
- Kayla Peterson
- Michael Krikonis

DCR, especially Kathryn Aroian,
Shawn Cameron, and Jenny
Pezzullo

WTI, especially Ruth Seward,
Derek Lirange, and Peggy
Middaugh

Thank You!



Highest Survivorship



Native	White Fir	American Arborvitae	Serviceberry
Non-Native	Japanese Tree Lilac	Kousa Dogwood	Cherry

Shade	White Fir	American Arborvitae	Honeylocust
Ornamental	Japanese Tree Lilac	Kousa Dogwood	Serviceberry

Front Yard	Japanese Tree Lilac	American Arborvitae	Kousa Dogwood
Back Yard	White Fir	Kousa Dogwood	Juniper

Other Planting Program Studies

Table 1
Early (<10 years since planting) urban tree survival rates for past cited planting program studies.

Source	Location	Species	% survival (n)	Yrs since planting	Notes
Impens and Delcarte (1979)	Brussels, Belgium	Numerous	88.7 (2905)	1	Average survival and number planted for 4 assessment periods Federal inner-city planting program Community-based inner-city planting program; includes replacements
Sklar and Ames (1985)	Oakland, CA, United States	Numerous	0.5 (2000)	<10	
			60–70 (1500)	<10	
Gilbertson and Bradshaw (1990)	Liverpool, United Kingdom	Numerous	77.3(401)	3	Average survival across 10 species and 3 cities Range of survival for 10 cultivars planted in 12 communities Large trees planted bare root with the majority of main structural roots/scaffold branches removed
Nowak et al. (1990)	Oakland/Berkley, CA, United States	<i>Robinia pseudoacacia</i>	65.4 (254)	2	
		<i>Magnolia grandiflora</i>	63.8 (199)	2	
		<i>Platanus × acerifolia</i>	81.5 (27)	2	
Miller and Miller (1991)	Wisconsin, United States	Numerous	67.5 (2048)	4	
Gerhold et al. (1994)	Pennsylvania and Maryland, United States	<i>Malus</i> spp.	94–100(unknown)	3	
Yang and McBride (2003)	Beijing, China	<i>Sophora japonica</i>	83.1 (450)	<1(11 wks)	Average for 21 cities/towns
		<i>Fraxinus chinensis</i>	62.7 (300)		
Thompson et al. (2004)	Iowa, United States	Numerous	91 (932)	4	
Lu et al. (2010)	New York, NY, United States	Numerous	91.3 (45,094)	2	Bare root stock; excludes missing/removed trees Balled-and-burlapped stock; excludes missing/removed trees
Jack-Scott (2011)	Philadelphia, PA, United States	Numerous	95 (590)	1–5	
			96 (573)	1–5	
Roman and Scatena (2011)	Philadelphia, PA, United States	<i>Acer campestre</i>	78.8 (151)	2–10	
Jack-Scott et al. (2013)	New Haven, Connecticut, United States	Numerous	73.8 (1393)	4–16	
Roman et al. (2013)	Oakland, CA, United States	Numerous	80.3 (unknown)	1–4	

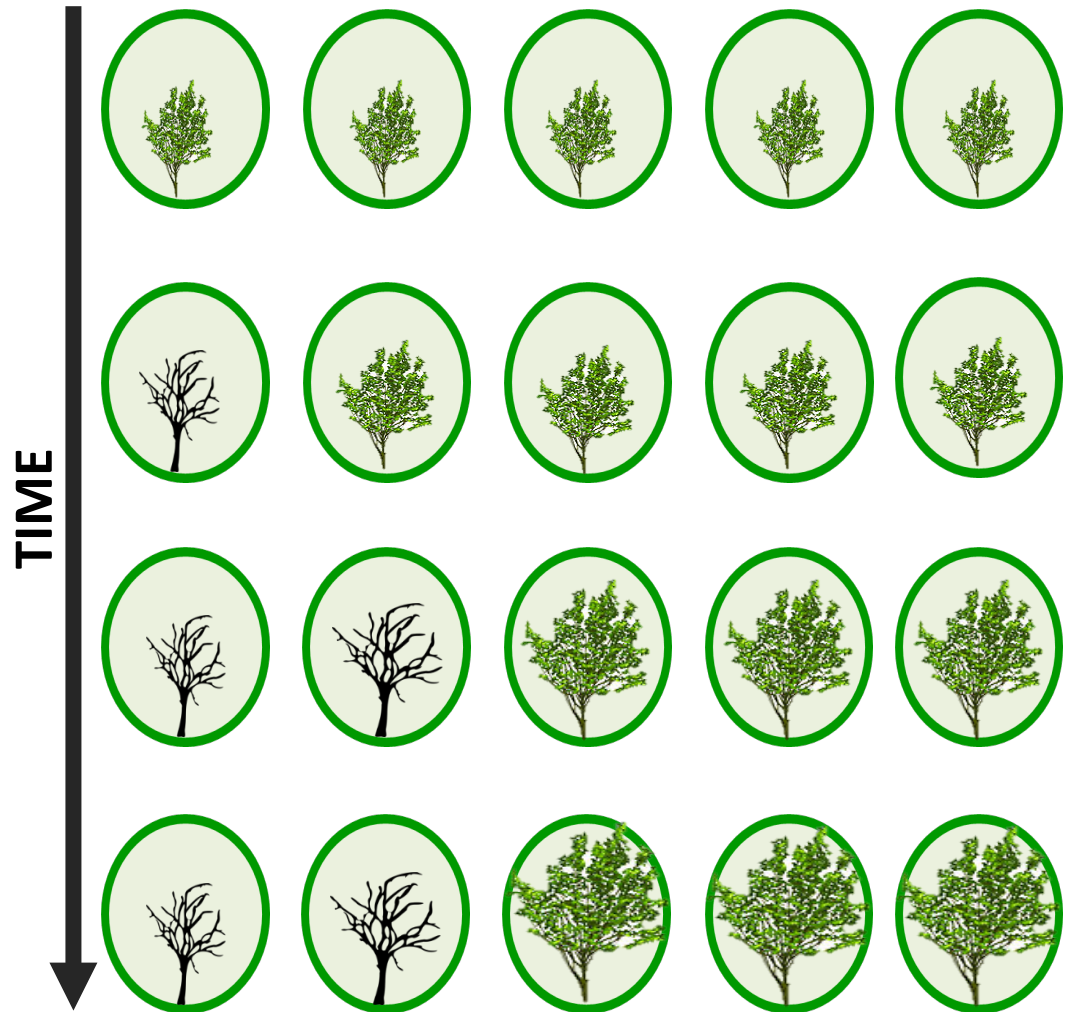
Replanting Survivorship



The benefits of tree planting programs accrue over the years as trees mature.

Planting benefits dependent upon tree mortality and growth rate.

Benefits are maximized when more trees reach maturity.



Mixed Methods

Tree Replanting Assessment

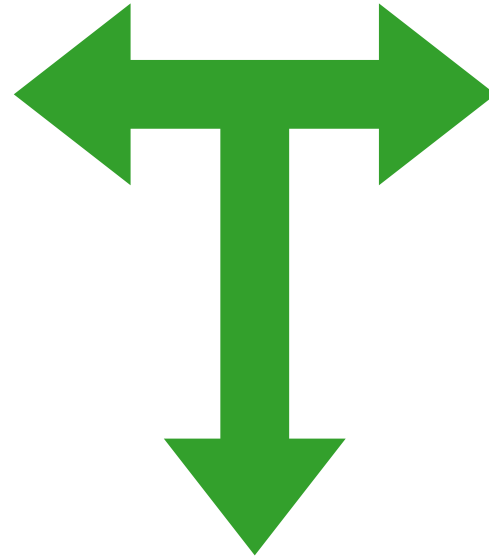
Tree-size metrics

Maps

Resident Experience Assessment

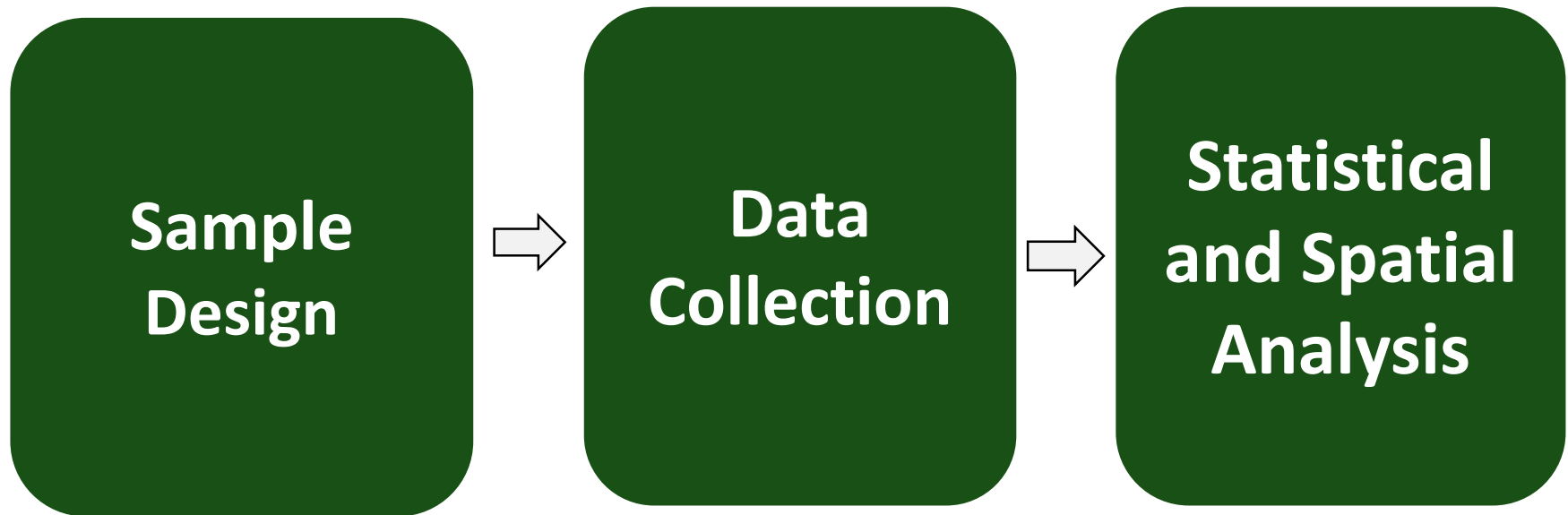
Surveys

Interviews

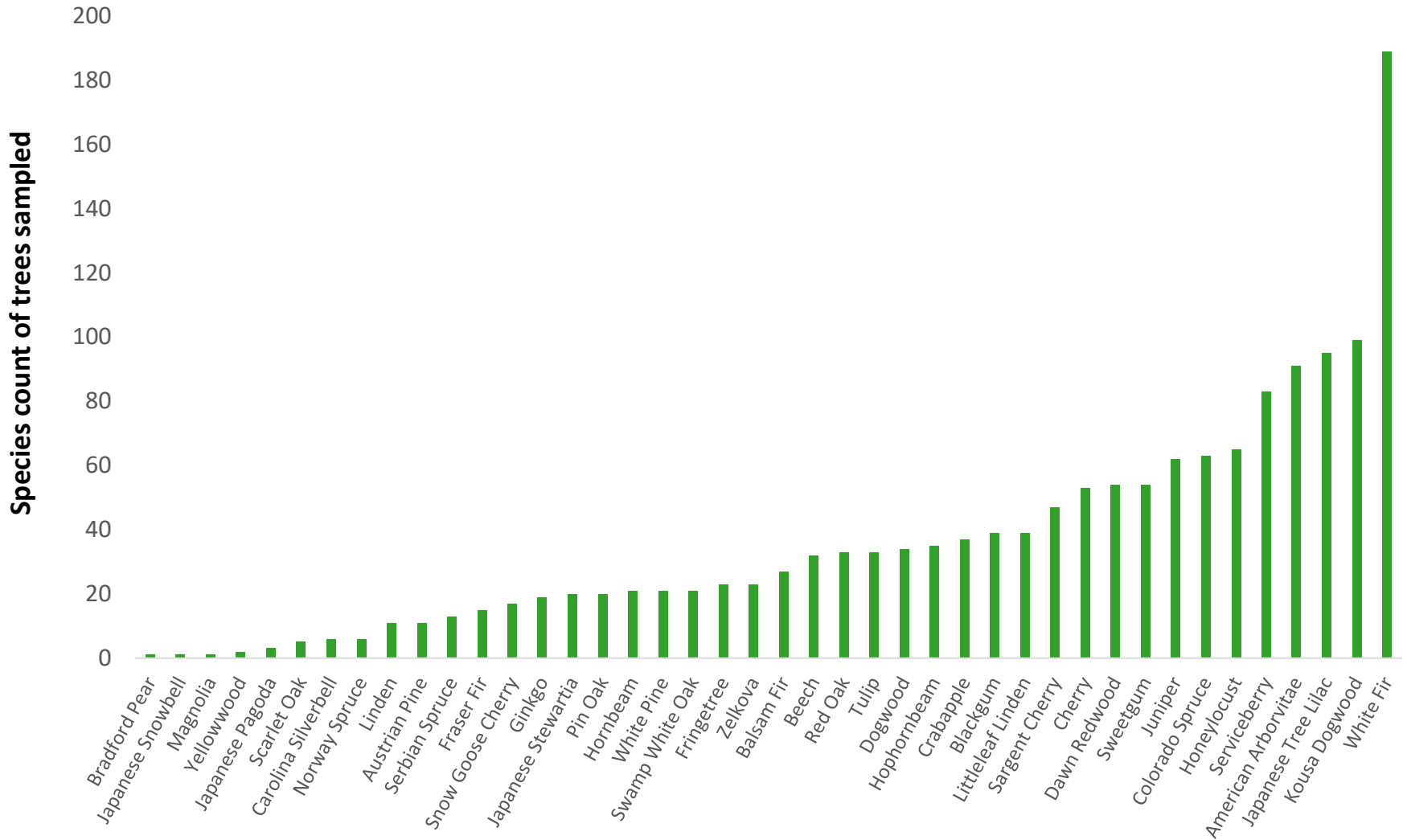


Mixed Methods Study

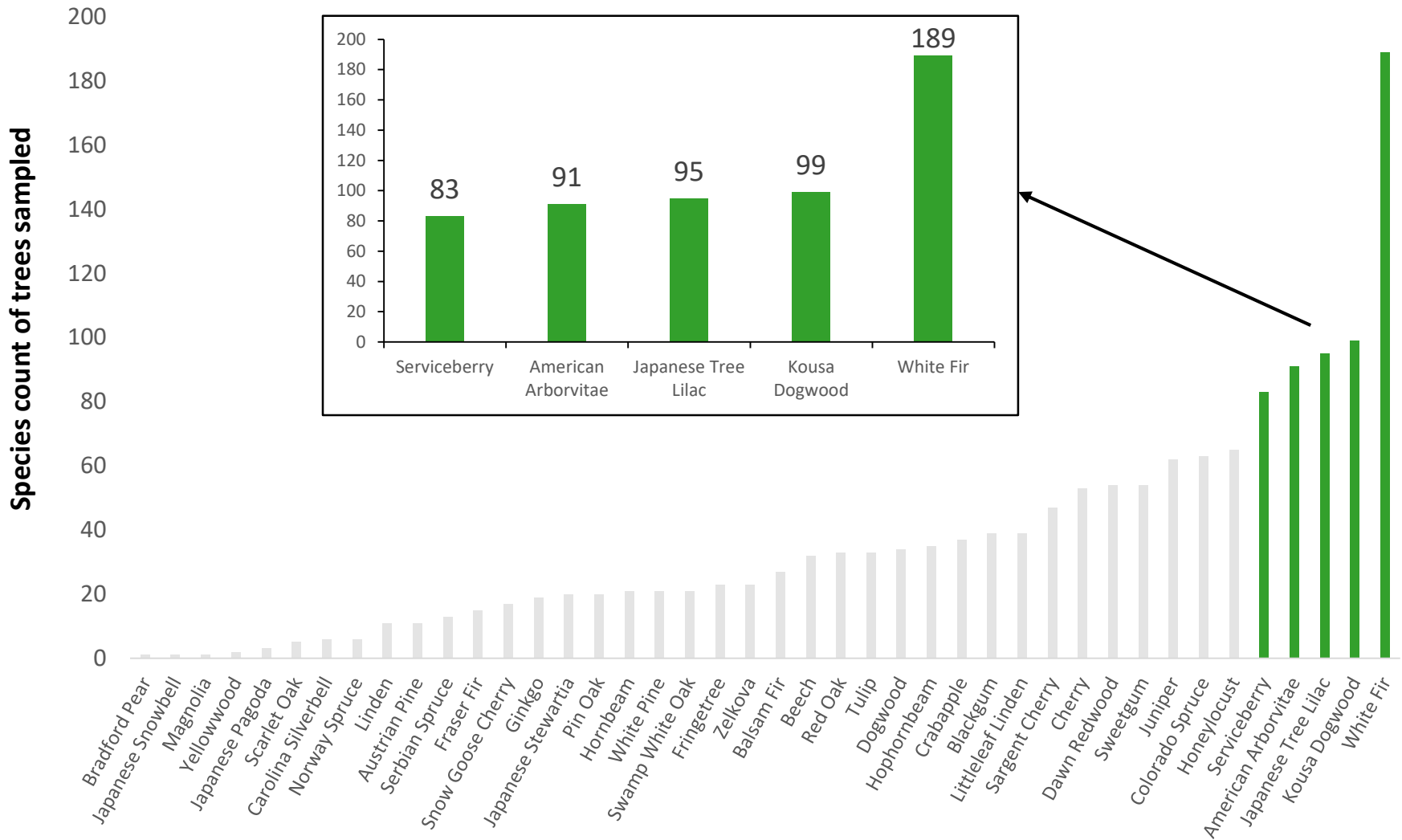
How did we choose our trees?



Species Count

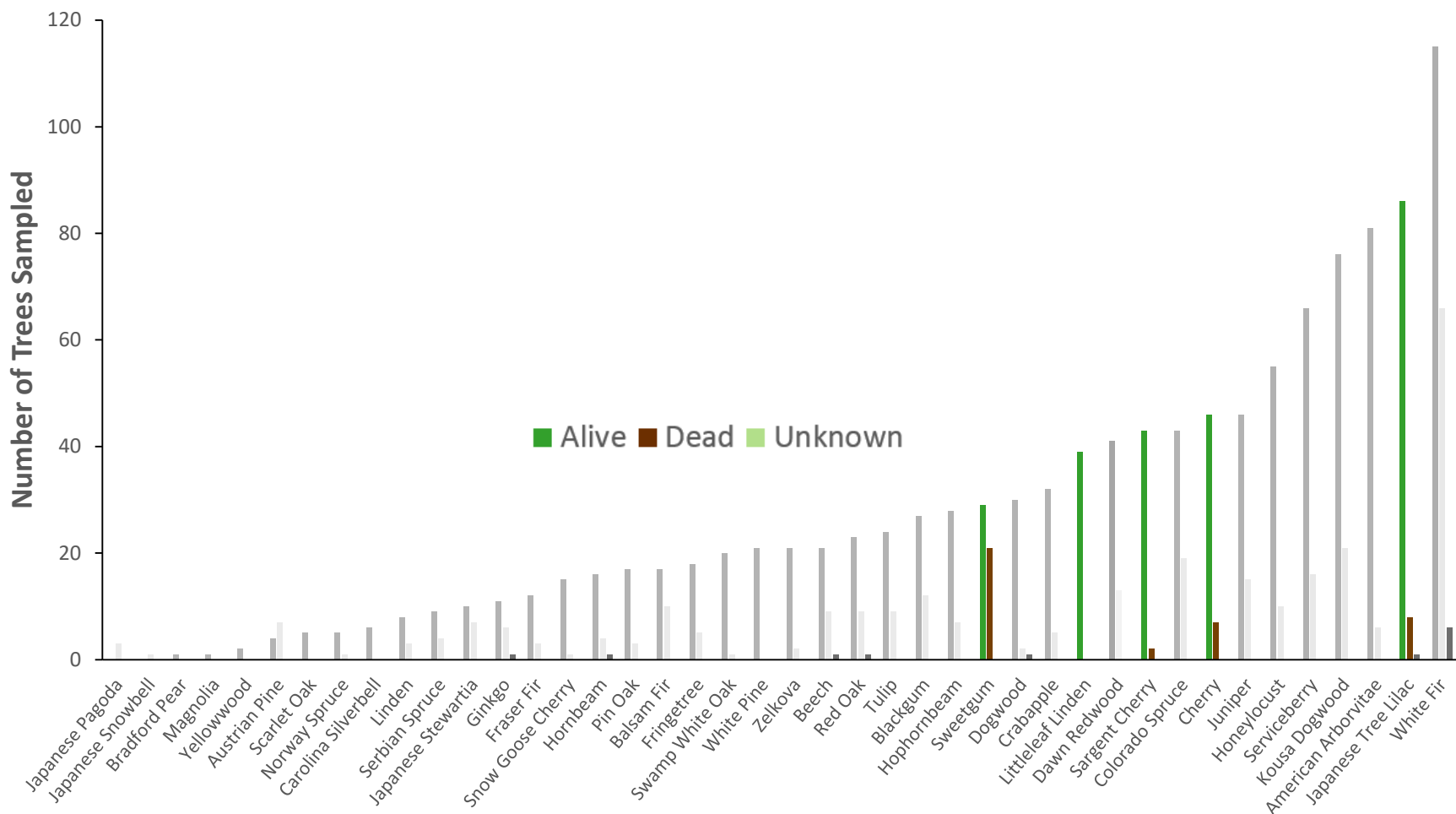


Species Count





Survivorship Status by Species

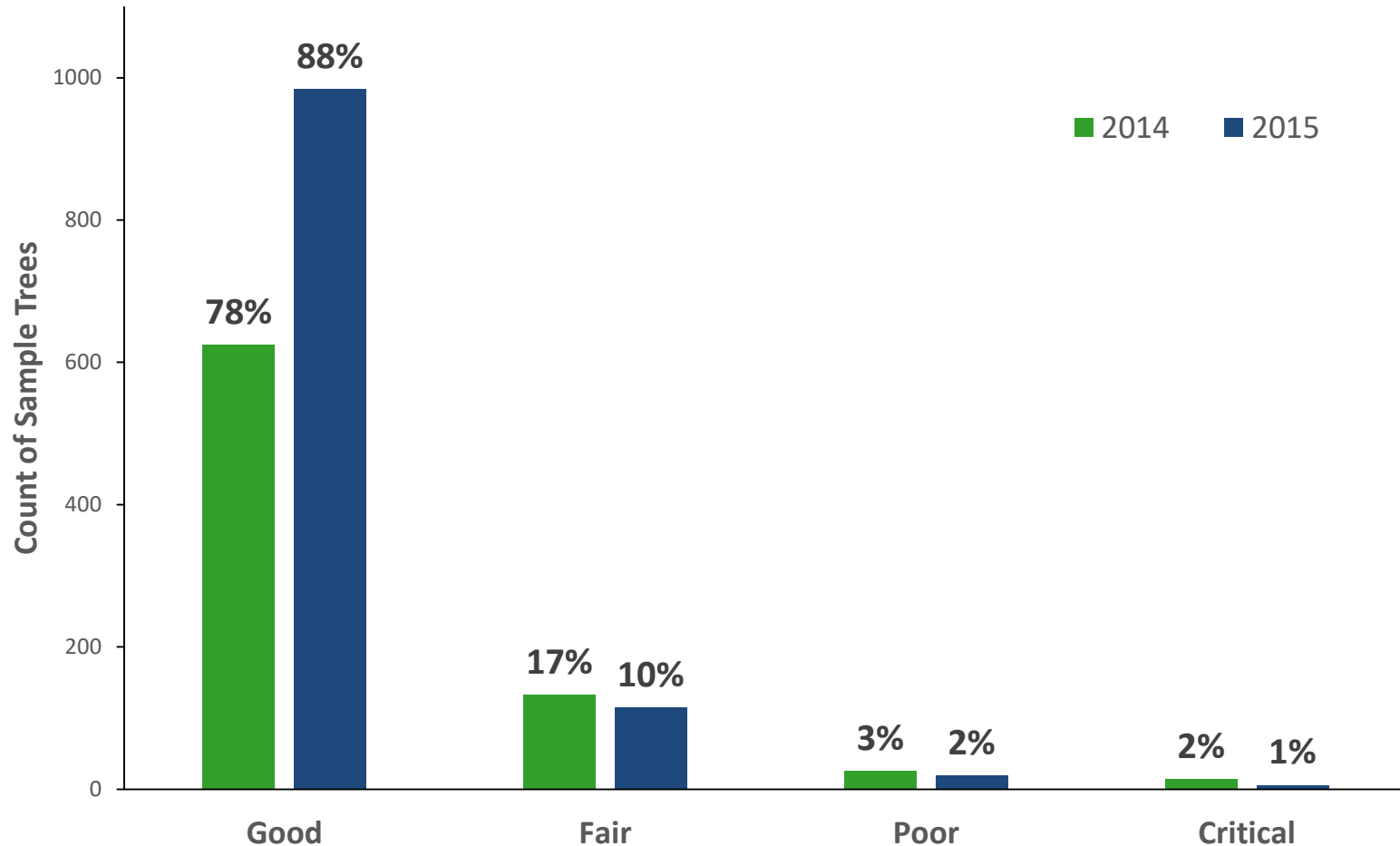


Investigating Survivorship

1. Native vs. Non-Native
2. Shade vs. Ornamental
3. Site Type
4. Land Use
5. Planting Season



Count of Tree Condition in 2014 and 2015



Condition of Re-surveyed Trees in 2015

