PRIVATE TREE MANAGEMENT IN BLOOMINGTON IN: INITIAL RESULTS OF PRIVATE PARCEL INVENTORIES

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THE PROBLEM...

- Urban trees produce public benefits but private-property parcels contain most urban trees (Clark *et al.*, 1997)

- Few incentives exist for private individuals to produce public benefits, although incentives can be created by cultural norms and public/private policies (Ostrom, 2005)

What do we know about private parcel structure and what incentivizes sustainable management?

RESEARCH QUESTIONS:

- **What is the structure of the privately-owned portion of the urban forest?**

- What factors motivate individual households to manage their urban trees?

  - What role do neighborhood and home-owner associations play in incentivizing sustainable management of private urban forests?

FRAMEWORK – URBAN FORESTS ARE SOCIAL-ECOLOGICAL SYSTEMS (SESS)

Sustainable UFM* Framework Clark et al. (1997)	SES Framework Ostrom (2009)
Vegetative resource	Resource system and resource units
Community	Users
Resource Management	Governance system (*institutions*)

Draw from theory the variables of importance for sustainable resource management

*Urban Forest Management
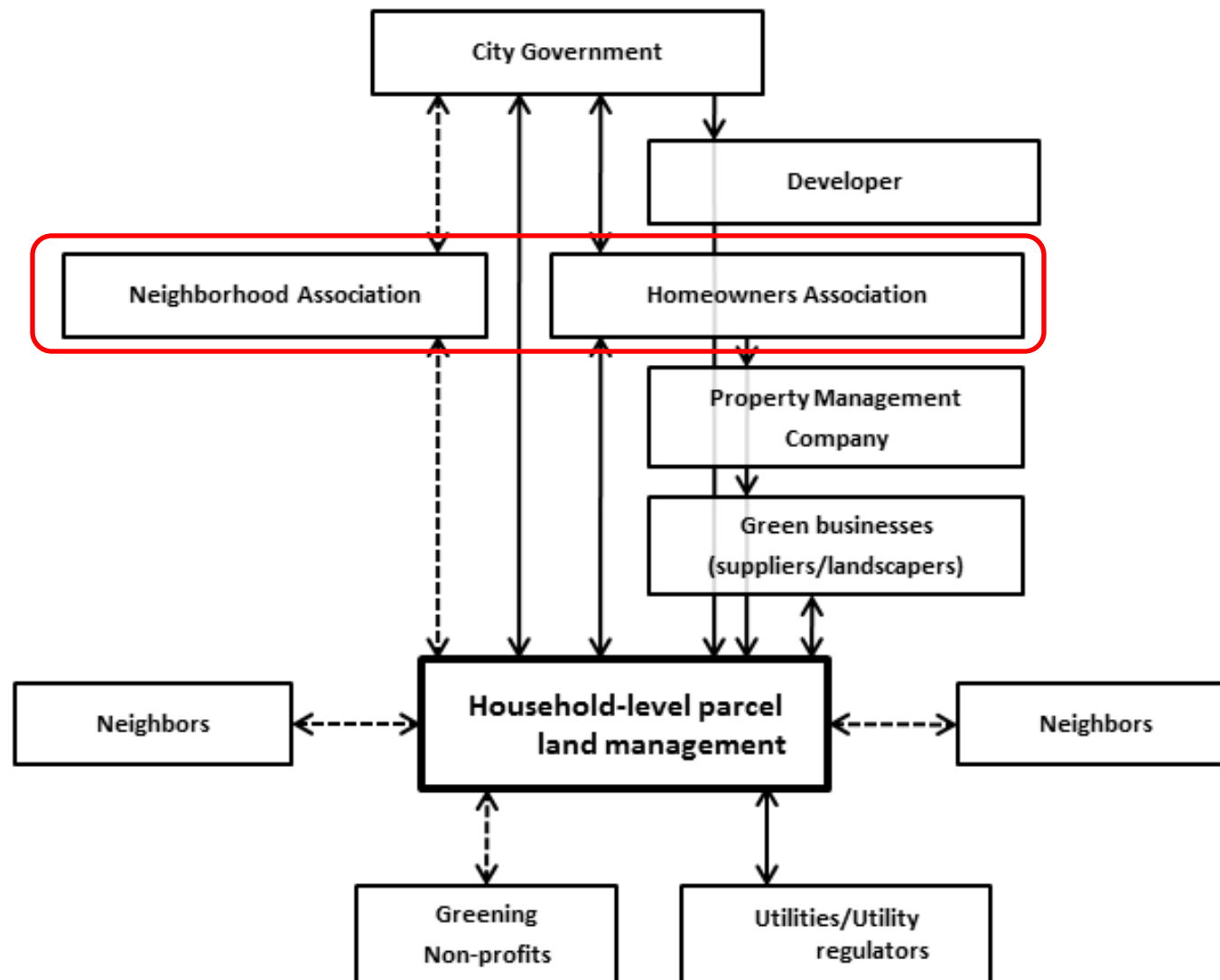
(From Mincey et al., 2012)

METHODS

- Stratified random sample:
  - Type of association
    - *Home-owners (HOA)*
      - Private Incorporation
      - Mandated participation/fees
      - By-laws and rules
    - *Neighborhood (NA)*
      - City-supported
      - Voluntary participation/fees
      - By-laws and norms
  - Age of development
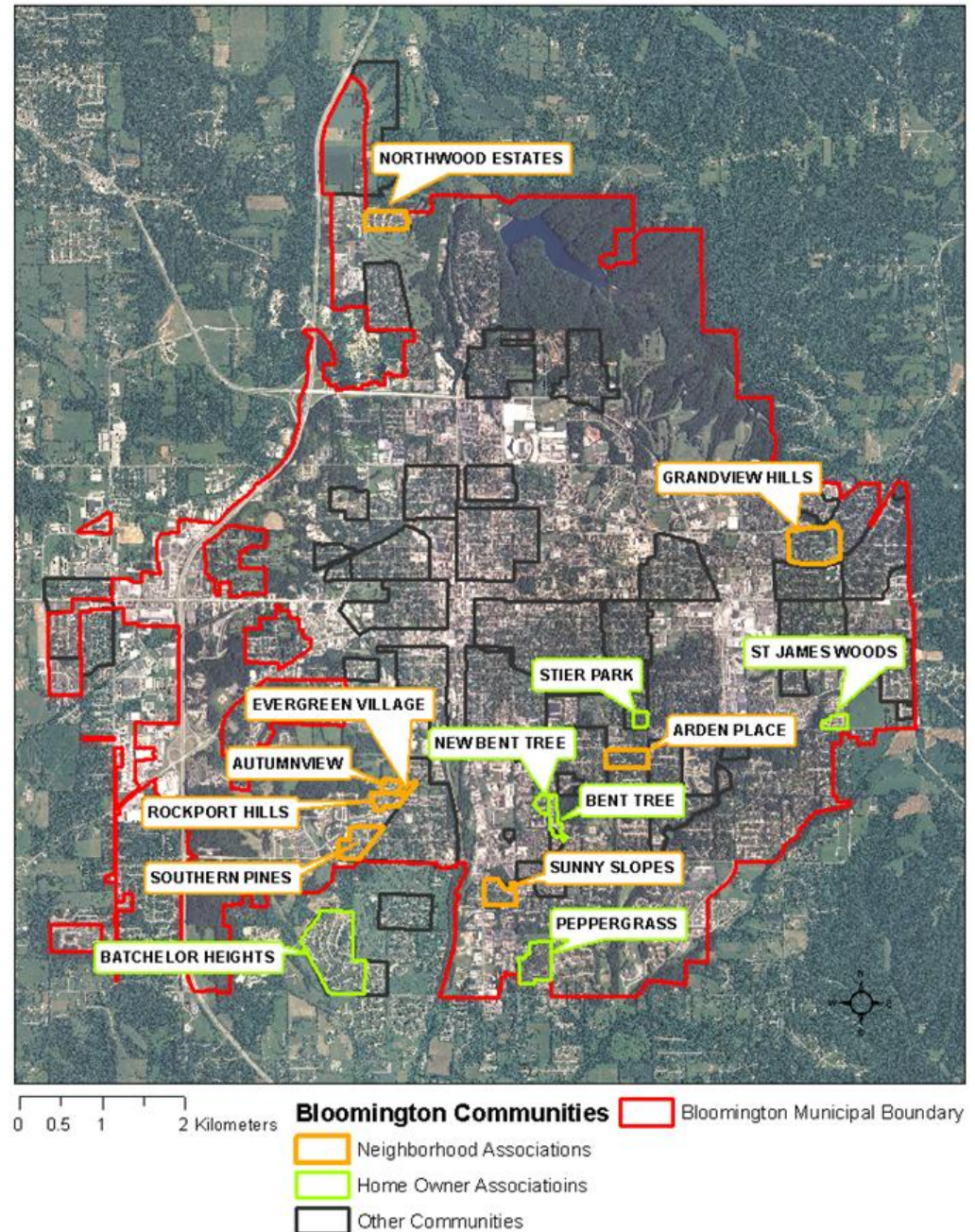   - *New vs. Old*
  - Size of community
    - *Big vs. Small*

	New (>1975)	Old (<1975)
Big (>85 parcels)	HOAs NAs	HOAs NAs
Small (<85 parcels)	HOAs NAs	HOAs NAs

METHODS

Controls on stratified random sample:

- Within City limits (or planning jurisdiction)

- Avoid core of city with development turnover

- Balanced number of parcel in any given combination of characteristics

METHODS

- Mailed household surveys to all parcels within our associations

- Asked about
  - Tree and land management of the property
  - Association norms and rules
  - Socio-demographic information
  - If we could inventory their property

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**A Survey of Urban Land Management
in Bloomington, Indiana**
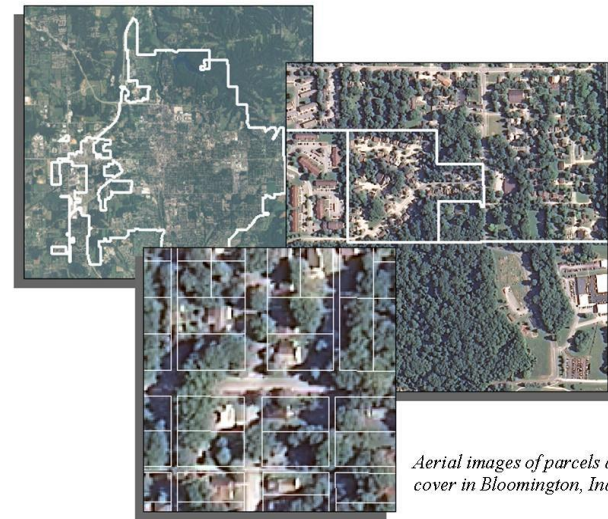
*Aerial images of parcels and tree cover in Bloomington, Indiana*

The following is a survey about land management and trees in the City of Bloomington. We would greatly appreciate your participation in this survey.

The confidentiality of all respondents will be maintained in this research.

We will produce a summary of our findings; if you would like a copy, please note this at the end of the survey.

METHODS

- Tree inventories on sample residential parcels and their associated PROW tree lawns

- Soil samples on same residential parcels
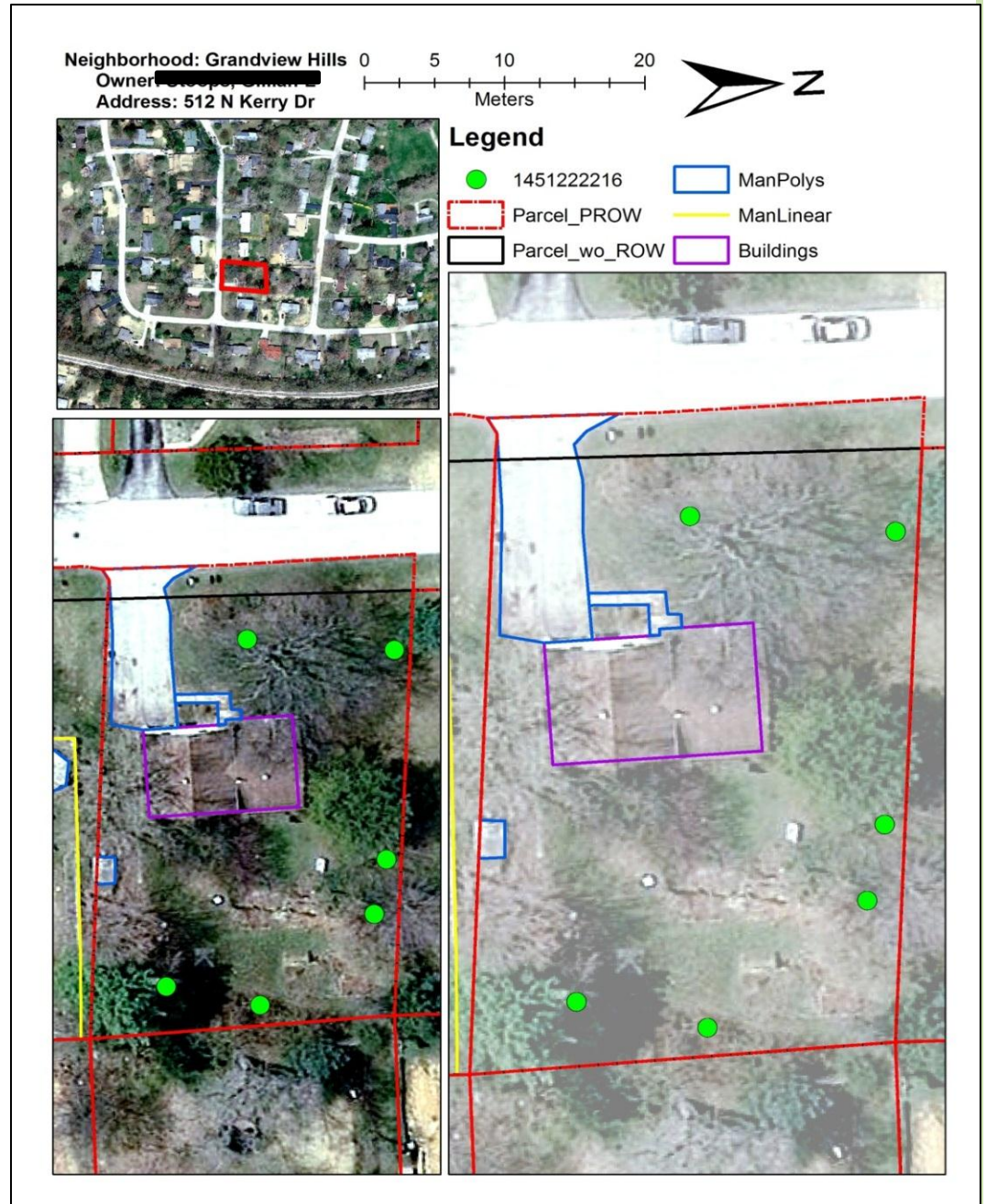
Preliminary Results - Descriptive Statistics

- 106 parcels inventoried
- 2021 trees inventoried
- Average no. of trees / parcel
  - Average privately owned = 17.6
  - Average publically owned = 1.13
- Average no. of tree species / parcel = 7.56
- Average DBH = 19.96cm (large) / 7.76cm (small)
- Average condition = 3.48 (large) / 3.64 (small)
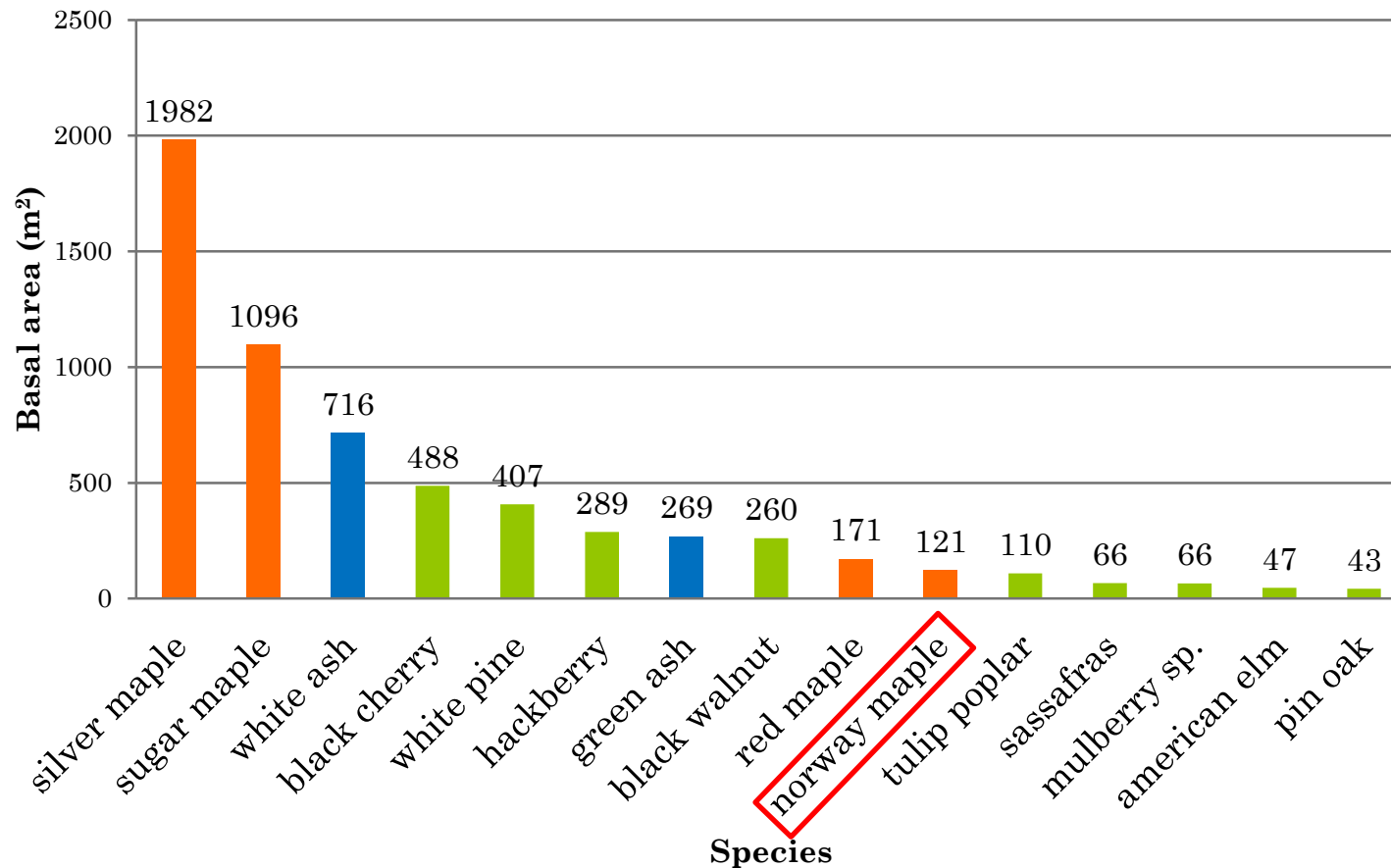- Maintenance on 42% of the trees

PRELIMINARY RESULTS – SPECIES DISTRIBUTION (ABUNDANCE)
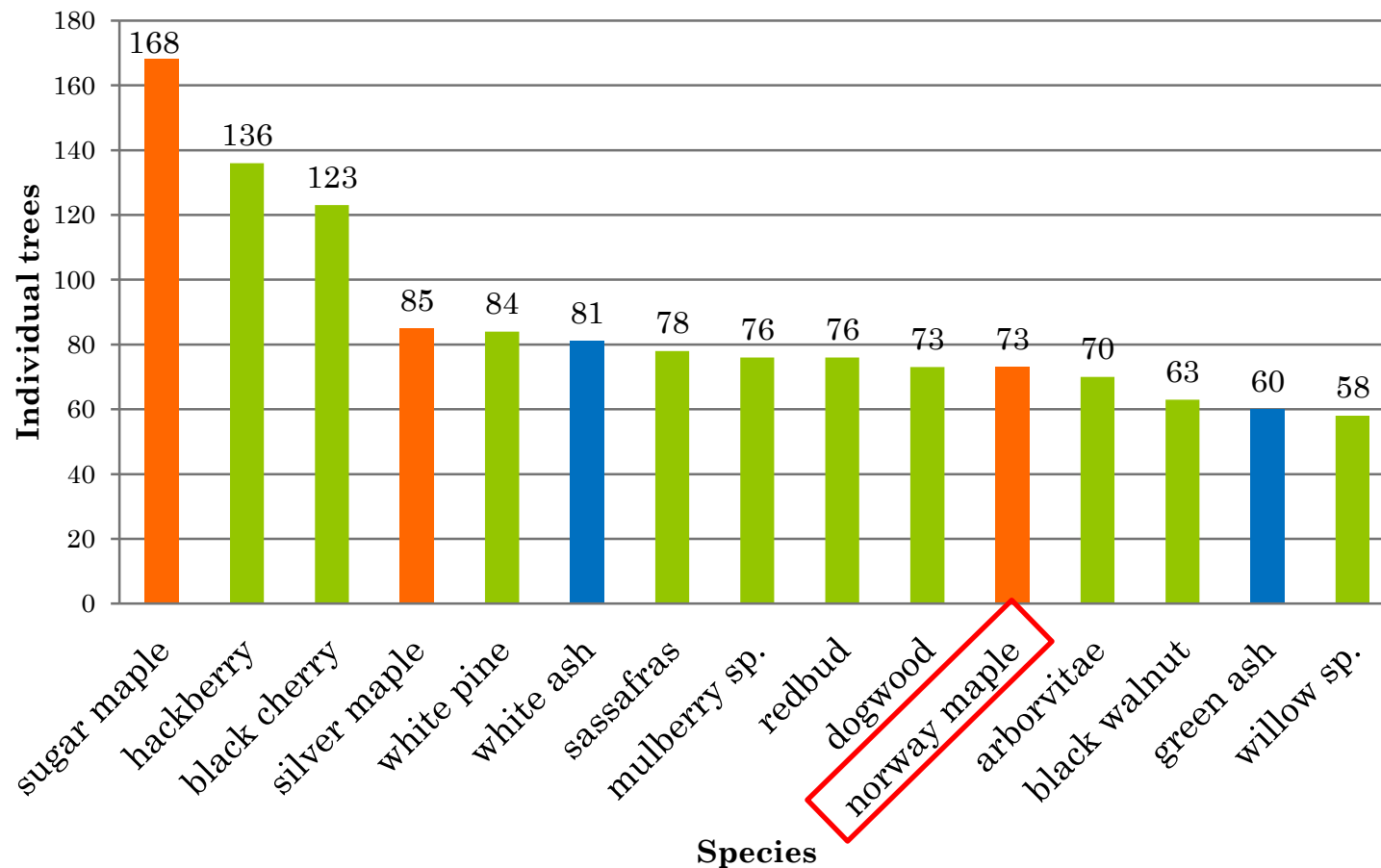
Top 15 most abundant species
(orange = *Acer*, blue = *Fraxinus*, red box = invasive).
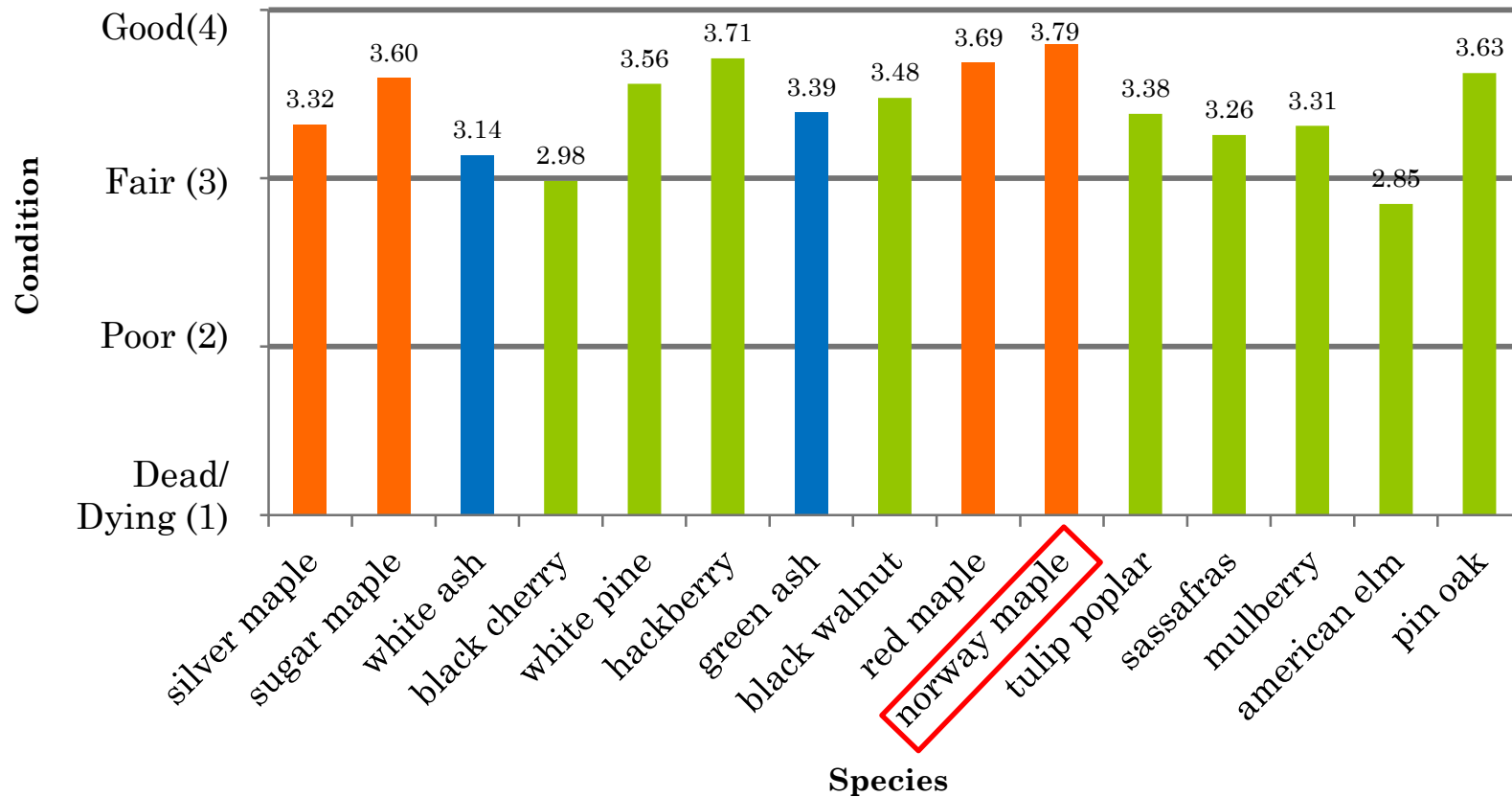
PRELIMINARY RESULTS – SPECIES DOMINANCE (BASAL AREA)

Top 15 most dominant species
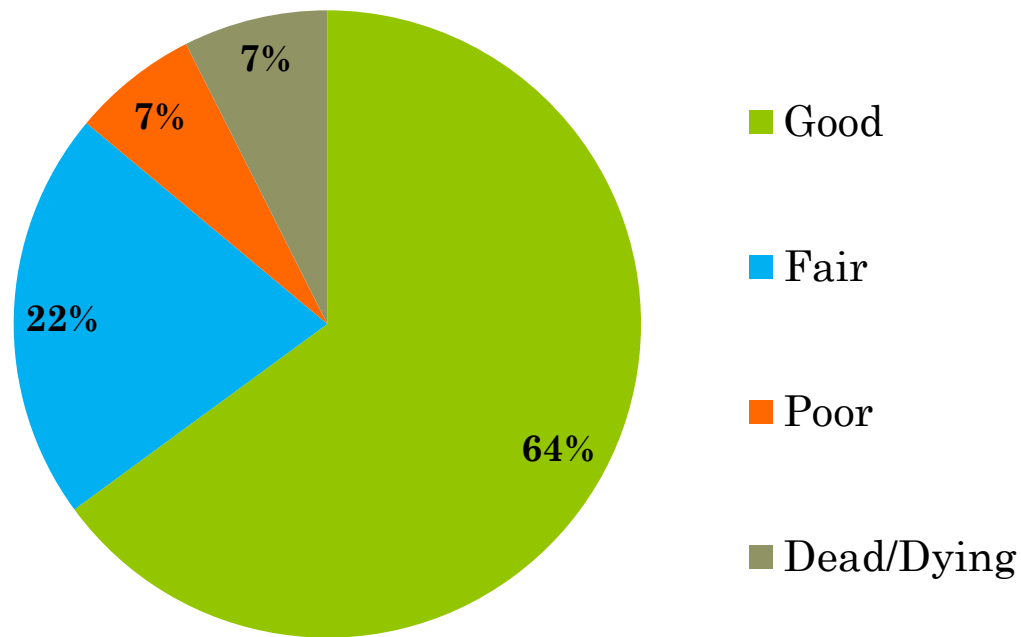(orange = *Acer*, blue = *Fraxinus*, red box = invasive).

PRELIMINARY RESULTS – CONDITION OF DOMINANT SPECIES

Condition of top 15 most dominant species (orange = *Acer*, blue = *Fraxinus*, red box = invasive).
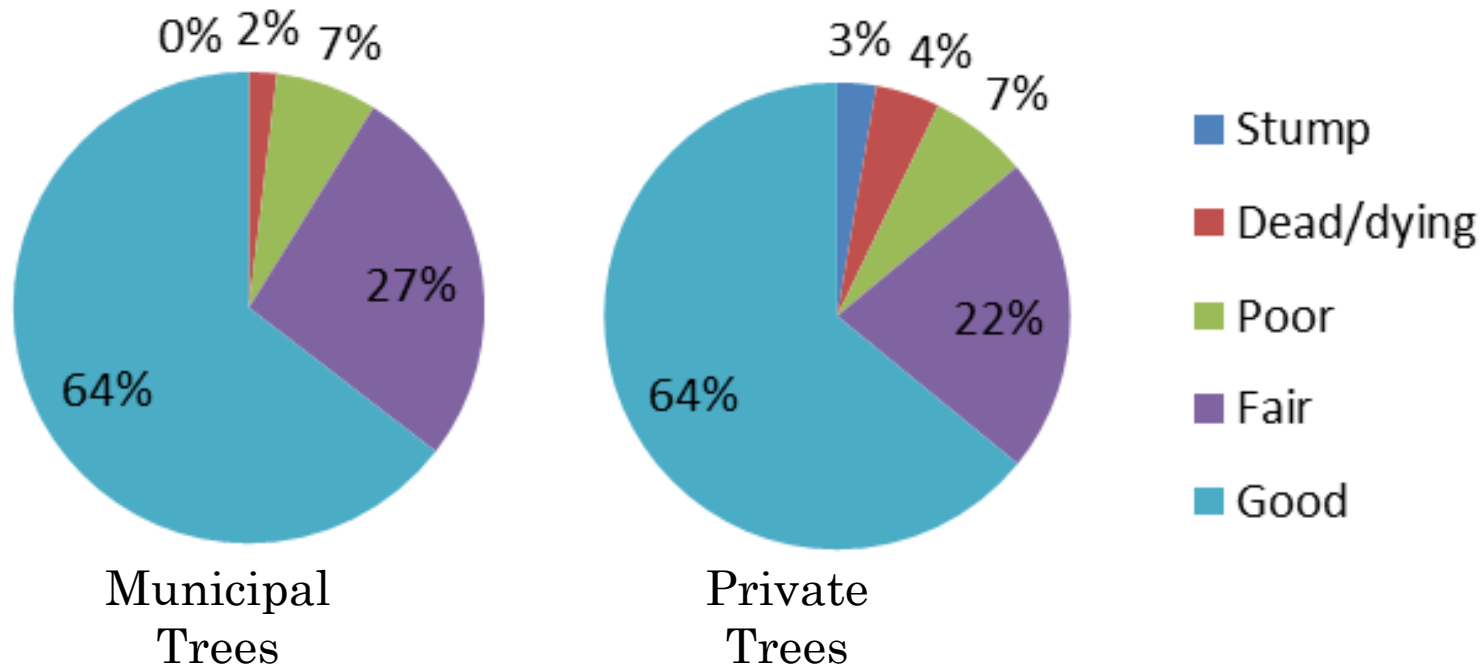
PRELIMINARY RESULTS – OVERALL TREE CONDITION

Pie chart legend:
- Good — 64%
- Fair — 22%
- Poor — 7%
- Dead/Dying — 7%

Decade of association's housing development correlated with parcels' average tree condition. In newer developments, a parcel's average tree condition was significantly better.

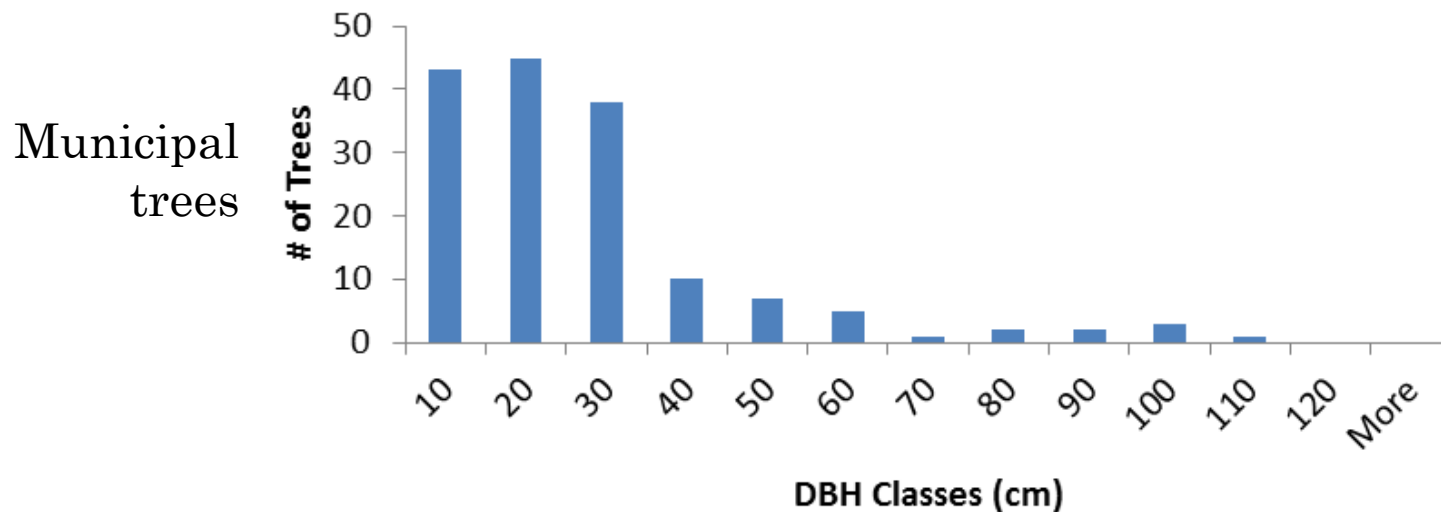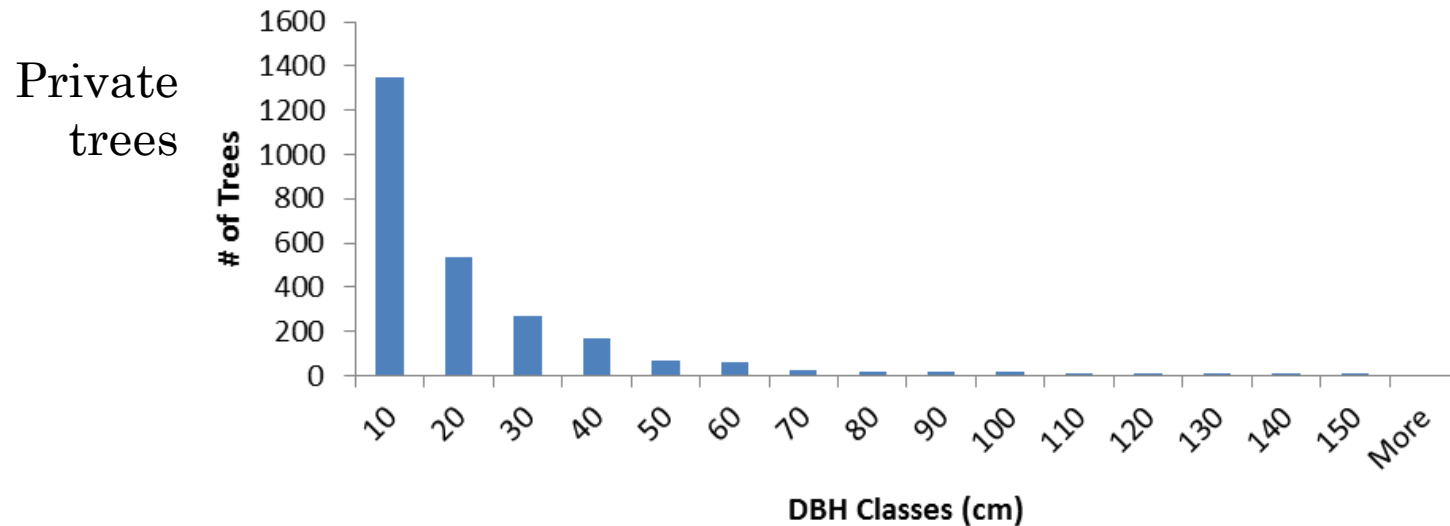# PRELIMINARY RESULTS – MUNICIPAL VS. PRIVATE TREE CONDITION

Municipal Trees

Private Trees

Very similar conditions but municipal property had:
- No stumps
- Fewer dead/dying trees

PRELIMINARY RESULTS –
SIZE DISTRIBUTION – MUNICIPAL VS. PRIVATE

Private trees

Municipal trees

Preliminary Results – Overall Invasive Tree Species Distribution

Pie chart: Norway Maple, 72; Callery Pear, 31; Black Locust, 20; Russian Olive, 20; Siberian Elm, 20; Tree of Heaven, 4
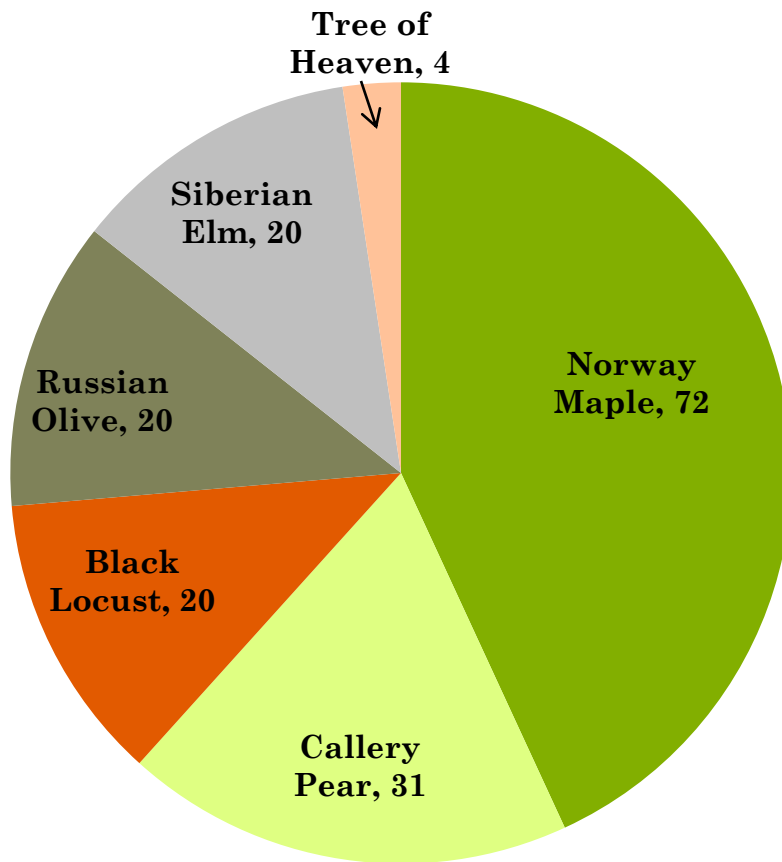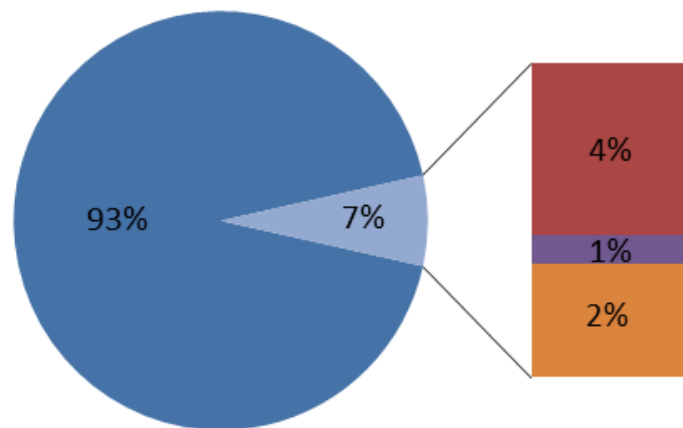
- 6 species identified
- 8.2% trees in inventory
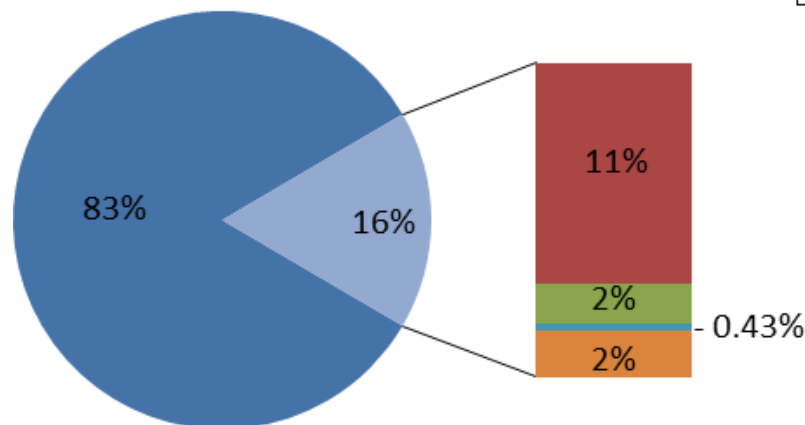- 35.8% parcels with ≥1 invasive tree

- The more trees on a parcel, the more invasive trees present

- The more trees "maintained" on a parcel, the fewer invasive trees present

PRELIMINARY RESULTS - TREE CONFLICTS


MUNICIPALLY OWNED

PRIVATELY OWNED

Legend:
- No conflict
- Utility
- Building
- Sidewalk
- Fence
- Road

- More conflicts for private trees than public trees, particularly with utilities.

- Parcels in older developments were more likely to have at least one tree with a conflict.

- Parcels with tree conflicts were more likely to have poorer average tree condition.

PRELIMINARY RESULTS – TREE MAINTENANCE
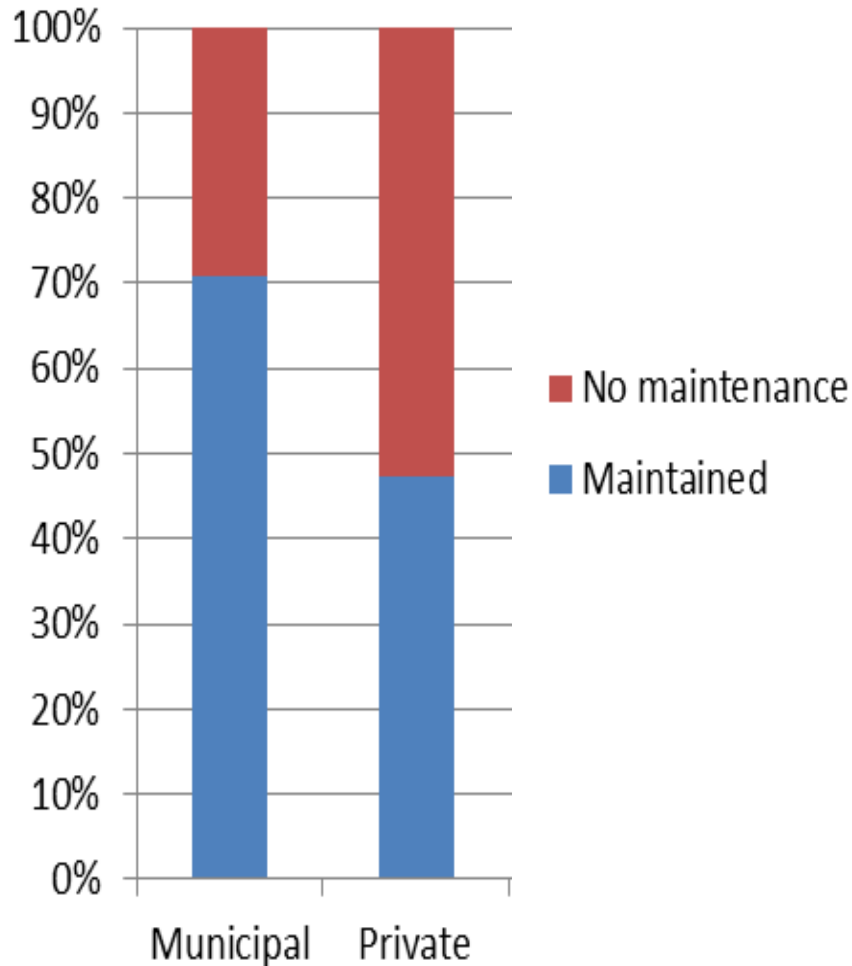
- Overall, less maintenance on private trees vs. public trees

  - The fewer trees on a parcel, the higher the proportion of trees "maintained"

  - The higher the proportion of trees "maintained" on a parcel the better the average tree condition

Preliminary Results – Age of Development

The older a parcel's development age:
- The more trees and the more species on a parcel
- The larger the average DBH and the higher the sum basal area per parcel. This levels off for neighborhoods developed in the 60s and 70s (likely older trees will have been removed).
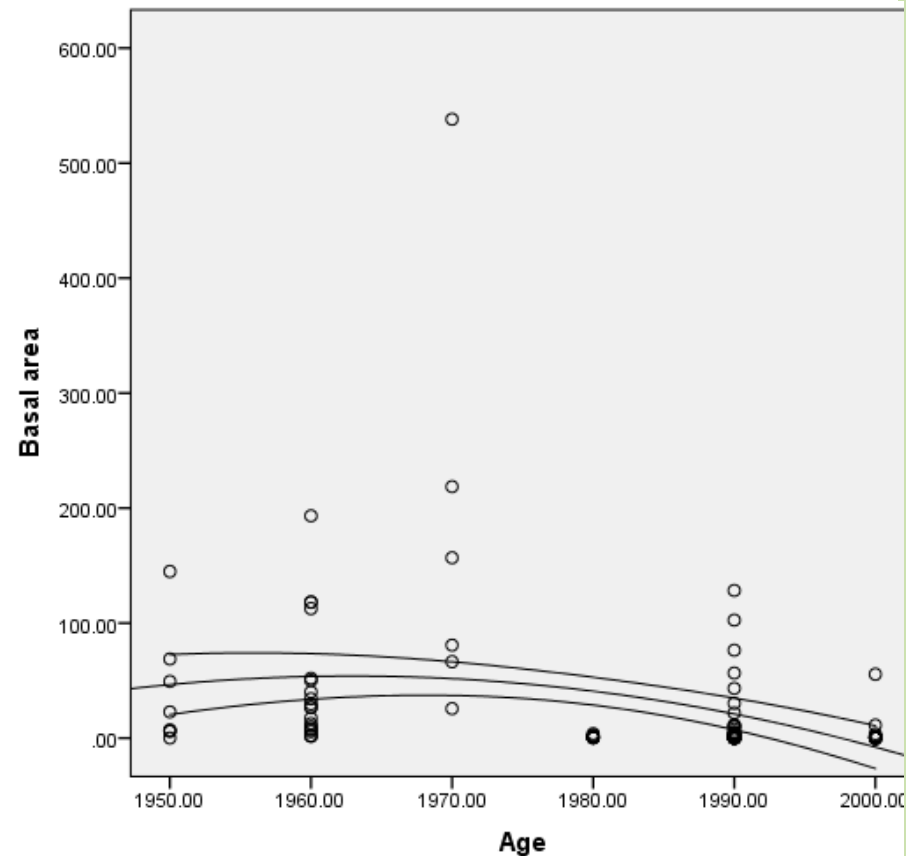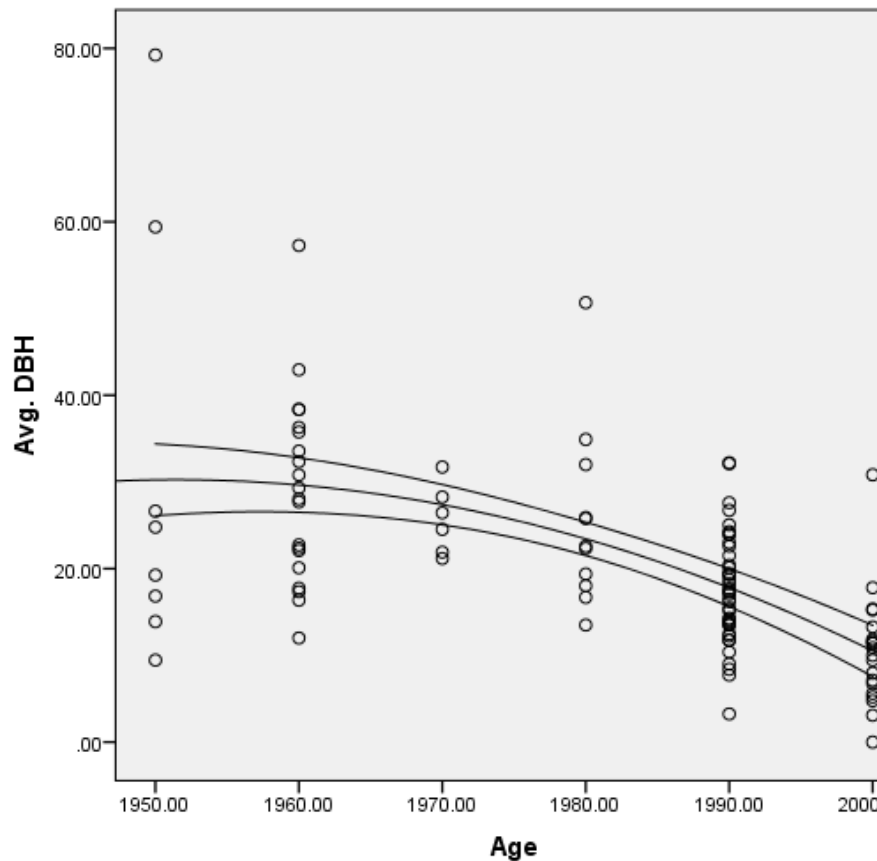
FUTURE GOALS

- Results to be sent to landowners
- Comparing soil carbon with urban forest structure and carbon content
- Analysis of survey data
- Linking survey data with inventory results to understand relationships between:
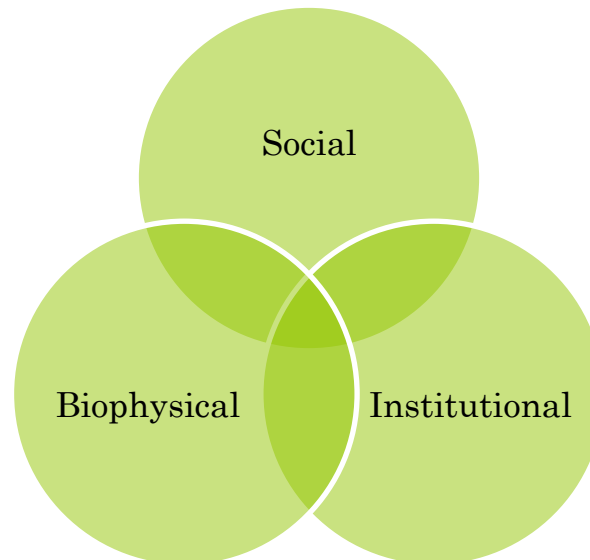
Resources

- Ostrom E (2005) Understanding Institutional Diversity. Princeton University Press, Princeton, NJ

- Clark JR, Matheny N, Cross G, and Wake V (1997) A model of urban forest sustainability. J of Arboric 23(1):17–30